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REPOSITORY ON INTERNET & SOCIETY

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Module 1: History of the Internet

Unit1: History of the Internet: Building Conceptual Frameworks

Introduction: Understanding the Internet

Let's begin at the beginning. Before we get into the history of the Internet, it might be a good thing to try and figure out what the internet is and what exactly are we talking about when we say 'internet'. Let's take a moment and figure out what the internet is. If you pause right now, and try and define the internet it is going to be tricky. However, if you look at other media and communication technologies you realise that the same is true for all the other technologies that you daily deal with. Try and define what a book is, or, what is a film? It is one of the signs that technology has become internal, personal and ubiquitous that it becomes transparent. It doesn't require us to think about how it works. Almost like magic, the technologies just ease our way into life and perform crucial tasks of everyday living, without really making their internal mechanics transparent. So it is highly possible that unless you are trained in technologies, you have a vague idea of what the internet is and how it works.

At a very basic level, the internet is a network of computers that are able to talk to each other using a protocol that is popularly known as the TCP/IP suite. That is it. At a most cursory level, that is all there is to the internet. Internet is an extensive network – even a network of network – that makes it possible for billions of users across the globe, to exchange information using digital data, in asynchronous and distributed forms. And this has been historically the case. The origins of the internet are found in military and state funded research in the United States of America in 1960s, where they were developing robust communication networks that could account for redundancy – which is to say that they wanted a network which would function even when particular nodes fell out of service, or certain flow-lines within the network were blocked. A history of the internet then will be a history of its technological development — the different protocols, programmes and innovations that allowed for this network to grow out of the defense research labs in the 1960s, be used extensively in American and European academia in the 1980s and then made available to the public in the 1990s. So that is one history that we might need to look at. It is a technological history of the internet that allows us to understand what the challenges, strengths, weaknesses and vulnerabilities of internet technologies have been and how we have constantly innovated to meet these problems and aspirations.

However, as you can imagine, that it is a technical history of technology which is documented, well, on the Internet. A look at the page on Wikipedia[1] will show you all the different technological, institutional and digital innovations that have shaped the internet from its early days residing on the ARPANET to the global phenomenon that we know now. It is a history of facts and dates, names and numbers and it is easily accessible to anybody who wants to look at the different institutions, technologies and conversations shaped what we understand as the

1. Wikipedia "History of the Internet",http://en.wikipedia.org/wiki/History_of_the_Internet, *Wikimedia Foundation*, last accessed on January 23, 2014.

Internet today. You might also want to look at these three different accounts of that history to get the facts,[2]anecdotes[3] and stories[4] in order.

You will realise from the sources that the internet is the backbone of our digital experience. It hosts a vast range of services, like peer-to-peer networks, voice and text chats, hypertext documents, and indeed, the most prominent of them all — the World Wide Web (WWW).We need to understand that the internet is thus larger than WWW and what we have access to, using the WWW, is a very small subset of this larger global digital network. To know the structure of the internet, how it is governed, what are the different inequities, vulnerabilities and problems it creates are important to study because they give us an entry point into understanding how the technological and technical choices that are made affect and impact our everyday concerns around questions of privacy, identity, access, usage, affordability, accessibility, etc. These are questions that often get addressed under the rubric of Internet Governance[5] and will be dealt with in the subsequent sessions for this Institute that expand upon the infrastructure and institutions that govern the internet[6]. In the meantime, I want to begin with the personal. Instead of beginning with the technological, I want to begin with our everyday experiences on the internet, and particularly of this thing that we call cyberspace.

Pinning Down Cyberspace

Let's take a pause and try and answer a hard question: What is Cyberspace? If you thought that defining the internet was tough, you will quickly realise that defining cyberspace is going to be even tougher. We know when we are on cyberspace. We use it across a variety of devices and interfaces. We think of ourselves as connected and online for most of our waking (and sleeping) hours. Cyberspace is right there —you will be able to point to it, give examples, and even talk about what it facilitates. For example, cyberspace is a virtual space created by digital communication and connection,or cyberspace is a repository of information that people create globally using computing technologies,or cyberspace is a space where people manage their social networks. These are all different instances of cyberspace and indicate the wide variety of things that we do when we are online, but they don't necessarily tell us what cyberspace is.Like all good things, the origins of the word cyberspace are found in science fiction. William Gibson in his iconic cyberpunk novel 'NeuroMancer' (1984) first coined the word cyberspace and defined it thus:

> Cyberspace: A consensual hallucination experienced daily by billions of legitimate operatorsin every nation, by children being taught mathematical concepts... A graphic representation of data abstracted from the banks of every computer in the human system.

2. Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts and Stephen Wolff, "A Brief History of the Internet", *Computer Communication Review*, available at http:\www.sigcomm.org\sites\default\files\ccr\papers\2009\October\1629607-1629613.pdf, last accessed on January 23, 2014.
3. Walt Howe, "A Brief History of the Internet", available at http://www.walthowe.com/navnet/history.html, last accessed on January 26, 2014.
4. Brief History of the Internet, *Internet Society*, available at http:\www.internetsociety.org\internet\what-internet\history-internet\brief-history-internet, last accessed on January 23, 2014.
5. Wiki Books "Governing the Internet / Introduction to Internet Governance", available at http://en.wikibooks.org/wiki/Governing_the_Internet/Introduction_to_Internet_Governance, last accessed on January 23, 2014.
6. Recommended reading: Lee A. Bygrave and John Bing (eds.) " Internet Governance: Infrastructure and Institutions" Oxford University Press, available at http://ukcatalogue.oup.com/product/9780199561131.do, last accessed on January 26, 2014.

> Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding.

While there are several critiques of Gibson's description of the word, we must remember that it is fiction and look at it to see what are the conceptual complexities that Gibson is throwing up that are now being discussed in contemporary debates. I want to highlight three things that Gibson's definition brings up, which might be important to understand how deal and engage with cyberspace.

1. *Consensual hallucination* – This is probably one of the strongest and the strangest ways of talking about cyberspace. A hallucination is something that happens in your head. It is a space of virtuality. It is an event that nobody except for the one individual who claims it, can verify. It is thus, categorically the non-real. However, a consensual hallucination is a mystifying thing.

   Let's say that you propose that from this moment on, you are a dog (even though, as the cartoon famously says, on the internet nobody knows you are a dog). If you were to stand up in your social circles and announce that you are a dog, it would lead to some strange reactions. If you persisted in acting like a dog and responding only to a dog, chances are that you might be put into a mental asylum to be treated of this hallucination. However, if everybody else in the room consented that you are a dog, and indeed, they are all, also dogs, then your hallucination becomes real. It gains valence. It has legitimacy. It becomes a norm.

   Gibson, in positing cyberspace as a 'consensual hallucination' is reminding us that this is indeed, the very way in which our reality is constructed. For instance, think of the colour blue. Now try and figure out how the blue that you are thinking about and the blue that I am thinking about is the same blue. We can't verify that we are all talking about the same blue. And yet, there is a consensus among us that there is ablueness to the colour blue that we all refer to when we think of the colour blue.

   Reality is a process of consensual hallucination. So is Cyberspace. Which mean that instead of making the distinction between the real and the virtual, or trying to figure out what is real and what is not, it is more fruitful for us to engage with the idea that the virtual is a part of the real. There are various processes – social, cultural, political, economic, and governmental – that structure and validate our reality. And hence, reality is always changing. The science fiction futures that were dreamt in the last century are the present times that we live in. The idea of consensual hallucination, takes us away from a debate about Virtual Reality and Real Life (VR – RL) that has been endemic to the conversations around cyberspace. Following Gibson's lead I would encourage us, not to think of cyberspace in terms of the virtual or the unreal, but as a constitutive and generative part of our reality.

2. *A graphic representation of abstracted data:* The use of the term 'space' is often bewildering in Gibson's coinage because it does not really seem to appear in the definition. Space, as we understand it, is a location metaphor. It refers to spatial dimensions of a thing. It gives us a sense of fixity. However, these are all expectations of physical space. The 'space' in cyberspace has more in common with the abstract concepts of space in mathematics and metaphors rather than in terms of geography and location.

We need to understand that even in geographical terms, space is an abstraction of sorts. Space is the virtual or perceived usage, volume and experience of place. If you have a piece of land, that is the place of that land. The place is geographically present. It can be materially touched and located. However, the space is what you attribute to that piece of land. It is defined by the intentions and aspirations, by what is allowed and what is not. Space is a philosophical concept. Which is why, in everyday talk, when you say, 'I need some space', you don't necessarily mean that you need geographical isolation, but often refers to the head-space that is less tangible.

Similarly, the space in Cyberspace, even though it has been often used to talk about the space on the network that connects different webpages, or the immersive environments that role playing games offer, or the virtual communities on social networking sites like Facebook, it is important to remember that space is an abstraction. And cyberspace thus is not the actual mechanics and nitty-gritties of technology but what is built because of those interactions.

Bruce Sterling, in his introduction to *The Hacker Crackdown* quite evocatively explains this: 'Cyberspace is the "place" where a telephone conversation appears to occur. Not inside your actual phone, the plastic device on your desk. Not inside the other person's phone, in some other city. **The place between** the phones. [...] in the past twenty years, this electrical "space," which was once thin and dark and one-dimensional—little more than a narrow speaking-tube, stretching from phone to phone—has flung itself open like a gigantic jack-in-the-box. Light has flooded upon it, the eerie light of the glowing computer screen. This dark electric netherworld has become a vast flowering electronic landscape. Since the 1960s, the world of the telephone has cross-bred itself with computers and television, and though there is still no substance to cyberspace, nothing you can handle, it has a strange kind of physicality now. It makes good sense today to talk of cyberspace as a place all its own."

3. Non-space of the mind: In the cyberpunk universe of the novel *Neuromancer*, Gibson makes a difference between cyberspace and meat-space. There is a definite privileging of cyberspace, which is the world of seduction, adventure, excitement and entertainment. The meat-space, where our biological bodies survive and live, is in a state of collapse and disrepair. This bleak vision of the biological as disintegrating and the digital as becoming the primary mode of existence has been espoused by various science fiction and fantasy narratives. For all of us who have seen *The Matrix*, we are familiar with this idea that slowly and singularly, we are moving towards creating digital lives which are gaining precedence over our 'real' lives.[7]Especially when it comes to the discourse around digital objects, this hierarchy of dismissing the biological and the real over the virtual and the digital is often reinforced. However, Gibson was already reminding us, with the 'non-space of the mind' that the digital and the biological are not as separate or discrete as we would have liked to imagine. Let us look at what the 'non-space' can mean. For this, we might have to look at two different conceptual moves in philosophy.

7. Recommended watching material to look at some of these questions: 1. The final flight of the Osiris: http://www.youtube.com/watch?v=ueiBYxI6Eqg 2. The Second Renaissance - part 1 - http://www.gametrailers.com/videos/n5vpzw/the-second-renaissance-part-i 3. The Second Renaissance - part 2: http://www.gametrailers.com/videos/va807i/animatrix-second-renaissance-part2

a. The first is a distinction between the brain and mind. It is obvious that the brain and the mind are not the same thing. The brain is the biological organ in our cranial cavity. It is made up on cells and neurons, flesh and blood, so to speak. It is what the artificial intelligence scholar Andy Clark calls 'a skin bag'. The brain performs various functions that keep our body alive and sapient. The mind, is an abstraction of the brain. The mind is our thoughts, memories, associations, feelings, and all the other things that make us human. The brain might support the mind but they are not the same. I hope that this is beginning to sound familiar to us – that the brain-mind relationship is the same as we have mapped out for Internet-Cyberspace. Just like cyberspace is an abstraction of data that we have consented to be real, the mind is also an abstraction that encapsulates the interiority of our selves.
b. The second is an understanding of binaries and opposites. We are designed, as human beings (even though we attribute this to the digital machines) to think in binaries. Black-White, Good-Bad, Day-Night. This is the way in which our cultures have been built. We think of the positive and the negative and create a spectrum in between to understand our world. These binaries are often confused with being opposites. So we would say that the opposite of Black is white. Or that the opposite of Day is Night. However, in the study of Logics, we are taught that the binary is not the same as opposite. All the way back in history, Aristotle had already posited that it is a fallacy to mistake a binary for an opposite. So, for instance the binary opposition of 'day' might be 'night', but the logical opposite of 'day' is 'non-day'. Or to make it simpler, the binary opposition of the colour 'black' is 'white'. However, the logical opposite of 'black' is 'non-black' and hence every other colour that is not black, is its logical opposite. We go through this to realise that in the brain-mind mapping, the brain is the place. The mind is the non-brain, or the space. And then the non-space of the mind, is the brain all over again. Gibson does this recursive negation to remind us that the things that happen in cyberspace have direct consequences on meatspace. What happens in cyberspace directly affects the non-space of our bodies, our lived realities and experiences.

It is important to begin with the definition that Gibson offered because it informs a lot of the debates that happened historically, around cyberspace and how we understand it. However, it also allows us to side-step these debates because they are not fruitful. They reinforce the idea that the internet and cyberspace are removed from our reality, that they are technological concerns rather than human, social and political concerns, and they insist that the internet and cyberspace are in opposition to being human. These ideas produce accounts of the internet and cyberspace which, for me, are fruitless. The leads from Gibson's definition, instead, allow us to understand the internet and cyberspace as deeply implicated in our conditions of being human, being social and being political. They offer us a different way of rewriting the history of the Internet, not merely as a linear narrative of the technological advancements, but as a rich and complex account of how the internet and cyberspace have shaped and been shaped by the social, cultural and political milieu that they have emerged in.

And so, we approach the history of the internet in a different way. Instead of looking at the Internet as a technology, we deal with the Internet in its many forms, through cyberspace and our everyday engagement with it. Or, rather, we formulate the history of Internet & Society, thus trying to look at the ways in which the emergence of digital technologies – Internet and cyberspace – have led to questioning the ways in which understand our personal, social and

political lives, and how, in-turn they have been changed through the various contexts that we live in.

Why Do We Need the History of the Internet?
So here is the million dollar question. Why do we need to study the history of the Internet? And if we do, for what do we need to study the history of the internet? These are both important questions and this is where I am hoping we will be able to start a critical inquiry into our own engagement with the topic.

Let us begin by questioning the very structure of history writing. What does it mean to write the history of a particular object? If we were to write, let's say, the history of a particular building. How far in time will we go? And in what minutiae shall we record it? Shall we begin by saying, how, once where the building stood, there was a tree. And on that trees there were leaves. The first leaf fell. The second leaf fell. The third leaf fell. It could fill up pages documenting every leaf that fell, before we even come to the building. So we know that when we write the history of a particular object, person or phenomenon, there is a very clear notion of where the history began. But we also know that if, we had an interest in the ecological history of the building, we might have actually spent time looking at that tree and its falling leaves. Which means that what constitutes history also has to do with our intentions of writing it.

And then the last point about this brief capsule on history writing that I want to make, is that history of things does not mean that we focus only on the thing. If we were to look at the cultural significance of the building under question, for example, we would talk to the society that engages with it, the people who occupy it, and the ways in which it shapes the fabric of the space and time. So history is often a large canvas – it might keep one particular object in question, but it also weaves in the complex structure of processes and flows that surround that particular object of study.

There is a rich scholarship about the problems, structures and processes of history writing. But these three points are important for us to think through why we want to delve into the history of the internet. Where do we begin? What do we study? And why do we study what we study? The minute you put these questions out, you start realising that there can be no definitive history of the internet. There can definitely not be just one history of the internet. And that the history of the internet is as much about the world as it is about the technological, but the technological only becomes a lens or an entry point into unravelling the various questions that are a part of our personal and professional lives. So we are not looking at imparting the one authoritative history of the internet. Instead, I am proposing, for this module to introduce you to different ways of thinking about the history of the internet.We are going to begin by looking at not the Internet – but cyberspace.

We are going to examine the intersections of cyberspace with three different objects and try and see how the debates at that intersection help us to define and entry point into the rich discourse around Internet & Society.

Unit 2: The Body in Cyberspace

Perhaps one of the most interesting histories of the cyberspace has been its relationship with the body. Beginning with the meatspace-cyberspace divide that Gibson introduces, the question of our bodies' relationship with the internet has been hugely contested. There have been some very polarized debates around this question. Where are we when we are online? Are we the

person in the chair behind an interface? Are we the avatar in a social networking site interacting with somebody else? Are we a set of data running through the atmosphere? Are we us? Are we dogs? These are tantalising and teasing questions.

Early debates around the body-technology questions were polarized. There were people who offered that the cyberspace is a virtual space. What happens in that make-believe, performative space does not have any direct connections with who we are and how we live. They insisted that the cyberspace is essentially a performance space, and just like acting in a movie does not make us the character, all our interactions on the internet are also performances. The idea of a virtual body or a digital self were proposed, thinking of the digital as an extension of who we are – as a space that we occupy to perform different identities and then get on with our real lives.

Sherry Turkle, in her book *Life on the Screen*, was the first one to question this binary between the body and the digital self. Working closely with the first users of the online virtual reality worlds called Multiple User Dungeons, Turkle notes how being online started producing a different way of thinking about who we are and how we relate to the world around us. She indicates three different ways in which this re-thinking happens. The first, is at the level of language. She noticed how the users were beginning to think of their lives and their social relationships through the metaphors that they were using in the online world. So, for instance, people often thought of life through the metaphor of windows – being able to open multiple windows, performing multiple tasks and identities and 'recycling' them in their everyday life. Similarly, people saying that they are 'low on bandwidth' when they don't have enough time and attention to devote to something, or thinking about the need to 'upgrade' our senses. We also are quite used to the idea that memory is something that resides on a chip and that computing is what machines do. These slippages in language, where we start attributing the machine characteristics to human beings are the first sign of understanding the human-technological relationship and history.

The second slippage is when the user start thinking of the avatars as human. We are quite used to, in our deep web lives, to think of machines as having agency. Our avatars act. Things that we do on the internet perform more actions than we have control of – a hashtag that we start on twitter gets used and responded to by others and takes on a life of its own. We live with sapient technologies – machines that care, artificial intelligence algorithms that customise search results for us, scripts and bots that protect us from malware and viruses. We haven't attributed these kinds of human agencies to machines and technologies in the past. However, within the digital world, there is a complex network of actors, where all the actors are not always human. Bruno Latour, a philosopher of science and technology, posits in his 'Actor Network Theory' that the emergence of these non-human actors has helped us understand that we are not only dependent on machines and technologies for our everyday survival, but that many tasks that we had thought of as 'human' are actually performed, and performed better by these technologies. Hence, we have come to care for our machines and we also think of them as companions and have intimate relationships with them. And the machines, even as they make themselves invisible, start becoming more personal.

The third slippage that Turkle points out is the way in which the boundaries between the interior and the exterior were dissolved in the accounts of the users' narratives of their digital adventures. There is a very simplistic understanding that what is human is inside us, it is sacred and organic and emotional. Earlier representational technology products like cinema, books, TV etc. have emphasised this distinction between real life and reel life. No actor is punished

for the crime they commit in the narrative of a film. It is not very often that an author claims to be the character in a book. We have always had a very strong sense of distinction between the real person and the fictional person. But within the virtual reality worlds, these distinctions seem to dematerialize. The users not only thought of their avatars as human but also experienced the emotions, frustrations, excitement and joy that their characters were simulating for them. And what is more important, they claimed these experiences for themselves.

NamitaMalhotra, who is a legal scholar and a visual artist, in her monograph on Pleasure, Porn and the Law, looks at the way in which we are in a process of data-stripping – constant revelation of our deepest darkest secrets and desires, within the user generated content rubric. Looking at the low-res, grainy videos on sites like Youtube and Vimeo, which have almost no narrative content and are often empty of sexual content, produce all of us in a global orgiastic setting, where our bodies are being extended beyond ourselves. In the monograph, Malhotra argues that the Internet is not merely an extension but almost like a third skin that we wear around ourselves – it is a wrapper, but it is tied, through ligaments and tendons, to the flesh and bone of our being, and often things that we do online, even when they are not sexual in nature, can become pornographic. Conversely, the physical connections that we have are now being made photographically and visually available in byte sized morsels, turned into a twitpic, available to be shared virally, and disseminated using mobile applications, thus making our bodies escape the biological containers that we occupy but also simultaneously marks our bodies through all these adventures that we have on the digital infobahn.

Case Study: A Rape in Cyberspace

A contemporary of Sherry Turkle, Julian Dibbell, in his celebrated account of 'A Rape in Cyberspace'[8] describes a case-study that corroborates many of the observations that Turkle posits. Dibbell analyses a particular incident that occurred one night in a special kind of MUD – LambdaMOO (MUD, Object-Oriented) – which was run by the Xerox Research Corporations. A MUD, is a text-based virtual reality space of fluid dimensions and purposes, where users could create avatars of themselves in textual representations. Actions and interactions within the MUD are also in long running scripts of texts. Of course, technically all this means that a specially designed database gives users the vivid impression of their own presence and the impression of moving through physical spaces that actually exists as descriptive data on some remotely located servers.

When users log into LambdaMoo, the program presents them with a brief textual description of one of the rooms (the coat closet) in the fictional database mansion. If the user wants to navigate, s/he can enter a command to move in a particular direction and the database replaces the original description with new ones, corresponding to the room located in the direction s/he chose. When the new description scrolls across the user's screen, it lists not only the fixed features of the room but all its contents at that moment – including things (tools, toys, weapons), as well as other avatars (each character over which s/he has sole control). For the database program that powers the MOO, all of these entities are simply subprograms or data structures which are allowed to interact according to rules very roughly mimicking the laws of the physical world.

Characters may leave the rooms in particular directions. If a character says or does something (as directed by its user), then the other users who are located in the same 'geographical'

8. Julian Dibbell "A Rape in Cyberspace", available at http://www.juliandibbell.com/articles/a-rape-in-cyberspace/, last accessed on January 24, 2014.

region within the MOO, see the output describing the utterance or action. As the different players create their own fantasy worlds, interacting and socialising, a steady script of text scrolls up a computer screen and narratives are produced. The avatars, as in Second Life or even on Social Networking Sites like Orkut, have the full freedom to define themselves, often declining the usual referents of gender, sexuality, and context to produce fantastical apparitions. It is in such an environment of free-floating fantasy and role-playing, of gaming and social interaction mediated by digital text-based avatars, that a 'crime' happened.

Dibell goes on to give an account of events that unfolded that night. In the social lounge of LambdaMoo, which is generally the most populated of all the different nooks, corners, dimensions and rooms that users might have created for themselves, there appeared an avatar called Dr. Bungle. Dr. Bungle had created a particular program called Vodoo Doll, which allowed the creator to control avatars which were not his own, attributing to them involuntary actions for all the other players to watch, while the targeted avatars themselves remained helpless and unable to resist any of these moves. This Dr. Bungle, through his evil Vodoo Doll, took hold of two avatars – legba and Starsinger and started controlling them. He further proceeded to forcefully engage them in sexually violent, abusive, perverted and reluctant actions upon these two avatars. As the users behind both the avatars sent a series of invective and a desperate plea for help, even as other users in the room (# 17) watched, the Vodoo Doll made them enter into sexually degrading and extremely violent set of activities without their consent. The peals of his laughter were silenced only when a player with higher powers came and evicted Dr. Bungle from the Room # 17. As an eye-witness of the crime and a further interpolator with the different users then present, Dibbell affirms that most of the users were convinced that a crime had happened in the Virtual World of the digital Mansion. That a 'virtual rape' happened and was traumatic to the two users was not questioned. However, what this particular incident brought back into focus was the question of space.

Dibbell suggests that what we had was a set of conflicting approaches to understand the particular phenomenon:

Where virtual reality and its conventions would have us believe that legba and Starsinger were brutally raped in their own living room, here was the victim legba scolding Mr. Bungle for a breach of *civility* … [R]eal life, on the other hand, insists the incident was only an episode in a free-form version of Dungeons and Dragons, confined to the realm of the symbolic and at no point threatening any players life, limb, or material well-being…'

The meaning and the understanding of this particular incident and the responses that it elicited, lie in the 'buzzing, dissonant gap' between the perceived and experienced notion of Technosocial Space. The discussions that were initiated within the community asked many questions: If a crime had happened, where had the crime happened? Was the crime recognised by law? Are we responsible for our actions performed through a digital character on the cyberspaces? Is it an assault if it is just role playing?

The lack of 'whereness' of the crime, or rather the placelessness of the crime made it especially more difficult to pin it to a particular body. The users who termed the event as rape had necessarily inverted the expected notion of digital space as predicated upon and imitative of physical space; they had in fact done the exact opposite and exposed digital spaces as not only 'bleeding into reality' but also a constitutive part of the physical spaces. Their Technosocial Space was not the space of the LambdaMoo Room # 17 but the physical locations (and thus the bodies, rather than the avatars) of the players involved. However, this

blurring was not to make an easy resolution of complex metaphysical questions. This blurring was to demonstrate, more than ever, that the actions and pseudonymous performances or narratives which are produced in the digital world are not as dissociated from the 'Real' as we had always imagined. More importantly, the notional simulation of place or a reference to the physical place is not just a symbolic gesture but has material ramifications and practices. As Dibell notes in his lyrical style.

'Months later, the woman in Seattle would confide to me that as she wrote those words posttraumatic tears were streaming down her face — a real-life fact that should suffice to prove that the words' emotional content was no mere playacting. The precise tenor of that content, however, its mingling of murderous rage and eyeball-rolling annoyance, was a curious amalgam that neither the RL nor the VL facts alone can quite account for.'

The eventual decision to 'toad' Dr. Bungle – to condemn him to a digital death (a death only as notional as his crime) and his reappearance as another character take up the rest of Dibbell's argument. Dibbell is more interested in looking at how a civil society emerged, formed its own ways of governance and established the space of LamdaMOO as more than just an emotional experience or extension; as a legitimate place which is almost as much, if not more real, than the physical places that we occupy in our daily material practices. Dibbell's moving account of the entire incident and the following events leading the final 'death' and 'reincarnation' has now been extrapolated to make some very significant and insightful theorisations of the notions of the body and its representations online.

Exercise: Based on this case-study, break into small groups to determine whether a rape happened on cyberspace and how we can understand the relationship of our online personas with our bodies.

Cyberspace and the State

The history of body and technology is one way of approaching the history of the internet. However, as we realise, that more than the management of identity or the projection of our interiority, it is a narrative about governance. How does the body get regulated on the internet? How does it become the structure through which communities, networks, societies and collective can be imagined? The actions and transactions between the internet and the body can also help us to look at the larger questions of state, governance and technology which are such an integral part of our everyday experience of the internet. Questions of privacy, security, piracy, sharing, access etc. are all part of the way in which our practices of cultural production and social interaction are regulated, by the different intermediaries of the internet, of which the State is one.

AshaAchuthan, in her landmark work *Re:Wiring Bodies*[9]that looks at the history of science and technology in India, shows that these are not new concerns. In fact, as early as the 1930s and 1940s, when the architects of India's Independence movements were thinking about shaping what the country is going to look like in the future, they were already discussing these questions. It is more popularly known that Jawaharlal Nehru was looking to build a 'scientific temperament' for the country and hoping to build it through scientific institutions as well as infrastructure – he is famously credited to having said that 'dams are the temples of modern science.' Apart from Nehru's vision of a modern India, there was a particular conversation

9. Asha Achuthan, "Re:Wiring Bodies", *Centre for Internet and Society*, available at http://cis-india.org/raw/histories-of-the-internet/rewiring-bodies.pdf, last accessed on January 25, 2014.

between M.K. Gandhi and Rabindranath Tagore, that Achuthan analyses in great detail. Achuthan argues that the dialogue between Gandhi and Tagore is so couched in ideology, poetry and spirituality that we often forget that these were actually conversations about a technology – specifically, the charkha or the spinning wheel.

For both Gandhi and Tagore, the process of nation building was centred around this one particular charkha. The charkha was the mobile, portable, wearable device (much like our smart phones) that was supposed to provide spiritual salvation and modern resources to overcome the evils of both traditional and conservative values as well as unemployment and production. The difference in Gandhi and Tagore was not whether the charkha – as a metaphor of production and socio-economic organisation – should be at the centre of our discourse. The difference was that Gandhi thought that the usage of charka, complete immersion in the activity, and the devotion to it would help us weave a modern nation For Gandhi, the citizen was not somebody who used the charkha, but the citizen was somebody who becomes a citizen in the process of using the charkha. Tagore, meanwhile, was more concerned about whether we are building a people-centred nation or a technology-centred device. He was of the opinion that building a nation with the technology at its core, might lead to an apocalyptic future where the 'danavayantra' or demonic machine might take over and undermine the very human values and ideals that we are hoping to structure the nation through.

If you even cursorily look at this debate, you will realise that the way Gandhi was talking about the charkha is in resonance with how contemporary politicians talk about the powers of the internet and the way in which, through building IT Cities, through foreign investment, through building a new class of workers for the IT industry, and through different confluences of economic and global urbanisation, we are going to Imagine India[10] of the future. Similarly, the caution that Tagore had, of the charkha as superseding the human, finds its echoes in the sceptics who have been afraid that the human is being forgotten[11] in the e-governance systems that are being set up, which concentrate more on management of data and information rather than the rights and the welfare of people.

This historical continuity between technology and governance, also finds theorisation in AshishRajadhyaksha's book *The Cultural Last Mile*[12] that looks at the critical turns in India's governance and policy history and how the technological paradigm has been established. Rajadhyaksha opens up the State-technology-governance triad to more concrete examples and looks at how through the setting up of community science centres, the building of India's space and nuclear programmes, and through on-the-ground inventions like radio and chicken-mesh wire-loops, we have tried to reinforce a broadcast based model of governance. Rajadhyaksha proposes that the earlier technologies of governance which were at our disposal, helped us think of the nation state through the metaphor of broadcast. So we had the State at the Centre, receiving and transmitting information, and in fact managing all our conversation and communication by being the central broadcasting agency. And hence, because the state was responsible for the message of the state reaching every single person, but also responsible that every single person can hypothetically communicate with every other single person, the last

10. Nandan Nilekani, "Imagining India: The Idea of a Renewed Nation", *Penguin*, available at http://www.penguin.ca/nf/Book/BookDisplay/0,,9780670068449,00.html, last accessed on January 24, 2014.
11. Jahnavi Phalkey, "Focus: Science, History, and Modern India", *The University of Chicago Press*, http://www.jstor.org/stable/10.1086/670950, last accessed on January 24, 2014.
12. Ashish Rajadhyaksha, "The Last Cultural Mile", *The Centre for Internet and Society*, available at http://cis-india.org/raw/histories-of-the-internet/last-cultural-mile.pdf, last accessed on January 24, 2014.

mile became important. The ability to reach that last person became important. And the history of technology and governance has been a history of innovations to breach that last mile and make the message reach without noise, without disturbance, and in as clean and effective a way as possible.

With the emergence of the digital governance set up, especially with the building of the Unique Identity Project,[13] we now have the first time when the government is not concerned about breaching the last mile. The p2p networks that are supposed to manage the different flows of information mean that the State is not a central addressee of our communication but one of the actors. It produces new managers – internet service providers, telecom infrastructure, individual hubs and connectors, traditional media agencies – that help us think of governance in a new way. Which is why, for instance, with the UID authorities, we are no longer concerned about the relay of state information from the centre to the subject. Hence, we have many anecdotal stories of people enrolling for the Aadhaar card without actually knowing what benefits it might accrue them. We also have stories coming in about how there are people with Aadhaar numbers which have flawed information but these are not concerns. Because for once, the last mile has to reach the Government. The State is a collector but there are also other registrars. And there is a new regime here, where the government is now going to become one of the actors in the field of governance and it is more interested in managing data and information rather than directly governing the people.

This historical turn is interesting, because it means that we are being subjected to different kinds of governance structures and institutions, without necessarily realising how to negotiate with them to protect us. One of the most obvious examples is the Terms of Services[14] that we almost blindly sign off when using online platforms and services and what happens when they violate rights that we think are constitutionally given. What happens when Facebook removes some content from your profile without your permission because it thinks that it is problematic? Who do you complain to? Are your rights as a user or a citizen? Which jurisdiction will it fall under? Conversely, what happens when you live in a country that does not grant you certain freedoms (of speech and expression, for instance) and you commit an infraction using a social media platform. What happens when your private utterances on your social networks make you vulnerable[15] to persecution and prosecution in your country?

These are all questions of the human, the technological, and the governmental which have been discussed differently and severally historically, in India and also at the global level. Asking these questions, unpacking the historical concerns and how they have leap-frogged in the contemporary governmental debates is important because it helps us realise that the focus of what is at stake, what it means to be human, what we recognise as fair, just and equal are also changing in the process. Instead of thinking of e-governance as just a digitization of state resources, we have to realise that there is a certain primacy that the technologies have had in the state's formation and manifestation, and that the digital is reshaping these formulations in new and exciting, and sometimes, precarious ways.

13. Ashish Rajadhyaksha, "In the Wake of Aadhar: The Digital Ecosystem of Governance in India", *Centre for Study of Culture and Society*, available at http://eprints.cscsarchive.org/532/, last accessed on January 23, 2014.
14. Terms of Service, Didn't Read, available at http://tosdr.org/, last accessed on January 26, 2014.
15. Siva Vaidyanathan, "The Googlization of Everything: (And Why Should We Worry)", *University of California Press*, available at http://www.ucpress.edu/book.php?isbn=9780520258822

Cyberspace and Criminality

The history of the internet in India, but also around the world, is bookended between pornography and terrorism. While there has been an incredible promise of equity, equality, fairness, and representation of alternative voices on the internet, there is no doubt that what the internet has essentially done is turn us all into criminals – pornographers, pirates, terrorists, hackers, lurkers… If you have been online, let us just take for granted that you have broken some law or the other, no matter how safe you have been online, and where you live. The ways in which the internet has facilitated peer-2-peer connections and the one-one access means that almost everything that was governed in the public has suddenly exploded in one large grey zone of illegality.

Ravi Sundaram calls this grey zone of illegal or semi-legal practices the new 'cyberpublics'. For Sundaram, the new public sphere created by the internet is not only in the gentrified, middle-class, educated people who have access to the cyberspaces and are using social media and user generated content sites to bring about active social and political change. More often than not, the real interesting users of the internet are hidden. They access the internet from cybercafés, in shared names. They have limited access to the web through apps and services on their pirated phones. They share music, watch porn, gamble, engage in illicit and surreptitious social and sexual engagements and they are able to do this by circumventing the authority and the gaze of the law.

On the other side are the more tech savvy individuals who create alternative currencies like Bitcoin, trade for weapons, drugs and sex on SilkRoute, form guerrilla resistance groups like Anonymous, and create viruses and malware that can take over the world. These cyberpublics are not just digital in nature. They erupt regularly in the form of pirate bazaars, data swaps, and the promiscuous USB drive that moves around the machines, capturing information and passing it on further. These criminalities are often the defining point of internet policy and politics – they serve as the subjects that need to be governed, as well as the danger that lurks in the digital ether, from which we need to be protected. For Sundaram, the real contours and borders of the digital world are to be tested in an examination of these figures. Because, as Lawrence Liang suggests, the normative has already been assimilated in the system. The normative or the good subject is no longer a threat and has developed an ethical compass of what is desirable and not. However, this ethical subject also engages in illicit activities, while still producing itself as a good person. This contradiction makes for interesting stories.

DPS MMS: Case Study

One of the most fascinating cases of criminality that captured both public and legal attention was the notoriously cases where the ideas of Access were complicated in the Indian context, was the legal and public furore over the distribution of an MMS (Multi-Media Message) video that captured two underage young adults in a sexual act. The clip, which was dubbed in popular media as 'DPS Dhamaka' became viral on the internet. The video clip was listed on an auction (peer-2-peer) website as an e-book and as 'Item 27877408 – DPS Girl having fun!!! Full video + Bazee points' for Rs. 125. This visibility of the clip on the auction site Bazee.com, brought it to the eyes of the State where its earlier circulation through private circuits and P2P networks had gone unnoticed. Indeed, the newspapers and TV channels had created frenzy around it, this video clip would have gone unnoticed. However, the attention that Bazee.com drew led to legal intervention.

Following the visibility of the video clip, there was an attempt to find somebody responsible for the crime and be held liable for the 'crime' that had happened. Originally, Ravi Raj, a

student at IIT Kharagpur, who had put up the clip on Bazee was arrested for possessing and selling pornography. He was arrested and kept in police custody for at least three days and so was the male student who made the clip. They were both made to go through proceedings in juvenile court (though he was the last to be arrested). Both the students in the video were suspended from school after the incident. Eventually, the most high profile arrest and follow up from the DPS MMS incident was the arrest of the CEO of Bazee.com – Avnish Bajaj. However, Bajaj was released soon because as the host of the platform and not its content, he had no liability.

This is the beginning of a series of slippages where a punishable body in the face of public outcry had to be identified. We witnessed a witch-hunt that sought to hold the boy who made the video clip responsible, the student of IIT who attempted to circulate the clip and eventually the CEO of Bazee. The string of failed prosecutions seems to indicate that the pornographer-as-a-person was slipping through the cracks of the legal system. As NamitaMalhotra argues, it is not the pornographic object which is 'eluding the grasp of the court' but that it seems to be an inescapable condition of the age of the internet -that the all transactions are the same transactions, and all users are pornographers.

We can see in the case that the earlier positions that were easily criminalised when it came to objects in mass media – producer, consumer, distributor of obscenity, were vacated rapidly in the DPS MMS case. We have a case where the bodies, when looked at through simplified ideas of Access, could not be regulated. The girl in the clip could not be punished because she was the victim in the case that could be read as statutory rape. In the case of the boy, a stranger argument was posed – 'that in our fast urbanising societies where parents don't have time for children, they buy off their love by giving them gadgets – which makes possible certain kinds of technological conditions...thus the blame if it is on the boy, is on the larger society' (Malhotra, 2011).

Eventually, the court held that the description of the object and the context of its presence indicates that the said obscene object is just a click away and such a 'listing which informed the potential buyer that such a video clip that is pornographic can be procured for a price'. There is a suggestion that there was nobody in particular that could be fixed with the blame. What was at blame was access to technology and conditions of technology within which the different actors in this case were embedded. Malhotra points out that in earlier cases around pornography, judgements have held pornography responsible for itself.

In the case of the DPS MMS, it seemed that technology – especially access to technology by unsupervised persons – has taken that role. The eventual directive that came out of this case was a blanket warning issued to the public that 'anyone found in possession of the clip would be fined and prosecuted'. It is as if the attention of the court was on the ways in which the video clip was produced, circulated and disseminated, rather than the content. There was an anxiety around peoples' unsupervised access to digital technologies, the networks that facilitated access to content without the permission of the state, and modes of circulation and dissemination that generated high access to audiences which cannot be controlled or regulated.

The State's interest in this case, is not in the sexual content of the material but in the way it sidesteps the State's authorial positions and produces mutable, transmittable, and transferable products as well as conditions of access. Such a focus on practices and behaviours around the obscene object, rather than the content itself, seems not to disrupt the

law's neat sidestepping of the force of the image itself. These different tropes of access to technology informed the State' attempt at control and containment of technosocial practices in the country, giving rise to imaginations of the User as being in conditions of technology which make him/her a potential criminal. This idea of access as transgression or overriding the legal regulatory framework does not get accounted for in the larger technology discourse. However, it does shape and inform the Information Technology regulations which are made manifest in the IT Act. The DPS MMS case complicated the notion of access and posited a potentially criminal technosocial subject who, because of access to the digital, will be able to consume information and images beyond the sanction of the law.

The DPS MMS case shows how the ways in which public discourse can accuse, blame and literally hang technology seems to diverge from how the court attempts to pin down an offence or crime and prosecute by constructing a technosocial subject as the pervert, while also accusing pornography as a phenomenon. The court is unable to hold technology to blame but the accused is technology-at-large and modernity, which subsumes practices around technology and separates out the good and ethical ways in which a citizen should access and use technologies to rise from the potentially criminal conditions of technology within which their Technosocial identity is formed.

Summary

We started by making a distinction between Internet and Cyberspace to see how the two are separate objects of focus and have a relationship that needs to be examined in greater detail. It was argued that while the Internet – in material, infrastructural and technological forms – is important to understand the different policies and politics at the local, regional and global level, it has an account that is easier to follow. Cyberspace, on the other hand, because it deals with human interactions and experiences, allows for a more complex set of approaches into understanding our engagement with the digital domain. We began with the original definitions and imaginations of cyberspace and the ways in which it founded and resolved debates about the real-virtual, the physical-digital, and the brain-mind divides which have been historically part of the cybercultures discourse.

It was proposed, hence, that instead of looking at the history of the Internet, we will look at the history of cyberspace, and see if we can move away from a straight forward historical narrative of the Internet which focuses largely on the institutions, numbers, names and technological advances. The ambition was not to just produce a similar history of cyberspace but think of conceptual frameworks through which cyberspace can be studied. The proposition was that instead of just looking at history as a neutral and objective account of events and facts, we can examine how and why we need to create histories. Also, that it is fruitful to look at the aspirations and ambitions we have in creating historical narratives. It was then suggested that instead of trying to create a definitive history, or even a personal history of the internet, it might be more fruitful to look at the intersections that cyberspace has with different questions and concerns that have historically defined the relationship between technologies and society. 3 different conceptual frameworks were introduced as methods or modes by which this historical mode of inquiry can be initiated.

The first framework examined how we can understand the boundaries and contours of the internet and cyberspace by looking at its relationship with our bodies. The ways in which we understand our bodies, the mediation by technologies, and the extensions and simulations that we live with, help us to understand the human-technology relationship in more nuanced fashions. Looking at the case-study of a rape that happened in cyberspace, we mapped out the different ways in which we can think of a technosocial relationship.

The second framework drew from historical debates around technology and governance to see how the current concerns of e-governance and digital subjectivity are informed by older debates about technology and nation building. Looking at the dialogues between Gandhi and Tagore, and then the imagination of a nation through the broadcast technologies, we further saw how the new modes of networked governance are creating new actors, new conditions and new contexts within which to locate and operate technologies.

The third framework showed how the technological is not merely at the service of the human. In fact, the presence of the technological creates new identities and modes of governance that create potential criminals of all of us. Through the case-study of the DPS MMS, and in an attempt to look at the grey zone of illegal cyberpublics, we saw how at new technosocial identities are created at the intersection of law, technology, governance and everyday practices of the web. The fact that the very condition of technology access can create us as potential criminals, in need to be governed and regulated, reflects in the development of internet policy and governance.

It was the intention of this module to complicate three sets of presumptions and common knowledge that exist in the discourse around Internet and Cyberspace. The first was to move away from thinking of the Internet merely as infrastructure and networks. The second was to suggest that entering the debates around human-technology everyday relationships would offer more interesting ways of looking at accounts of the technological. The third was to propose that the history of the internet does not begin only with the digital, but it needs larger geographical and techno-science contexts in order to understand how the contemporary landscape of internet policy and governance is shaped.

The module was not designed to give a comprehensive history and account of the internet. Instead, it built a methodological and conceptual framework that would allow us to examine the ways in which we approach Internet and Society questions – in the process, it would also help us reflect on our own engagement, intentions and expectations from the Internet and how we create the different narratives and accounts for it.

Additional Readings

1. Johnny Ryan,"A History of the Internet and the Digital Future", *University of Chicago Press*, http://press.uchicago.edu/ucp/books/book/distributed/H/bo10546731.html
2. John Naughton,"A Brief History of the Future", *Overlook*, https://www.kirkusreviews.com/book-reviews/john-naughton/a-brief-history-of-the-future/
3. Christos J.P. Moschovitis et al.,"History of the Internet", *Barnes & Noble*, http://www.barnesandnoble.com/w/history-of-the-internet-christos-j-p-moschovitis/1100883985?ean=9781576071182
4. Katie Hafner and Matthew Lyon, "Where Wizards Stay up Late", *Barnes & Noble*, http://www.barnesandnoble.com/w/where-wizards-stay-up-late-katie-hafner/1113244151?ean=9780684812014
5. Janet Abbate,"Inventing the Internet", *MIT Press*, http://mitpress.mit.edu/books/inventing-internet
6. Tim Berners-Lee,"Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web", http://en.wikipedia.org/wiki/Weaving_the_Web:_The_Original_Design_and_UltimateDestiny_of_the_World_Wide_Web_by_its_inventor
7. Peter Salus,"Casting the Net: From ARPANET to INTERNET and Beyond", *Pearson*, http://www.pearson.ch/1471/9780201876741/Casting-the-Net-From-ARPANET-to-INTERNET.aspx

Module 2: Principles of the Internet

Unit 3: Accessibility

In the current day scenario, it would be impossible for anyone to conceive of a world without the internet. From being the easiest source of news and information to becoming the medium for communications ranging from personal to commercial, to becoming a place for social connectivity and virtual hangouts, the internet has been woven into the fabric of general society.

While the internet seems to be a one-stop shop for all solutions, persons with disabilities find themselves excluded from it due to their inability to either see the screen, use the mouse or keyboard, inability to access content or unfriendly user interface as many of the websites can still be navigated only by using a mouse, most of the audio visuals are not captioned for the use of persons with hearing impairment and web developers use graphics instead of using text, making them unreadable for screen reader users. The internet, however, is a most convenient medium for persons with disabilities as it has made it possible for them to independently access information, transactions and entertainment without having to wait for someone to provide them with the same. While discussing the reach and power of the internet, accessibility is one of the topics that need to be addressed. Even though there are many measures for accessibility currently available, they are not being addressed and worked on aggressively to bridge the gap. In the digital age where the internet is ubiquitous and a platform where more and more economic activity is happening, the lack of initiative and accessibility policy is leading to exclusion.

What is Accessibility?

Accessibility is a measure of the extent to which a product or service can be used by a person with a disability as effectively as it can be used by a person without that disability.[16] For example, an elevator can be fitted with audio outputs and buttons that also have Braille notations, thus making it possible for persons with visual impairment to use it on their own. Similarly, buildings and public places can be built with ramps along with stairs, making it possible for persons using wheel chairs to access them. When a product or service is created such that it is completely usable by persons with disabilities without external support, the product or service is called accessible. In circumstances when only some of the features are usable for persons with disabilities, or when the product or service is usable by persons with certain types of disabilities, while it is not usable for persons with other types of disabilities, they are termed as partially inaccessible.

The Need for Accessibility

Over a billion of the world's population has some form of disability. They are the world's largest minority. This figure is on a constant increase due to increase in the population as well as the medical advances that have decreased mortality due to old age. Studies show that the world's population is increasingly becoming older and at least one billion people belong to the older aged category. It is expected that older people may acquire certain disabilities due to age related conditions. Making resources and information accessible to persons with disabilities is of great importance in this scenario as more and more people will start requiring accessibility.

16. Dr. Mark Magennis (ed.), "Accessibility and the purposes of ICTs", e-Accessibility Policy Toolkit for Persons with Disabilities, *G3ict and ITU*, available at http://e-accessibilitytoolkit.org/toolkit/eaccessibility_basics/accessibility_and_the_purposes_of_icts#what, last accessed on January 23, 2014.

As per the World Bank estimates included in the 2011 "World Report on Disability", 20 % of the poorest people in the world are disabled and occupy the most marginalized and disadvantaged sectors of society. Furthermore, due to discrimination or incapacity to perform certain work, people living with disabilities have a difficult time finding employment, with unemployment rates reaching 80% for disabled people in the working age group.[17]

Persons with disabilities are experiencing a lack of access to technologies due to visual, hearing, mental, and/or other impairments that make it difficult to operate various devices. Other groups facing accessibility issues are illiterate and elderly populations. According to the United Nations Educational, Scientific and Cultural Organization(UNESCO) study in 2010, there are 796 million adults in the world that are illiterate, most of whom reside in the developing world.[18] This population faces barriers to text based communication. Elderly persons are also marginalized from access to technologies much the same way as persons with disabilities due to problems of physical access and marginalization.[19]

It is these groups that would most benefit from technological innovations and solutions that can empower and enhance societal inclusion and participation through providing access to knowledge and information, a medium to make one's voice heard, as well as access to business and administrative processes within the state. [20]

International and Regional Frameworks on Accessibility and Development

Beginning in the 1990's, accessibility concerning people with disabilities has been prioritized within the global policy framework. The United Nations General Assembly recognized the importance of providing equal opportunities for disabled individuals in the context of development. In 1993, the UN General Assembly adopted the Standard Rules on Equalization of Opportunities for Persons with Disabilities. Along with this measure, a five-year review and appraisal of the World Programme of Action concerning Disabled Persons (1982) was initiated in 1997, 2002 and 2007.

Access to ICT's is essential for full citizen participation in all the aspects of society and is increasingly becoming essential for the achievement of many development goals. The Biwako Millennium Framework (BMF) and Biwako plus Five, which cover the Asia and the Pacific region, have made ICT accessibility one of the seven priority areas as included in its regional policy frameworks adopted in 2003 and 2007 respectively. Under these frameworks, many initiatives to increase ICT accessibility and promote equitable development for persons with disabilities throughout the region have been undertaken.

The global recognition of the right of people living with disabilities to partake fully in all aspects of society, access to ICT's being an integral part of this right, was further advanced

17. "World Report on Disability", *WHO and the World Bank*, available at http://www.who.int/disabilities/world_report/2011/en/index.html, last accessed on January 23, 2014.
18. UNESCO Institute for Statistics, Adult and Youth Literacy: Global Trends In Gender Parity, UIS Fact Sheet, September 2010, No. 3.
19. Emma Daly, "United Nations Says Elderly Will Soon Outnumber Young for First Time", New York Times, available at http://www.globalaging.org/waa2/articles/untimes.htm, last accessed on January 24, 2014.
20. Nirmita Narasimhan (ed.), "Web Accessibility Policy Making: An International Perspective", *G3ict, Centre for Internet and Society and Hans Foundation*, available at http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_7/id_150, last accessed on January 23, 2014.

with the Convention on the Rights of Persons with Disabilities adopted by the United Nations General Assembly in 2006. The Convention entered into force in 2008. [21]

Important Points from the UN Convention on the Rights of Persons with Disabilities

Article 1 of the convention defines who is included in the UN category of persons with disabilities, stating that "Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others." [22]

The first section of Article 9, which outlines accessibility priorities of the convention, puts responsibility on the state to ensure that persons with disabilities, along with other essential services and systems, have equal access to "information, communications and other services, including electronic services and emergency services". Section 2 of the article further puts onus on private entities that offer facilities and services to the public to make them accessible to disabled members of the public. Access to information, information technologies and systems, in particular the internet, is also included in this section.[23]

Freedom of expression and opinion, and access to information is covered under Article 21 of the convention. The section recognizes that the said freedoms begin with access to appropriate mediums of communication. Information intended for the general public must be accessible to persons with disabilities through accessible formats and technologies in a "timely manner and without additional cost". The mass media, including internet content providers, have the responsibility to ensure that their services are accessible to all members of society.[24]

Accessibility Policies in India

In India, about 60 million people are disabled and 42.5% of them are women while 75% of people with disabilities come from rural areas. In India, there is a confluence of barriers to accessibility with inaccessible and unaffordable technologies, inaccessible websites and unsupportive laws.

The right to full participation in society and equality of disabled individuals in India was recognized through the Persons with Disabilities (Equal Opportunities, Protection of Rights & Full Participation) Act which was enacted in India in 1995. India is also a signatory to both UNCRPD (2006) and Biwako Millennium framework towards an Inclusive, Barrier-free and Rights-based Society for Persons with Disabilities in Asia and the Pacific (2002). [25] While there is no specific legislation in India which ensures the right of disabled persons to access ICT's, The National Telecom Policy 2011 strategizes the need to recognize "telecom and

21. UN News Center, "Rights and Dignity of Persons with Disabilities", *United Nations*, available at http://www.un.org/disabilities/default.asp?navid=46&pid=1596, last accessed on January 26, 2014.
22. UN News Center, "Rights and Dignity of Persons with Disabilities", *United Nations*, available at http://www.un.org/disabilities/default.asp?id=261, last accessed on January 26, 2014.
23. UN News Center, "Rights and Dignity of Persons with Disabilities", *United Nations*, available at http://www.un.org/disabilities/default.asp?id=269, last accessed on January 26, 2014.
24. UN News Center, "Rights and Dignity of Persons with Disabilities", *United Nations*, available at http://www.un.org/disabilities/default.asp?id=281, last accessed on January 26, 2014.
25. Nirmita Narasimhan (ed.), "Web Accessibility Policy Making: An International Perspective", *G3ict, Centre for Internet and Society and Hans Foundation*, available at http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_7/id_150, last accessed on January 23, 2014.

broadband connectivity as a basic necessity like education and health and work towards 'Right to Broadband'."[26]

The need for accessibility – both in the physical environment and in the use of information technology – is accentuated by the increase in consumption among the general public. As more and more persons with disabilities start utilising public marketplaces, products and services, a demand is generated to make these accessible to be able to reach out to a group of untapped consumers.

This holds true also for the internet. The penetration of the internet has caused many businesses to offer their products and services through the online medium in order to gain a longer reach. However, a 2003 survey on the impact of disabilities on computer technology conducted by Forrester Research found that: approximately one in four (25%) computer users have a visual difficulty or impairment; nearly one in four (24%) computer users have a dexterity difficulty or impairment; one in five (20%) computer users have a hearing difficulty or impairment; and about 16% of computer users have a cognitive difficulty or impairment. It becomes imperative for organisations offering their businesses online to make their facilities accessible to persons with disabilities to be able to tap into a large base of potential consumers.

Key Concepts

While making a case for accessibility and stressing the importance of making all products and services open to the public accessible to persons with disabilities, it is of great importance to understand some of the key concepts attached to accessibility.

Universal design: It is simply a technique of designing a product or service in such a way that it is equally usable by persons with disabilities as well as persons without disabilities. Universal design eliminates the need to create multiple products or services to cater to the same requirement of people belonging to different categories. This is highly useful in not only creating accessible systems, but also curtailing expenses and reducing redundant efforts.

For example, public transport systems such as buses and trains can be modelled keeping in mind wheel chair users. Buses may be created with ramps such that a wheel chair user is able to board and alight from the bus without any inconvenience. Similarly, trains can be constructed such that the door is on the same level with the platform and the door is wide enough to accommodate a wheelchair to enable passengers using wheelchairs to be able to enjoy the public services on par with other passengers.

Reasonable Accommodation: This is defined as the changes and modifications that can be made to a place, system or a process so as to enable persons with disabilities to enjoy the facilities provided without causing undue hardship to the provider of the facilities or to the other users. This could be in the form of changes to the physical environment to accommodate the independent mobility needs of persons with disabilities, or modification in the procedure of performing a task to ensure that a person with disability is able to enjoy equal opportunities.

An example of this would be an organisation employing persons with visual impairment providing them with screen reader software to enable them to work productively. Likewise, employees with disabilities could be granted extra leave in addition to their regular days of leave for attending health care sessions or training camps related to managing their disabilities.

26. Government of India, "New Telecom Policy", *Department of Telecommunications*, available at http://www.dot.gov.in/NTP-2011/final-10.10.2011.pdf, last accessed on January 23, 2014.

Accessibility to the Physical Environment

One of the major requirements of physical accessibility is the availability of a barrier free environment for persons with disabilities to experience equal opportunities. This includes constructing new buildings and modifying old buildings and other public places with ramps, lifts and accessible signages for persons with disabilities. Accessible physical environment also includes transports and transport systems as well as roads being made accessible for persons with disabilities. This could be done by constructing roads with properly defined sidewalks, ramps at proper intervals for wheelchair users, engraved zebra crossings, beeps at traffic signals and accessible signages at road directions. Public transports such as buses, trains and other applicable options could be modified to allow persons with disabilities including wheelchair users to enter and exit them comfortably through ramps, broad doorways etc. Places such as railway stations, airports and bus stations should be made accessible by provision of ramps, lifts, accessible signages and accessible enquiry services.

E-accessibility

For the ease of understanding, Persons with Disabilities (PWD) are broadly categorized as:

1. Persons with visual impairment – includes people with blindness, low vision and colour blindness
2. Persons with hearing impaired – includes persons with deafness and various degrees of hardness of hearing
3. Persons with motor disabilities – includes inability to use a mouse, slow response time and limited fine motor control
4. Persons with cognitive disabilities – includes learning disabilities, distractibility, inability to remember or focus on large amounts of information.

Contrary to common belief, adapting the user interface, content or designing of the internet to suit the needs of users with disabilities is a fairly uncomplicated process that can be managed even while retaining the look and feel of a regular webpage. Also, adaptations benefit not just persons with disabilities but other users also as everyone enjoys well organised content, easy navigation and clear illustrations. Videos with captions benefit not just people with hearing impairments but can also be beneficial to those watching the video without audio or those who find it difficult to follow the accent or voice of the narrator.

Assistive Technology to Aid Accessibility

Assistive Technology has made it possible for persons with disabilities to operate and utilise products and services along with other users without disabilities. To enable universal accessibility, it is important to recognise the key role played by assistive technology and create products and services such that persons using assistive technology are able to make equal use of the facilities provided.

Briefly explained below are some of the technological and non-technological solutions that are being utilised by users with disabilities to access the web.[27]

27. Web AIM, "Introduction to Web Accessibility", available at http://webaim.org/intro/, last accessed on January 26, 2014.

Vision:
Problem: For blind and visually impaired people, visual data is not accessible. Therefore, they require audio based solutions, high contrast, magnification and the like. These technologies come in the form of hardware and software.

Hardware:

1. Refreshable Braille Display: This is an electro-mechanical device that displays text outputs while using a computer. It can be used along with speech synthesizers or on its own.

Mobile features:
Software:

1. Screen Readers: These are used by persons with visual impairment. Screen readers are softwares that convert text into synthesized speech, enabling users to listen to the web content. They make it possible for users to access information and navigate through the web by listening and responding to the audio signals. Some of the popular screen readers are JAWS, NVDA, Window Eyes and Home Page Reader.
2. Screen Magnifiers: These are used by persons who have low vision. This technology enables users with low vision to zoom in on a small portion of the screen and magnify the content so as to be able to read it clearly. Some of the popular screen magnifiers are ZoomText and Magic.

Mobile Features:

1. Tactile Markers: These markers allow the users to orient themselves on the keypad which includes things like a raised dot on number 5 for navigation.
2. Audible cues: These are specific sounds that indicate things like low battery, caller waiting or missed calls.[28]

Apps:

1. Look Tell Money Reader: This app immediately recognises the currency and speaks the denomination enabling persons with visual impairment to use money quickly. The app supports 21 currencies including the US Dollar, Australian Dollar, Bahraini Dinar, Brazilian Real, Belarusian Ruble, British Pound, Canadian Dollar, Euro, Hungarian Forint, Israeli Shekel, Indian Rupee, Japanese Yen, Kuwaiti Dinar, Mexican Peso, New Zealand Dollar, Polish Zloty, Russian Ruble, Saudi Arabian Riyal, Singapore Dollar, and United Arab Emirates Dirham. The app does not require an internet connection and is available for IPhone 5, 4S, 4, 3GS, IPod Touch 4th Gen, IPad 2 & 3 and Mac OS X.[29]

Hearing:
Problem: Those who are deaf or hard-of-hearing can't communicate via telephone or hear automated electronic messages.

Technologies:

1. Assistive listening devices (ALD): They amplify audio output from other devices like the TV or radio to hear clearly in environments.
2. Teletext: This offers a range of text based information.

28. For more see Making Mobile Phones and Services Accessible for Persons with Disabilities, *ITU*, available at http://www.itu.int/ITU-D/sis/PwDs/Documents/Mobile_Report.pdf, last accessed on January 26, 2014.
29. For more see Look Tel Products, available at http://www.looktel.com/moneyreader, last accessed on January 24, 2014.

3. Hearing loop systems: This uses electromagnetic energy to transmit sound. It can be worn on the head like a headpiece.

Mobile Features:

1. Vibrating Alerts[30]
2. Visual or tactile indicators on the keypad: Lights or vibrations after actions have been performed or buttons being pushed is a useful indicator.
3. Captioning: Some phones support closed captioning, open captioning and subtitles for videos.

Apps:

1. MobileSign: This is a British sign language lexicon that provides information on more than 4000 signs. It is available on both Google Play and Apple Store and is a very useful tool for communication for persons with hearing impairment.[31]
2. ASL Dictionary: This is an American Sign Language dictionary with more than 4800 signs. The app allows the videos to be slowed down and looped for easier learning. It also has signs for common phrases, idioms and symbols.
3. My Smart Hands – Baby sign language dictionary: This app has been designed for parents of children with hearing impairment. This app has more than 300 videos of the most common signs for children with verbal description of the motion to ensure that the parent is signing correctly.
4. Tap Tap: This app is designed to vibrate and flash whenever there is any sound. It has been particularly created for persons with hearing impairment as it would alert them to important sounds in their surrounding such as sudden screaming and shouting or the buzz of the smoke alarm.[32]

Motor Disability[33]:

Problem: People who have no or diminished motor capacity will not be able to press buttons or physically navigate through most technology.

Technologies:

1. Mouth Stick: Though not a technological device, a mouth stick is one of the most popular devices used by persons with disabilities who are unable to use their hands for operating a keyboard. A mouth stick is a hard stick that is held in the mouth by the user and used to type on a keyboard. Some users who have better control on their mouth sticks can also use it to manipulate a track ball mouse.
2. Head Wand: This device is similar to the mouth stick and is used by persons with disabilities who are unable to use their hands for operating keyboard or mouse. The head wand is strapped to the head and the person moves his or her head to type on the keyboard or navigates through web documents.
3. Single Switch Access: People who have very limited mobility use this type of device. If a person can move only the head, for example, a switch could be placed to the side of the head that would allow the person to click it with head movements. This clicking action is usually interpreted by special software on the computer, allowing the user to navigate through the operating system, web pages, and other environments. Some software facilitates the typing of words by using an auto-complete feature that tries to guess what the person is typing, and allowing the person to choose between the words that it guesses.

30. See reference 13 above.
31. For more see Mobile Sign, available at http://www.mobilesign.org/, last accessed on January 26, 2014.
32. See more at http://appadvice.com/applists/show/apps-for-the-deaf
33. See reference 13 above.

4. Sip and Puff Switch: Similar in functionality to the single switch described above, sip and puff switches are able to interpret the user's breath actions as on/off signals, and can be used for a variety of purposes, from controlling a wheelchair to navigating a computer. The hardware can be combined with software that extends the functionality of this simple device for more sophisticated applications.
5. Oversized Trackball Mouse: A trackball mouse is not necessarily an assistive technology—some people without disabilities simply prefer it to the standard mouse—but it is often easier for a person with a motor disability to operate than a standard mouse. Someone may, for example, use a trackball mouse in conjunction with a head wand or mouth stick. It is relatively easy to manipulate a trackball with these devices and much harder to manipulate a standard mouse. Someone with tremors in the hands may also find this kind of mouse more useful because once the person moves the mouse cursor to the right location, there is less danger of accidentally moving the cursor while trying to click on the mouse button. A person with tremors in the hands could also manipulate the trackball mouse with a foot, if there is enough motor control in the feet.
6. Adaptive Keyboard: In cases where a person does not have reliable muscle control in the hands for precision movements, an adaptive keyboard can be useful. Some adaptive keyboards have raised areas in between the keys, rather than lowered areas, to allow the person to first place the hand down on the keyboard, then slide the finger into the correct key. A person with tremors, or spastic movements could benefit from this type of keyboard. Keyboard overlays are also available as an adaptation to standard keyboards, which achieve the same results. In some cases, adaptive keyboards come with specialized software with word-completion technology, allowing the person to type with fewer keystrokes, since typing can be rather laborious and slow otherwise.
7. Eye Tracking: Eye tracking devices can be a powerful alternative for individuals with no control, or only limited control, over their hand movements. The device follows the movement of the eyes and allows the person to navigate through the web with only eye movements. Special software allows the person to type, and may include word-completion technology to speed up the process. These systems can be expensive—usually in the thousands of US dollars—so they are less common than the less sophisticated devices, such as mouth sticks and head wands.
8. Voice Recognition: This software is used by persons with disabilities who are unable to use their hands to type or navigate through the web using a keyboard. This software allows a person to control a computer through speech.
9. Apps:
10. Wheelcrowd: This application helps in searching for wheelchair accessible places such as restaurants, facilities etc. around a neighbourhood. This application is available for both IPhone and Android users. This application is currently developed to provide information in Germany.[34]
11. City Rollers: This free app is specifically made for wheelchair users to assist in navigating through cities on wheels. It allows users to locate, add and rate important places such as rest rooms, public transportation, restaurants and wheelchair supply and repair shops. Version 1.0 of this app provides support for select American cities. It is compatible with IPhone.
12. Fast Mall: This free app provides directions to wheelchair accessible routes in malls especially to elevators and rest rooms in malls and shopping districts. It functions even while offline. It is optimised for IPhone 3 and above.

34. For more see Jabberwocky, available at http://jabberwocky.eu/2012/11/25/wheelcrowd/, last accessed on January 25, 2014.

13. Local Eats: Upon keying in the location, this free app provides information on the local restaurants and indicates whether they are wheelchair accessible. This is optimised for IPhone.[35]

Cognition:
Problem: People with cognitive disabilities find it difficult to navigate through normal functions of technologies and hence need technologies that are simpler to compensate for things like diminished analytical skills, reading skills etc.
Technologies[36]:

1. Predictive text: This makes it easier to compose messages.
2. Prompting: External cueing systems are useful for people with memory and organization problems as it prompts the next steps of a task and send reminders as in the case of built-in schedule reminders.

E-Governance

In 2007, India ratified the United Nations Convention on the Rights of the Persons with Disabilities (UNCRPD). The convention says that "State Parties shall take appropriate measures to ensure to persons with disabilities, access on an equal basis with others, to the physical environment, to transportation, to information and communications, including ICTs and systems and to other facilities and services open or provided to the public." When a party to a convention ratifies it, it means that they have to have domestic legislation or policy passed by the legislative body making it law within the country. Many countries who are signatories to the UNCRPD have also ratified it to ensure equality for those with disabilities.

The Indian government as well has recognized that electronics and ICTs are important enabling mechanisms to mitigate the barriers faced by disabled people. In October 2013, the Union cabinet approved the National Policy on Universal Electronic Accessibility[37] that among other things, mainly recognizes the need to eradicate discrimination against the disabled and to foster equal access to electronics and ICTs. Various stakeholders including NGOs commented on it and the policy was prepared after incorporating them. The policy attempts to facilitate access to physically and mentally disabled persons as well as local language support thought universal access to electronics and ICT products. The plan of action for this policy is:

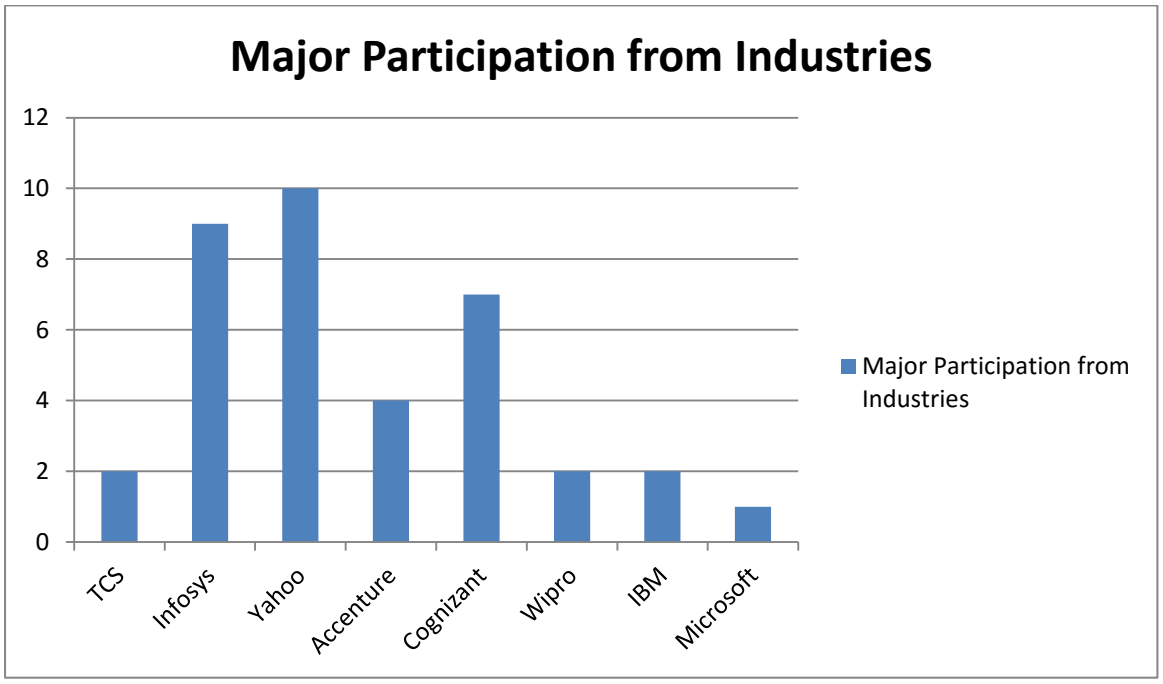
1. Creating awareness on universal electronics accessibility and universal design.
2. Capacity building and infrastructure development.
3. Setting up of model electronics and ICTs centres for providing training and demonstration to special educators and physically as well as mentally challenged persons.
4. Conducting research and development, use of innovation, ideas, technology etc. whether indigenous or outsourced from abroad. \
5. Developing programme and schemes with greater emphasis for differently abled women/children.
   Developing procurement guidelines for electronics and ICTs for accessibility and assistive needs.

35. For more information see Paralysis Resource Center, available at http://www.christopherreeve.org/site/c.mtKZKgMWKwG/b.6133757/k.38B9/2010_Travel.htm, last accessed on January 25, 2014.
36. See more at http://www.pulse.embs.org/Past_Issues/2008March/LoPresti.pdf
37. For more see Press Information Bureau, Government of India, available at http://pib.nic.in/newsite/erelease.aspx?relid=99845, last accessed on January 26, 2014.

Under the Ministry of Social Justice and Empowerment, there is a Department of Disability Affairs. In 1995, the Equal Opportunities, Protection of Rights & Full Participation Act[38] (a.k.a The Persons with Disability Act) was passed as one of the acts under this department. The act calls for the education, employment, creation of a barrier free environment, social security and other areas of discrimination for the disabled.

1. It provides for the evolution of policy in that directly benefits people with disabilities.
2. It calls for the implementation of the laws and policies of the Act.
3. It also calls for monitoring the implementation process and the redressal of grievances.

As we can see, there is a dearth of Acts and legislations relating to accessibility in India when compared to a lot of other countries in the west and even in Asia. It is an even more unfortunate state of affairs that the acts that are already in place are still not being implemented to the full effect. Even the participation of industries is lacking in terms of web accessibility. On a scale of 10, with 10 being the high quality accessibility, the following chart shows examples of industrial efforts in this matter.



Given above is a chart depicting participation from leading industries such as TCS, Infosys, Yahoo, IBM, Microsoft, Accenture, Cognizant, Wipro, etc.[39]

38. See more at http://www.thenationaltrust.co.in/nt/images/stories/pwdact1995.pdf
39. See more at http://www.w3cindia.in/word_pdf/WAI-workshop-report.pdf

Websites

The age of the internet has had many unintended consequences in the field of accessibility and most of them have been in terms of information dissemination. There have also been intentional consequences in terms of web based services that help serve the disabled communities. In terms of general services, the internet opens windows for people in professional, educational, consumer, economic and government service aspects. In the social sphere, there is the ability to do social networking, form interest groups, video and text communication. In order for these avenues of living to be accessible to disabled people at the same level changes have to be made in various ICTs so that they accessible when they are released. The guiding principle is that if every ICT or service is made inherently accessible, then no changes need to be made specifically for PWDs. When this isn't possible, then reasonable accommodation has to be made. When adaptations are required, there are third party accessibility softwares that have to be used. According to the ITU, websites, as the theatres of accessibility have a greater socio-economic and educational impact than any other ICT with the exception of mobile phones for independent living.[40]It is also easy to make websites inherently accessible so there is a great potential for accessibility here.

The different disabilities require different technologies to facilitate access to the internet. People with visual impairments could use a range of technologies from a screen reader, screen magnifier to glasses. People with motor impairments use one handed key boards and the deaf can use cochlear implants. However, the main space for accessible design has to be the websites themselves.

User Interface and Design Considerations for Better Accessibility

The Web Content Accessibility Guidelines 2.0 (WCAG 2.0) brought out by the World Wide Web Consortium (W3C) covers a wide range of recommendations to make the web content more accessible. Following these guidelines will make content more accessible to a wider range of people with disabilities including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movements, speech disabilities, photo sensitivity and combinations of these.[41]

The WCAG 2.0 guidelines can be broadly categorised as:

Perceivable:

1. Provide text alternatives for any non text content so that it can be changed into other forms people need, such as large print, Braille, speech, symbols or simpler language
2. Provide alternatives for time-based media
3. Create content that can be presented in different ways (for example simpler layout) without losing information or structure
4. Make it easier for users to see and hear content including separating foreground from background.

Operable:

5. Make all functionality available from a keyboard
6. Provide users enough time to read and use content
7. Do not design content in a way known to cause seizures
8. Provide ways to help users navigate, find content and determine where they are

40. See more at http://www.itu.int/en/action/accessibility/Documents/The%20ICT%20Opportunity%20for%20a%20Disability_Inclusive%20Development%20Framework.pdf
41. Web Content Accessibility Guidelines (WCAG) 2.0, *W3C*, available at http://www.w3.org/TR/WCAG/, last accessed on January 25, 2014.

9. Understandable –
10. Make text content readable and understandable
11. Make web pages appear and operate in predictable ways
12. Help users avoid and correct mistakes
    a. Robust:
13. Maximise compatibility with current and future user agents including assistive technologies.

Given below (in a table) is an example of how the WCAG standards of accessible websites have been applied in various countries:[42]

Criteria	US	EU	Korea	Philippines	Australia	Thailand
Type of Policy	Legislation	Council Resolution + Action Plan	Legislation	Working group currently formulating policy.	Legislation + Advisory Notes	Policy + guidelines
Effective From	1998, 2010	2002	2007	N/A	1992, 2002, 2010	Not available
Scope of Coverage	Web and other infrastructure as well	Includes other electronic infrastructure	Web and other infrastructure as well	N/A	General legislation with web specific advisory notes	Web accessibility guidelines
Compliance with WCAG	Partly	Yes	Yes	N/A	Yes	Partially compliant with WCAG 1.0s
Applicability	Only Federal Department and related agencies.	Public Sector Websites of the Member States	Both private and public sector gradually by 2015 as per the current roadmap.	N/A	Any individual/ organization creating a web page (Government & Private)	Guidelines targeted at both the private and public sectors
Signatory to UNCRPD	Yes	Yes	Yes	Yes, signed and ratified	Yes and also signed and ratified the optional protocol	Yes, signed and ratified

Accessibility of Content

Accessible content is the most vital aspect of e-accessibility. Content that is present directly on the web and that is shared electronically need to be accessible to persons with various disabilities and thus with varying accessibility requirements.

Screen reader users, for example, would not be able to access content in graphical or image format. This is also true for documents in pdf formats as not all content in pdf is accessible through screen readers. While pdf documents that are tagged are accessible through screen readers, those documents that are structured, unstructured or secured are still inaccessible. Document formats that are accessible are listed below:

42. For more see Web Accessibility Policy Making: An International Perspective, *G3ict and Centre for Internet and Society*, available at http://cis-india.org/accessibility/web-accessibility.pdf, last accessed on January 26, 2014.

1. HTML
2. MS Word Document
3. Text Document
4. Daisy
5. Epub
6. PDF

Content in audio format is inaccessible to persons with hearing impaired. This applies to not only audio files, but also to videos as they usually are accompanied by audio outputs. Additionally, videos are also inaccessible to persons with visual impairment. In order to make audio files and videos universally accessible, videos should be accompanied with narration while both audio files and videos should have captions and sub titles.

A critical step that needs to be taken to make content accessible is to formulate a binding policy that would require all web content developers to ensure accessibility of their content. A good example of this would be the enactment of the Copyright Act, as the various provisions under it made it possible for printed books to be converted into accessible format for persons with print impairment. This in turn made it possible for millions of people to be able to access information that had remained inaccessible before. The World Intellectual Property Organisation (WIPO) agreed on a Treaty for the Visually Impaired that aims at making millions of printed books and other material available to persons with print impairment by converting them to alternate accessible formats.

In order to make it compulsory for web developers in India to design websites that comply with the requirements for e-accessibility, there is a need to put in place a policy that would mandate strict adherence to norms. The Government of India, through the Department of Electronics and Information Technology, set up a process to formulate a national policy to ensure accessibility of websites and ICT products and services In August 2009. This policy requires that all government websites comply with WCAG 2.0 and with other international accessibility standards for all electronic information and products and services delivery. However, a study conducted by CIS in August 2012 in which 7800 websites were tested, it was found that close to 25% of the websites did not open. Almost all the remaining websites had accessibility issues. The study also highlighted shortcomings of many websites to meet the set accessibility requirements.

Access to physical environment and information is not a privilege but a right. The national policy is the need of the hour, one that is likely to make adherence to accessibility standards a compulsory requirement and in turn make the internet more accessible for persons with disabilities.

As we have seen, accessibility stretches out like a universe and for the purpose of brevity; we will be concentrating on accessibility in the context of ICTs. More specifically, we will be looking at the electronic infrastructure that is most ubiquitous and hence automatically become the objects of accessibility concerns. This will include websites from various interfaces like mobile phones and computers and television. Before we begin looking at the particular technologies, let us look at the administrators and ministries that are responsible for helping the disabled.

Government Websites

Policies like the Electronic Delivery of Services Bill, 2011 coming forth from the government are attempting to completely transition from manual to electronic delivery of services. In the implementation of all the e-governance goals of the Indian government, website inaccessibility is one of the biggest barriers. In India, there are many groups that don't are usually marginalized in the mainstream of websites like the illiterate, rural, only fluent in vernacular or the many disabled and website design by the government becomes crucial in the actuation of its services and a marker for the efficacy of its governance. Being an essential interface between the government and its citizenry, websites thus become the lowest hanging fruit in attaining a better democracy. It is rather unfortunate, therefore that when a study was conducted testing 7800 government websites, 1985 of them didn't even open.[43] Most of the remaining 5815 websites has some accessibility problem. This shows that the government has a long way to go before it can claim to provide services online because even if the services are being shifted, they are not being used by many marginalized demographics in the country due to accessibility issues with the websites themselves.

Mobile Devices

In the gallery of ICTs we have discussed mobile phones are the most crucial to persons with disabilities for independent living, which is the cornerstone of accessibility. At a basic level, the ability to make phone calls and send SMSs ensures that emergency services, personal aides and family members are merely a few buttons away. Added to this, the pervasiveness of mobile phones has made it the most ubiquitous ICT platform in the world with more than 4 billion subscribers. The potential of mobiles goes deeper with the advent of smart phones which can be used to aid the physical, sensory and cognitive needs of the disabled. Hearing aid compatibility is starting to become a mandate in many countries in smart phones like the FCC HAC mandate in the U.S.[44] There are screen readers built into mobile phones along with adjustable font settings, predictive text and voice recognizers that can make mobile phones more accessible.[45] The main feature of a mobile phone that increases independence is the fact that it is small and portable unlike a laptop and can be accessed quickly and from anywhere in the network. Many accessibility technologies are high cost and cumbersome to handle physically but mobile phones are often operator-subsidized, easily customizable and much cheaper than computers. In the current app market, many phones come with built-in accessibility systems and easily downloadable apps. The W3C has a set of standards called Mobile Web Application Best Practices.[46] The goal of these standards is to aid in the development of rich and dynamic mobile web applications by listing out the relevant engineering practices that enable a better user experience and warn against some practices that may be counterproductive or even harmful.

In the evolution of mobile accessibility consciousness, there have been three major factors:

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43. For more see Nirmita Narasimhan, Mukesh Sharma and Dinesh Kaushal, "Accessibility of Government Websites in India: A Report", *Centre for Internet and Society and Hans Foundation*, available at http://cis-india.org/accessibility/accessibility-of-government-websites-in-india, last accessed on January 26, 2014.
44. For more see "The ICT Opportunity for a Disability-Inclusive Development Framework", *ITU*, available at http://www.itu.int/en/action/accessibility/Documents/The%20ICT%20Opportunity%20for%20a%20Disability_Inclusive%20Development%20Framework.pdf, last accessed on January 26, 2014.
45. For more see Nirmita Narasimhan (ed.) e-Accessibility Policy Handbook for Persons with Disabilities, *ITU, G3ict and the Centre for Internet and Society*, available at http://cis-india.org/accessibility/publications/e-accessibility, last accessed on January 25, 2014.
46. For more see Mobile Web Application Best Practices, available at http://www.w3.org/TR/mwabp/, last accessed on January 26, 2014.

1. The increased processing power coupled with creative software has lead to useful user interfaces with features like voice recognition or text to speech.
2. An increased effort on the part of regulators, activists and users to rectify hearing aid compatibility and visually inaccessible handsets.
3. In many wireless markets that are saturated, the realization has dawned on operators that the disabled and elderly represent an untapped market.

TV and Radio

In the past two decades, the newer ICTs like mobiles and computers have become the primary means of social inclusion and accessibility. However, the older ICTs like TV and radio are not yet obsolete and can play an important role in accessibility. Traditionally, the radio has been an indispensible source of information for the visually impaired and now, the digital radio remains relevant in keeping the visually impaired informed. Whatever the type of radio being used, the listener has to navigate through a range of hardware (displays, dials and buttons) and software (menus, schedule guides, etc) which makes it challenging to use for persons with disabilities. People with visual impairments will probably need labelled buttons that can be read through touch, display settings that can increase the size and different brightness options. People who use internet or mobile radio will need the applications or websites to be compatible with the other assistive hardware and software that they use for along with their computers or mobile devices.[47] The Research Institute for Consumer Affairs, UK (RICA) conducted a consumer study and identified the radio model 'Roberts RD-8BW Duet' as user friendly for blind and partially sighted persons. [48]

It has a good reception; it has separate rotary dials, 5 large illuminated presser buttons and a large display.

Even the TV and traditional broadcasting remains relevant as they provide visual, audio and textual information through closed captioning. Digital TV allows for the option of sign language interpretation and voice over audio channels in the signals that are broadcasted. The internet is, however, usurping many of the functions of the TV and the Internet Protocol Television (IPTV) is an example of that. This is a system through which traditional television services are delivered using the internet instead of the old terrestrial, satellite signal or cable television formats. Time shifted television (catch up TV) and video on demand (VOD) are examples of IPTVs. To make this clear, for cable, satellite/ terrestrial television, the equipments involved are televisions, a separate receiver called 'set-top box' is used sometimes and a remote control. For internet or mobile television, the equipments involved are PCs or mobiles with internet access. Here as well, like in the case of radios, regardless of the type of television being used, there needs to be a constant engagement with hardware (screens, buttons, cables) and software (menus, programme guides, pause/rewind function etc) which can prove difficult for people with sensory and physical disabilities. Accessible equipment is required to use the television itself which is a huge barrier. The second layer of accessibility comes from the content of the television programmes which remain opaque to the visually or hearing impaired. Captions, audio descriptions of video content and sign language are necessary in order to make the content accessible. The ITU-T has been spearheading the standardization in IPTV and has worked out some standards for IPTV accessibility.

47. For more see Nirmita Narasimhan (ed.) e-Accessibility Policy Handbook for Persons with Disabilities, *ITU, G3ict and the Centre for Internet and Society*, available at http://cis-india.org/accessibility/publications/e-accessibility, last accessed on January 25, 2014.
48. For more see Roberts RD-8BW Duet 2, available at http://www.rica.org.uk/content/roberts-rd-8bw-duet-2, last accessed on January 26, 2014.

1. Secure
2. Reliable
3. Accessible
4. Open
5. Green
6. Global
7. Interoperable

Additional Reading

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2. Web Accessibility Policy Making: An International Perspective, January 2012, *G3ict, Hans Foundation and the Centre for Internet and Society*,http://cis-india.org/accessibility/web-accessibility.pdf.
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6. Accessibility and the Purposes of ICTs, e-Accessibility Policy Toolkit for Persons with Disabilities,*International Telecommunication Union and G3ict*, http://e-accessibilitytoolkit.org/toolkit/eaccessibility_basics/accessibility_and_the_purposes_of_icts#what.
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Unit 4: Access to Knowledge

Introduction

In the middle of the 16th century, Queen Mary was faced with a difficult question that was brought to her by none other than most powerful publishing house in England at the time. The Stationers, like any other craft guild in the business of printing and producing books loved a monopoly in the profits of their books and terribly feared competition.[49] Therefore, they went to Queen Mary with the request of a royal charter. This charter would allow them to seize illicit editions of their books and bar the publication of books unlicensed by the crown. The Queen suddenly thought that this could indeed be a more efficient way to squash sedition and dissent through censorship by puppeteering this craft guild than previous, perhaps less subtle means like torture and death. In 1557, she granted them this early form of a copyright. Notice how the author or the creator of the work has no place in this agreement and the origins of intellectual property in English law are based on privilege, namely power and profit. This rhetoric, however, changes with the coming of the 18th century and the passing of the *Act of Anne* in 1707 to one of creativity and learning. The concern for the author has a steady positivist rise after this in the tug of war over intellectual property. In the case *Miller v Taylor* in 1769, the author sought to extend copyright to common law. Three judges ruled in favor of this motion and two judges ruled against.[50] A closer examination at the reasoning provided by the three assenting judges will tell us almost all the philosophical justifications of intellectual property. The first judge called upon his notion of justice and said it is just that the author control the destiny of his work as it is a product of his labor. The second judge said that extending the copyright would encourage creativity by making the work the creator's property. The third judge said it is the authors natural right as the work wouldn't exist if not for the mental labor of the author. Together, justice, incentives and natural rights are the cornerstones of the justifications of intellectual property.

Although history is littered with theories on property, there have been only sparse discussions on intellectual property. The question then arises, can intellectual property be accommodated within normal property. The similarity is in the fact that intellectual property is also a relationship between people but the difference lies in the fact that the object is an abstract one.[51] This leads many to believe that it cannot be subject to the same rules of property. The first dissenting judge in *Miller v Taylor*, for example, said that abstract ideas cannot be occupied like corporeal objects so they cannot be property. He said the author deserves a reward which the *Act of Anne* provides in the form of limited monopoly but that's about it. In fact, an idea is almost the perfect example of a resource like the air or light that is not zero sum and inexhaustible in that my use of it doesn't take away from your use of it. Neither air nor light can become personal property which leaves ideas in a property limbo. This leaves room for very interesting discussions and debates over the existence of intellectual property and the place it should occupy in society. This discourse has largely taken two forms: the deontological and the consequentialist. Deontological justifications for IP come from *a priori* reasons like rights or duties which can be established in many forms. There is the ontological basis for rights which answers questions like whether rights exist and if so, where they come from. One of the preeminent figures in this discourse has been John Locke, an English philosopher whose argument for individual property as "natural rights" remains relevant even today when applied to intellectual property. Locke's major assumptions in his claim were:

49. Peter Dravos
50. Ibid
51. Ibid

God has given the world to people in common.
Every person owns his own personality.
A person's labor belongs to him.
When a person mixes his labor with something in the commons he makes it his property.
The right of property is contingent upon its being good for commoners.[52]

In order to extend this argument, Locke says that exclusive ownership of a resource is a precondition for production. Ideas before labored upon by people, however, are not exclusively owned which resists the cross application of his ideas to intellectual property. Another impediment in extending the natural right to intellectual property is the 5th assumption. Intellectual labor, in annexing an idea, stops it from becoming a part of the intellectual commons. If this labor, armed with the property of becoming property is doing a disservice to society, then it may not be a natural right at all. The notion that ideas are a part of the intellectual commons is also one that needed evidence and Locke found that in scripture as Judeo-Christian philosophy clearly advocates the idea of all worldly resources being part of the commons.

Hegel, on the other hand, took the route of personality theory. He argued that if individuals have claims to anything, they had to be considered an individual first. He states that in order to be individuals, people must have a moral claim to things like their character traits, feelings, talents and experience.[53] The definition of these aspects or the process of self-actualization requires an interaction with tangible and intangible objects in the world. The external actualization process requires property that includes intellectual property for Hegel as he sees the works as an extension or an establishment of the self in the external world that embody the person's personality in an inseparable and even immortal way.

Another form is in linguistics, where we ask questions like what we mean when we say rights and property. Skinner said that in the history of intellectual property law, the social context of its use and the matrix of assumptions involved in reference is the determining factor. This is why the history of intellectual property is as important as and to the philosophical underpinnings.

The consequentialist justifications of IP assume that the specious connection between IP and creativity is fact and warn of a chilling effect on creative activity in the absence of IP. History shows us that the relationship between IP and creativity is local and contingent rather than necessary and universal. Imperial China, for example, was a creative and inventive empire that gave rise to many technologies and artistic subcultures without any promise of IP. Indeed, Marx's historical materialism could be seen as condemning IP as a superstructural phenomenon in the industrial development phase of capitalist societies and one that a future society can function well without.[54] If one was interested in the consequentialist debate over IP, then historical empirical data would be more important than an *a priori* analysis.
The lack of a definitive philosophical, ethical or normative justification for the existence of Intellectual Property rights unlike those for free expression or equal treatment under the law shows us that its application needs to be tempered with other considerations. If, as Rawls suggested, we hide behind the veil of ignorance and tried to form an ideal society, then IP may not feature within it as it tends to create social stratification and further marginalizes the least

52. Ibid.
53. For more on intellectual property see http://plato.stanford.edu/entries/intellectual-property/
54. Supra note above.

advantaged in social life and democratic culture.[55] Since IP's are liberty intrusive privileges that do not "allow the most extensive liberty compatible with a like liberty for all." or "benefit the least advantaged." or are "open to all under conditions of fair equality of opportunity.", their utilitarian claims of creativity have to answer to the injustices that manifest from them before they get a carte blanche in society.

The access to knowledge has been a yearning of society to shift and dilute the concentration of this most precious of resources because of the old adage "knowledge is power". This concept, however, can be understood from many lenses including the sociological and the legal. At first, in order to understand the importance of the legal entities under access to knowledge, we must explore its saliency in society.

Humanity world over is at the cusp of a major shift in the production, consumption, dissemination and distribution of knowledge. This warrants changes in frameworks of looking at knowledge, information and data in the digital era at multiple levels and by multiple players including students, academics, entrepreneurs, researchers, civil society and the State. In order to understand why and how knowledge matters in the world today, we must see how it makes a difference in our world and how it materially changes the world.

Many prominent economists and social theorists have sought to claim that knowledge has affected the organization of society in a manner that is different than in previous eras though knowledge has been an organizing principle of society throughout history. How the exact time of the shift and the nature of the shift are catalogued will depend on what category the basis is. From an economic perspective, Marx said that the capitalist system depends on the constant improvement and dynamism of technology. The real understanding of the role of knowledge in our economy came when Robert Solow posited that the majority of economic growth in the beginning of the 20th century was less due to labor or capital and more due to technological changes. These advances in knowledge came in the form of new machines to new production techniques that made the production process more efficient.[56] Fritz Machlup stated that in the 1960's the change in the knowledge intensity of the economy was marked by "an increase in the share of 'knowledge-producing' labor in total employment." The Harvard historian Daniel Bell observed in his study of post-industrial societies that 1/3rd of the US workers were employed in the service industry at the turn of the century but by the 1980's almost 7/10ths of the workers were employed in the service industries.[57] People who were employed in the industrial sectors were flocking steadily to finance, education, information technology and the cultural industry. The movements of people came as a reaction to the movement of profitability from industrial sectors to finance, biotechnology and information technology. Knowledge basically is a positive feedback loop which means that as more information and communication technologies emerge, it allows more innovation. Manuel Castell categorizes this shift in the place of knowledge as a global one even though it's concentrated in a few wealthy countries because all the economies ultimately depend on the global one. The disparity between countries is still massive but it used to be just in terms of raw materials and manufactured goods but now at a global level, there is a huge knowledge (high technology low technology, high knowledge services low knowledge services) disparity between wealthy and non-wealthy countries. This

55. For more see Darryl J. Murphy "Are Intellectual Property rights compatible with Rawlsian principles of justice?, *Springer*, available at http://link.springer.com/article/10.1007%2Fs10676-012-9288-8
56. For more see Ashish Rajadhyaksha, "The Last Cultural Mile", Centre for Internet and Society, available at http://cis-india.org/raw/histories-of-the-internet/last-cultural-mile.pdf, last accessed on February 1, 2014.
57. See citation above.

claim may seem to imply that knowledge is simply technical and scientific, but there are obviously other important kinds of knowledge like ethical and humanities knowledge. The point here is that the enhanced ability of humans to organize and employ specific kinds of technical and scientific knowledge has created a huge shift in the global economy similar to the effect of the increase in access to knowledge from the invention of printing press. This shift in the importance of knowledge has made our health better as well. The average lifespan has increased exponentially in the past half century and it is our scientific advancement in the mechanisms of disease and medicine that has aided this achievement.

When there is so much integral societal dependence on knowledge, the non market production of knowledge is essential for equality in access to this knowledge. Yochai Benkler stated that the processing power of the modern computers linked together on the internet creates a platform that allows for new kinds of collaboration. Apart from new kinds of political activism, it also leads to decentralized knowledge production like open source/ free software and Wikipedia.

Within this context of the digital turn, openness and transparency are gaining newer significance. On the one hand emerging participatory models of openness like Wikipedia[58] are increasingly pushing us to look beyond the traditional models of the bygone century;[59] on the other hand these models are being thought of to be effective even in governance and policy making. Open data,[60] for instance is becoming a key prerequisite for the State and civil society alike in imagining better governance models. This could potentially create a pre-condition for the transformation of society into a 'Knowledge Society', wherein the citizen is increasingly repositioned from a 'spectator' to 'spect-actor'.[61] Eventually, the distinction between a knowledge society and governance could get blurred. However, this process needs strong civil society players to catalyze and cultivate an effective knowledge society. Such work happens at multiple layers of policy coupled with advocacy, research, dissemination and infrastructure creation. The larger policy debate happens in the form of a contest between understandings of knowledge. The two sides are knowledge as property versus knowledge as a common resource. This tension is explored in the Universal Declaration of Human Rights.

The Right to Access to Knowledge

The discourse around the access to knowledge has been around for a while as it is inscribed in the Universal Declaration of Human Rights which was adopted in 1948. Article 27 of the charter attempts to bring about a balance between the right of access and the protection of material interests.

58. Geert Lovink and Nathaniel Tkacz, Critical Point of View: A Wikipedia Reader, published by CIS and Institute of Network Cultures,
available at http://www.networkcultures.org/_uploads/%237reader_Wikipedia.pdf
59. The Access to Knowledge (Wikipedia) team from CIS has held several workshops and produced more than 50 blog entries in nearly 10 months.
60. See Pranesh Prakash, Nishant Shah, Sunil Abraham and Glover Wright, "Open Government Data Study: India" published by Transparency & Accountability Initiative, available at http://cis-india.org/openness/blog/publications/open-government.pdf
61. A term coined by the Brazilian theatre practitioner Augusto Boal in the context of theatre. This formulation of spect-actor is very useful in reimagining the citizen in the digital era that has created preconditions for the citizen to effectively participate in governance. For more on Spect-actor see Augusto, Boal (1993). *Theater of the Oppressed*. New York: Theatre Communications Group.

Article 27[62]

Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

Here, many academics and Access to Knowledge theorists posit that the right to access to knowledge is the more important right. This is because the right to material protection or rather the Intellectual Property (IP) right is ultimately for sale and transferrable so is not inalienable like the right to access to knowledge. Many right to knowledge theorists are of the opinion that the level of IP protection currently in place in the world is too much.

In 1996, the International Covenant on Civil and Political Rights (ICCPR)[63] was adopted by the General Assembly of the UN. As we may expect, the right to free speech has a longer history of acceptance and positivist outlook on it. Article 19 of the ICCPR reads as follows:

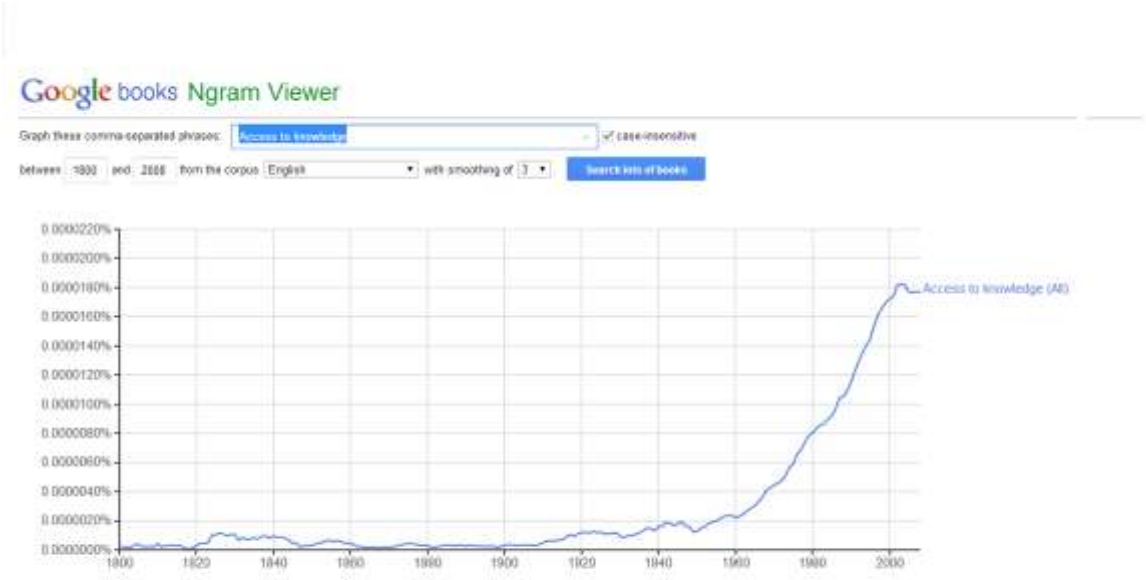
"Article 19.

1. Everyone shall have the right to hold opinions without interference.
2. Everyone shall have the right to freedom of expression; this right shall include freedom *to seek, receive* and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of his choice.
3. The exercise of the rights provided for in paragraph 2 of this article carries with it special duties and responsibilities. It may therefore be subject to certain restrictions, but these shall only be such as are provided by law and are necessary:
    a. For respect of the rights or reputations of others;
    b. For the protection of national security or of public order (order public), or of public health or morals." (Italics are mine)

The idea that free speech includes the right to seek and receive is something that will be discussed in the chapter on free speech but the important positive externality or reading that one can glean from this wording is that the access to knowledge becomes a right.

62. For more see Article 27 available at http://www.un.org/en/documents/udhr/index.shtml#a27, last accessed on January 31, 2014.

63 Read the full Covenant at https://treaties.un.org/doc/Publication/UNTS/Volume%20999/volume-999-I-14668-English.pdf



However, as you can see in the graph, the discourse around Access to knowledge doesn't begin to really take off until the early 1960's when the U.S government was just starting to build a network between computers. In the early stages of the modern internet around the early 1980's the discourse around access to knowledge becomes even more frequent. This is because intellectual property rights started to eclipse the astronomical increase in the production of knowledge and vast portions of the world's population remained in the dark. Especially, the production of academic knowledge has increased exponentially in the recent past which has made it essential that the barriers to this knowledge are attenuated as much as possible.Now that we have explored the sociological aspect of access to knowledge and the philosophical debates around it, let us look at how it is codified in law. Specifically we will look at copyright and patents.

Patents

What are Patents?

Of all forms of intellectual property rights (IPR) patents are said to be the most restrictive, granted to inventors of devices or processes on the basis that the invention is**novel**, can be applied for a **useful function**, and**involves an inventive step** (and may not be obvious to a professional in the relevant field).

Under **Indian patent law**, a patent is a **statutory right** for an invention, giving the inventor the **exclusivity** to prevent others from making, using, or selling the invention—unless, of course, they are to receive permission from the right holder and pay the necessary **royalty fees** to do so. For this reason, a patent holder is said to have a **monopoly** over the invention.[64]In return for this exclusivity, the right holder must disclose a detailed, accurate and complete written description of the invention to be available for the public.[65]

64. Stephan Kinsella, "Against Intellectual Property", Journal of Libertarian Studies 15, no. 2 (Spring 2001), available at http://www.stephankinsella.com/publications/against-intellectual-property/, last accessed on February 1, 2014.
65. See "Inventing the Funture: An Introduction to Patents for Small and Medium-sized Enterprises, World Intellectual Property Organization", available at http://www.wipo.int/export/sites/www/freepublications/en/sme/917/wipo_pub_917.pdf , last accessed on January 31, 2014.

A patent may be a **utility patent**, issued for the invention of a new and useful process, machine or product; a **design patent**, for a new and original design to be used in the manufacturing of a product; or a **plant patent**, for a new and distinct, invented or discovered type of plant.[66] Subject matter that is unpatentable in India includes an invention that is immoral, an invention which claims anything contrary to natural laws (e.g. gravity), the discovery of anything occurring in nature, and the formulation of an abstract theory.[67] That being said, a patentable invention generally must be able to result in a useful, concrete and tangible result, although restrictions of what is not patentable may vary country to country.

Patents are valid for a limited period of time; generally 20 years from the start of the term. A patent's exclusivity is also limited to the country in which it was granted, meaning that a patent holder may not be able to exclude others from the making, using, or selling of a similar invention in a different jurisdiction that would otherwise **infringe** upon the their IP right.[68]

Effects on Innovation

There are vast perspectives around the adoption and application of patents, ranging from a strong opposition—by those in favour of free and widespread access to products of innovation and knowledge processes (e.g. medicines and educational materials)—to those in strong support of a more restrictive intellectual property (IP) regime, as a means of protecting the inventor and his or her inventions.

One of the underlying principles for the consideration and enforcement of a patent regime is the claim that this form of IPR serves as an incentive for innovation to take place. By offering a "reward" in the form of statutory recognition, protection, and remuneration, the granting of a patent may encourage innovation. An opposing viewpoint to such a claim, however, may argue that patents do not encourage innovation, but stifle it, by preventing others from being able to innovate through their enforcement. Just as well, a patent is granted after the fact, and the odds of one's application being approved are quite slim—not to mention expensive!—so a patent would not be an ideal form of incentive, with remuneration only taking place when one's patent is infringed or one's monopoly abused.

One's monopoly may be abused when the right holder of a patent (or thousands!) brings an industry to a standstill by shutting out others from having their new inventions reach the market. Often, patents may prevent the manufacturing and selling of innovations that are not actually relevant, but claim by the right holder to fall within the scope of the patented invention.

The effects of the excessive granting and enforcement of patents may trickle down to the level of the individual when the economic threshold for starting a new business increases, one's business's profitability reduces due to the payments of royalties and legal expenses, and the potential for such an entrepreneur to scale beyond national boundaries is undermined.[69]

66. See "Types of Patents", available at http://www.uspto.gov/web/offices/ac/ido/oeip/taf/patdesc.htm , last accessed on January 31 , 2014
67. See "Inventions not Patentable in India", available at http://www.cazri.res.in/itmu/pdf/Inventions%20not%20Patentable%20in%20India.pdf, last accessed on January 31, 2014.
68. Supra note 62 above.
69. See Research Proposal on Pervasive Technologies available at http://cis-india.org/a2k/pervasive-technologies-research-proposal.pdf , last accessed on January 31, 2014.

Case Study: Pervasive Technologies

Because of these limitations placed onto others by patent holders, small-to-medium business and enterprises in India and China tend to ignore existing IPR for inventions they may use within their manufactured products due to the high costs associated to seeking permission and paying royalties to the right holder. For this reason, these businesses may only begin to develop protection and risk-mitigation strategies when they have scaled up and can afford to do so.[70]

A phenomenon that has risen out of a restrictive market and resulting repeated efforts to get around such restrictions is the "gray" market, where mobile phone are being manufactured with the likelihood of infringing upon a number of existing patents for inventions used in the manufactures. Mobile phones that are entirely legal may cost well over INR 8000/- (US $120) when gray market devices generally range from INR 3000/- to INR 4000/- (US $48-60), demonstrating the high price of patents on the availability of hardware.[71] The term, **pervasive devices**, coined by the Centre for Internet & Society, largely refers to sub-$100 communication devices that are becoming near-ubiquitous as a result of their increased availability to reach larger demographics of lesser income brackets.

Software Technologies

Although software technologies are predominantly protected under Indian copyright law, in countries such as the United Kingdom and the United States, software is patentable. Unlike American companies, such as IBM which has applied for 5,896 US patents, very seldom do Indian companies apply for software patents, and instead are likely to become at risk for litigation in attempts to penetrate markets elsewhere due to the patents already existing.

Most commonly, software producers from India do not own the rights to the IP they have created and instead adopt a "software as a service" (SAAS) business model, within which contracts signed require all IP developed to be signed over to the client. As international players continue to register a multitude of software patents, it becomes increasingly difficult for Indian companies to move away from this SAAS model to developing their own proprietary products due to the increased risk of litigation.[72]

Pre-Grant and Post Grant

Upon signing the **Trade Related Aspects Intellectual Property Rights (TRIPS) Agreement**, India introduced two kinds of patent oppositions, where an individual may write to the Indian Patent Office to oppose the granting of a patent. The first kind, **pre-grant opposition**, may occur after the patent application has been published by the Patent Office, but has not yet been granted, for the primary purpose of challenging the application's validity before a patent is granted. One may also give notice of opposition to the Patent Office *after* the granting of a patent, under **post-grant opposition**, so long as it occurs within a year of the granted patent's publication.[73]

Compulsory Licensing

In March 2012, the Government of India granted its first compulsory license ever to Indian generic drug manufacturer, Natco Pharma Ltd. to allow for the manufacturing of Sorateni

70. Ibid
71. Ibid
72. Ibid
73 http://techcorplegal.com/Indian_Law_Firm/patent_opposition_in_india_pregrant_patent_opposition_post_grant_opposition/

tosylate, a treatment for advanced kidney and liver cancer. Patent Holder and German pharmaceutical giant, Bayer Corporation, had not been making the drug adequately accessible to the people of India on a commercial scale, and had not imported the drug at all in 2008, and barely in 2009 and 2010. As a result, Natso Pharma Ltd. applied for a compulsory license.

Once granted, Natco was to pay a reduced royalty fee to Bayer quarterly, was required to provide the drug for free to at least 600 needy and deserving patients per year, to sell the drug for a set fee, as specified by the Indian government.

Pharmaceuticals have been an area of fierce debate as drugs for treating serious illnesses, such as malaria, HIV and AIDS, are widely available in the West, and generally too expensive for developing countries due to being protected by patents, where outbreaks are more likely to occur. India's first compulsory license had been a landmark decision for India, as it is an exemplary case which demonstrates the possibility of a "new" drug under patent to be produced by generic makers at a fraction of the price, compensating the patent holder through royalty payments, while at the same time, enabling access to individuals that would not have otherwise been able to receive this form of treatment.

In the scenario where a government feels a patent holder is abusing one's monopoly over their patented invention by excessively limiting others to access—and when it could otherwise substantially benefit the public good—a government may grant special privilege to another to use or manufacture such a patented product without the consent of its owner. This is called a compulsory license, and does not take the rights away from the patent holder, but limits them, as to enable increased access. A license fee or royalty payment is still to be paid to the patent holder; however this rate may be negotiated by the government, contrary to a statutory license, where this rate is fixed by the law.

Copyright

Copyright refers to the protection granted, in law, to the expression of some ideas. It is to be noted that the idea itself is not protectable. For instance, if I were to tell you about an 'idea' that I had about writing a story about a cat and a mouse, and, a few days later, you wrote a story about a cat and a mouse, the copyright of that story would vest with you, despite the fact that the 'idea' for the story was mine. This concept is called the *idea-expression dichotomy.*

The 'expression' that is eligible for protection could be in various forms, including literary, artistic or dramatic works.

Components of Copyright

Copyright recognises the concepts of ownership and authorship of work, and the fact that these might vary in specific instances, when various persons could be involved in the creation of a work. Some may have provided creative input (the author of the book or the director/screen play writer/story writer of the movie), and some may have provided monetary input (the publisher of the book/producer of the movie).

The moral right of 'attribution', that is, the right to be recognised for the work vests with the authors. Economic rights associated with copyright vest in the owner of the copyright. The owner could be different from the author. For instance, in case of the book, the owner of the copyright could be the publisher, and in the case of the movie, it could be the producer. In some instances, copyright may be jointly owned as well. Copyright vests in the owner of copyright. It grants the owner the right to exclude all others from making use of/exploiting the work in

question commercially. This would essentially prevent others from adapting, copying, distributing, or making any other use of the protected work, unless authorised by the owner.

Copyright and the Law

Copyright law is territorial in nature, that is, copyright granted by law in one nation state is only enforceable in the said that grants the right. One aspect of territoriality could be the term of copyright. Generally, the term is the lifetime of the author (creator/owner) (plus) fifty to hundred years from the death of the author. Anonymous works, or works owned by corporations have a fixed term of copyright, usually between fifty and hundred years. The exception to this general rule of territoriality is if the state in question has entered into any international agreement to the contrary.

Other aspects of copyright regulated by law include subject matter of protection, requirements of registration, term of protection and associated rights. Internationally, the Berne Convention for the Protection of Literary and Artistic Works, 1886 is the key instrument. Additionally, some other important international instruments include the WIPO Copyright Treaty, 1996 and the WIPO Performers and Phonograms Treaty, 1996.

While the general rule is that all copying and distribution of the copyrighted work has to be done with the express permission of the copyright holder, some exceptional circumstances allow for this requirement to be dispensed with. These are known as fair use/fair dealing (depending on the jurisdiction).

Case Study: The Oxbridge Textbooks[74]

The Broad Issue:

The issue of copyrights when it comes to academic purposes has always been one that has sparked debates and very compelling arguments on both sides. While research that is published in scientific journals is carried out with the pure intent of spreading knowledge that will ultimately lead to broader scientific inquiry and research, in the past few decades it has transformed into a product of "ruthless capitalism" whose profit margins are far too high.

The question then arises that how research that is carried out mostly with government funded public money be made available to the general public across the world at reasonable and affordable rates? Don't students in the developing world have equal rights to access a level of education and research that would enable them to compete with their affluent counterparts? But this issue isn't just a cause for concern in the developing world as one of the world's richest schools,Harvard University released a memorandum in mid-2012 that the cost of its journal subscriptions has become prohibitively expensive. This forces us to take a moment and think about the world of academic publishing, the accessibility of knowledge, and the flow of information when *the richest academic institution on the planet* cannot afford to continue paying for its journal subscriptions?

According to Thomes and Clay's report, commercial publishers within the last twenty to thirty years have taken control over many publications that had been controlled by non-profit academic and scholarly societies. The shift took place during the 1960's and 1970's as commercial publishers recognized the potential for profitability in acquiring journals from

74. Ariel Bogle, Cambridge & Oxford University Press sue Delhi University for copyright infringement — over course packs, March 18, 2013, *Melville House*, available at http://www.mhpbooks.com/cambridge-university-press-oxford-university-press-sue-delhi-university-for-copyright-infringement-over-course-packs/,last accessed on January 29, 2014.

the societies. This has resulted in publishing houses now commanding hefty profit margins up to 40%.

The Broad Solution:
The Indian Copyright Act, Section 52, provides for a wide educational fair use exception for academic purposes. Yet the publishing houses, demand for the purchasing of a Blanket License under the IRRO (Indian Reprographic Reproduction Organization)[75] which costs Rs 24,000 per annum for 20 copies of a single publication and not more than 10% of each copy being photographed.

This clause can be challenged on the grounds of "fair use exception" under Section 52. The cancellation of these licenses is a fair demand as the risks of purchasing the license and complying to the publishing houses norms have many repercussions. Due to the business model of the publishing industry, a steep increase in prices has been seen for the past decade, the Harvard letter being just the tip of the iceberg. In 2012, over 12,000 researchers have signed a statement promising to boycott any publication published by Elsevier (a publication house accused of pocketing 40% of the profits). The increase in the prices of academic works in the international market has a steep impact on the budget of children who attend public universities such as Delhi University where the annual fees is Rs. 5000 per annum.

Specific Issue at Hand:
The specific issue here is a lawsuit filed by the Cambridge and Oxford publication press against Delhi University and a small photocopy shop for copyright infringement. The store, who they accuse of creating photocopied "course packs" in agreement with the University that include content from their textbooks, is selling these bundles for much cheaper than the original books. The presses are demanding more than US$110,000 in damages.

On one hand we have powerful international publishing houses and on the other students who do not have access to study material from these houses due to their impoverished backgrounds. It is unlikely that the publishing houses' revenues would increase post this suit, as most students cannot afford to purchase the study material unless the university foots the bill.

It is also important to note that a previous lawsuit that Cambridge publication house lost was due to the defendant using only 10% of the book. In this case we have:

Average percentage of entire book copied = 8.81 %. The breakup of the amount of material used per book can be found here.[76]

Out of the 23 books in question, only 5 extracts exceed the 10% threshold(these have been marked in red in the document). To suggest that the photocopy shop and Delhi University should have to shell out Rs. 60,00,000 in damages for this case, is a case of publishing houses flexing their muscle power over students in the developing world who deserve equal access to academic material.

75. http://www.irro.in/about.php
76. Book-wise Percentage Analysis (DU Photocopying Case), available at https://docs.google.com/spreadsheet/ccc?key=0AnUBa-WkvhlOdDItVENnYkpZZ1ZYYTYwRGVycXVtZ1E#gid=0, last accessed on January 29, 2014.

Unit 5: Openness

The philosophy of openness is one that concerns itself with shifting power from centralized authorities of knowledge like owners to the community with its varied components like users, producers or contributors. Many people think of openness as being merely about the digitization of pre-existing knowledge or content but it is far more than that. Often, as Nishant Shah puts it in his article "Big Data, People's Lives, and the Importance of Openness"[77], "it (openness) is about claiming access to knowledge and information hidden behind paywalls and gateways that are often produced using public resources." Openness is important for the same reasons that access to knowledge is important, but it takes many different forms. We will be discussing Open Content, Open Access, Open (Government) Data, Free and Open Source Software and Open Standards.

After a quick narration of what we mean by commons and contents, we move on to open access to science and scholarship. We distinguish openness of knowledge as it prevails today from the public libraries of the print era and then move on to developments that led to the open access movement. We then discuss the status of open access in India and end with the bright future awaiting open access.

The notion of the 'commons' (meaning open to all) has been in existence for a very long time. For example, as early as the 4th Century B C, Aristotle commented "What is common to the greatest number gets the least care!" [1] Ecologist Garret Hardin developed this notion into the 'tragedy of the commons' for explaining the numerous environmental crises and ecological dilemmas we face today [2]

Commons is defined as "resources accessible to all members of a society". A good example of the commons is the village greens in Great Britain around which people reside and have their church and school. Then there are grazing lands for their cattle, and water bodies, which no one owns but everyone can use. The moment someone has a title deed for a piece of land he 'encloses' it with a fence. Even here, if that piece of land has been used for long by people to cross to the other side, the owner keeps open a narrow footpath.

It is only three or four decades ago the commons became an object of serious study. The idea of the 'knowledge commons' draws upon the work of people like Elinor Orstom on 'common pool resources,' 'natural resource commons' and 'public good' such as forests, water systems, fisheries, grazing fields and the global atmosphere all of which are common-pool resources of immense importance for the survival of humans on this earth [3-5].Ostrom and her colleague Charlotte Hess also contributed to knowledge commons and in particular to our understanding of scholarly communication and cultural resources as commons. Their work brought out the essential role of collective action and self-governance in making commons work [6].

Definitions

Before talking about knowledge commons let us define these terms:

1. Knowledge includes all useful ideas, information and data in whatever form in which it is expressed or obtained, and useful knowledge can be indigenous, scientific, scholarly, or non-academic. It also includes music and the visual and theatrical arts – humanity's literary, artistic and cultural heritage.
2. Ostrom and Hess define a commons as a resource shared by a group of people that is subject to social dilemmas.

77. Read more at http://dmlcentral.net/blog/nishant-shah/big-data-peoples-lives-and-importance-openness

3. Social dilemma in the context of knowledge includes enclosure by intellectual property (IP) regulations, loss due to inadequate preservation or simple neglect, and different laws being applied to print and digital forms.
4. Open Knowledge Definition defines openness in relation to content and data thus: A piece of content or data is open if anyone is free to use, reuse, and redistribute it without technical or legal restrictions, subject only, at most, to the requirement to attribute and/ or share-alike [http://opendefinition.org]. And 'digital commons' is defined as "information and knowledge resources that are collectively created and owned or shared between or among a community and that is (generally freely) available to third parties. Thus, they are oriented to favour use and reuse, rather than to exchange as a commodity."

Free and Open Software

Definition

Free and open-source software (FOSS) is software that is both free and open source. Free software is software for which the source code is released when it is distributed. The users are free to adapt study and distribute the software.[78] Most commercially available software is proprietary software so the free software is mostly developed cooperatively. The free software movement was launched in 1983 which was a social movement for the attaining these freedoms for software users. It basically draws upon the 1970's hacker culture but the founder of the movement Richard Stallman started the GNU Project in 1983.[79] Open source software (OSS) is released with its source code and the license is one where the copyright holder extends the right for users to study, change and distribute the software to anyone and for any purpose. OSS is also often developed collaboratively in a public endeavor. Free software licenses and open-source licenses are often used by many software packages instead of proprietary software licenses which have restrictive copyrights. Usually all software and bug fixes under this are also made available under the same free and open licenses which creates a kind of living software. These types of software are essential for society moving forward because they help reduce costs, increases productivity, enhance security, and improve compliance standards. FOSS presents the lowest risk among software systems because they have the best long term investment protection.

UNESCO has recognized the importance of FOSS as a practical tool in development and in achieving the Millennium Development Goals (MDG).[80] It recognizes that:

1. Software plays a crucial role in access to information and knowledge;
2. Different software models, including proprietary, open-source and free software, have many possibilities to increase competition, access by users, diversity of choice and to enable all users to develop solutions which best meet their requirements;
3. The development and use of open, interoperable, non-discriminatory standards for information handling and access are important elements in the development of effective infostructures;
4. The community approaches to software development has great potential to contribute to operationalize the concept of Knowledge Societies;

78. For more see GNU Operating System, "The Free Software Definition", available at http://www.gnu.org/philosophy/free-sw.html, last accessed on January 26, 2014.
79. Read more at http://freeopensourcesoftware.org/index.php?title=History
80. For more see Millennium Development Goals, *United Nations*, available at http://www.un.org/millenniumgoals/bkgd.shtml, last accessed on January 26, 2014.

5. The Free and Open Source Software (FOSS) model provides interesting tools and processes with which people can create, exchange, share and exploit software and knowledge efficiently and effectively;
6. FOSS can play an important role as a practical instrument for development as its free and open aspirations make it a natural component of development efforts in the context of the Millennium Development Goals (MDGs);
7. Consistent support plays an important role in the success and sustainability of FOSS solutions;
8. All software choices should be based upon the solution's ability to achieve the best overall return on technology investments.[81]

Organizations[82]

There is no rule that excludes anyone who wants to support FOSS from doing so. Usually, however, the trend shows that non-profit organizations (NPO), academic institutions, developers and support/service businesses invest their time and resources in these projects. Here are some of the important organizations that have supported FOSS:

1. FLOSS Manuals -- FLOSS Manuals is a community that creates free manuals for free and open source software.
2. FOSS Learning Centre – They are an international NPO that is a center for information and training about FOSS.
3. GOSLING - "Getting Open Source Logic Into Governments" is a knowledge sharing community assist with the introduction and use of free/libre software solutions in the Canadian Federal and other government operations.
4. International Open Source Network -- "The vision is that developing countries in the Asia-Pacific Region can achieve rapid and sustained economic and social development by using effective FOSS ICT solutions to bridge the digital divide."
5. Open Source for America – This is a combination of NGO's, academic institutions, associations, technology industry leaders that advocates and helps raise the awareness of FOSS in the US Government.
6. Open Source Initiative – This was the organization that first gave mass market appeal to the term "open source. They are the recognized certification authority for whether or not a given software license is FOSS.
7. Open Source Software Institute – This is another NPO that consists of government, academic and corporate representation and they encourage open-source solutions in U.S. government agencies and academic entities.
8. OSS Watch – This is a public institution in the UK which provides advice on the development and licensing of FOSS.
9. SchoolForge – They offer references to references to open texts and lessons, open curricula, and free open source software in education.

Types of Licenses[83]

Source Code: This is a code that is readable by humans. It has statements like:*Simple Hello Button () method.

81. For more see "Free and Open Source Software", Communication and Information, *UNESCO*, available at http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/free-and-open-source-software-foss/, last accessed on January 26, 2014.
82. Read more at http://freeopensourcesoftware.org/index.php?title=Organizations
83. Read more at http://freeopensourcesoftware.org/index.php?title=Licenses

When a computer is running, a source code is translated into binary code which is not readable or modifiable by humans. It reads something like:01011001101.

The licenses that will illuminate where FOSS licenses stand relatively are GPL licenses (that are the most restrictive) and BSD licenses (which are almost public domain). The primary distinction between these two is the way in which source code is treated as opposed to binary code.

The GPL license differed from prior ones because they stipulated that the source code has to be provided along with the binary code which meant that the licensees could use and change the source code. This requirement was an important part of the domino effect in driving innovation since old industrial standards did not apply to software. However, though this freedom with binaries produced exists, there are no requirements to make the source available. The prime difference between the two being that legally, the release of the BSD source is completely at the discretion of the releasing entity.

The following table compares different kinds of FOSS licenses. In order to be considered as such, the bare minimum is for the licenses to pass the first four tests in the table.[84]

	Source must be free	Must retain copyright notice	Can sell executable without restriction	Modifications covered under license	Prevented from use for software or data locking	Linked code covered under license	New updates to license will apply	Patent retaliation, loss of use if suit brought	Can sell source code
GPL V3	Y	Y	Y	Y	Y	N	Y	?	N
Mozilla (V1.1)	Y	Y	Y	Y	N	N	Y	Y	N
BSD	Y	Y	Y	Y	N	N	N	N	Y

Differences[85]

The most salient distinction between the two types of software comes from the principles behind them. For the "open source" movement, the idea that software should be open source is a practical one and isn't concerned with the ethical dimensions behind the question. For the free software movement, the problem behind software licenses is a social one for which free software is the solution.

84. See citation 6 above.
85. For more see GNU Operating System, Why "Free Software" is better than "Open Source" https://www.gnu.org/philosophy/free-software-for-freedom.html, last accessed on January 26, 2014.

OPEN SOURCE

4 Freedoms of FOSS

Free / Open Source Software (FOSS) is an essential part of the Internet, and more importantly, it is a very important for ensuring freedoms. All FOSS guarantees at least 4 freedoms, and these 4 freedoms help ensure a range of other freedoms, including the ability to run a system the protects your privacy, is free of surveillance technologies, furthers free speech through the ability to communicate anonymously with encryption, and not be restricted by digital locks ("DRMs"). It is also important that governments use FOSS, since it prevents vendor lock-in, allows greater configurability, makes localization easier, and lowers costs.

FOSS promotes

The Centre for Internet and Society hosted the first meeting that set up Fosscom (a loose network for FOSS advocacy in India), helped defeat software patents from being allowed in the Patent Manual, helped promote open standards through the National Open Standards Policy (which is a necessity for FOSS to be used in government), and is publishing a report on the state of FOSS policy and usage in the public sector in India.

OPEN VIDEO

BY 2016, APPROXIMATELY

86%

OF ALL* VIDEO CONTENT WILL BE INTERNET VIDEO

* TV, video on demand [VoD], Web, and P2P

However, most of this video is currently made using proprietary technologies, based on proprietary formats. The openness of the web has not come to video yet.

In a report prepared with funding from Open Video Alliance / iCommons, CIS argued that the prevelant models of viewing 'openness' of video only from a technological or copyright vantage point was limited, and that 'openness' could be seen from other perspectives as well.

- **Openness as independence in creativity**
- **Openness as participatory creation: bringing Wiki-like culture to video**
- **Openness as open technology: open standards based filming, editing and distribution formats**
- **Openness as free/open source software: software that all can use**
- **Openness as access for all: including illiterate, persons with disabilities, poor, etc.**
- **Openness as openly-licensed content: with innovative models for rewarding artists**
- **Openness as freedom of speech: platforms must not be legally limited**

OPENNESS

Innovation and creativity are fostered through openness and collaboration. The advent of the Internet radically defined what it means to be open and collaborative. The Internet itself is built upon open standards and free/libre/open source software.

FOSS in India

Many support groups like the Free Software Movement of India and various NGO's have spawned in order to campaign for FOSS in India.[86]

The National Resource Centre for Free and Open Source Software (NRCFOSS) was an initiative by the DIT in 2005 in order to be the central point for all FOSS related activities in India. Through awareness campaigns, training programs and workshops a large collection of FOSS trained teacher and student communities have been formed across India.[87] In many curricula in technical institutes, FOSS is even offered as an elective. The Department of Electronics and Information Technology (DEITY) boasts of "BOSS – Bharat Operating System Solutions External website that opens in a new windowis a GNU/Linux based localized Operating System distribution that supports 18 Indian languages - Assamese, Bengali, Bodo, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telegu and Urdu."[88]

Case Study: Curoverse[89]

Open source software is a mainstream enterprise that can be both beneficial to society, academia and companies. This was the underlying assumption when $1.5 million was invested in an open source genomics tool project at Curoverse, Boston. The Personal Genome Project (PGP) endeavors to sequence 100,000 human genomes in the U.S. The storage of these massive amounts of data is facilitated by Arvados, which is an open source computational platform. Curoverse, which is a product of the PGP is planning to release its commercial products next year and in anticipation, Boston Global Ventures and Common Angels have invested $1.5 M. The PGP, according to George Church (the creator), the database needed to hold almost one Exabyte of data for the researchers to efficiently analyze the data. Some of the functions necessary were the ability to share the data between research centers and to make sure that complex analyses could be reproduced. In order to satisfy these requirements, the software had to open source. Although similar to the new age cloud computing the software Arvados was programmed to hold extremely high amounts of genetic data. It can run on both public and private cloud services, so it'll be available both on Amazon and other cloud platforms. Although this software was developed in 2006, the project hadn't officially taken off but this investment in open source software coming from high impact technology companies like Boston Global Ventures.

Case Study: Open-Sorcerers[90]

Many magical tricks can be protected by copyright. For example, Teller from Penn and teller fame is suing a Dutch magician for allegedly stealing his "shadow" illusion. Litigating on these matters is proving to be extremely difficult so magicians, like programmers are taking the route of open-source licenses. This doesn't mean that they would just share magical secrets in violation of the Alliance of Magicians on a forum like YouTube. This is more congruous with what open source technology activists advocate which is the idea of

86. For more see Free Software Movement of India, available at http://www.fsmi.in/, last accessed on January 26, 2014.
87. See the Department of Electronics and Information Technology, Ministry of Communications & Information Technology, Government of India, Free and Open Source Software available at http://deity.gov.in/content/free-and-open-source-software, last accessed on January 26, 2014.
88. See citation above.
89. For more see Curoverse Gets $1.5M to Develop Open Source Genomics Tool, available at http://www.xconomy.com/boston/2013/12/18/curoverse-gets-1-5m-develop-open-source-genomics-tool/2/, last accessed on January 26, 2014.
90. For more see The Open-Sorcerers, available at http://slate.me/18NNx4x, last accessed on January 24, 2014.

collaboration. If magicians work with more technologists, artists, programmers, scientists and other magicians, there could be better illusions and a general cross-pollination of magical ideas among various disciplines. For this, the technology behind these illusions needs to be freely available and the licenses have to open up for open sorcerers.

Techno-illusionist Marco Tempest and Kieron Kirlkland from a digital creativity development studio in Bristol are the main proponents of open source in magic. Tempest has stated that famous magicians in the status quo contract illusion engineers, technologists or other magicians to design new effects for their acts and make them all sign secrecy agreements and the creators have no ownership of what they have created. This has been detrimental to innovation and perfection of techniques as they are not allowed to refine their work over time. If the ownership is instead shared and freely available to the co-creators and developers, then it would lead to better illusions and speed up the process faster.

Open Standards

Definition

Interoperability has many social, technical and economic benefits and interoperability on the internet magnifies these benefits many fold. Interoperability, unlike a lot of other economically beneficial changes, was not a result of the adapting markets. It came about in what modest existence it has, through a concerted effort from processes and practices by the IETF, the W3C and the Interop conferences among others.[91]

Open standards are applicable to any application programming interface, a hardware interface, a file format, a communication protocol, a specification of user interactions, or any other form of data interchange and program control.[92]

The billions of dollars of capital investment in the past few years since the internet's advent into the mainstream has come from an understanding of very basic laws of the market. Metcalfe's law says the value of interoperability increases geometrically with the number of compatible participants. Reed's law states that a network's utility exponentially increases as the number of subgroups increase.

The problem with having standards for this interoperability is that the open standard either needs to be most open or most inclusive and unlike in many other cases we have discussed, here it can't be both. If it wants to be inclusive, it should have standards that permit any license that is free, closed or open. It should have standards that have any type of implementation under any implementor.[93] On the other hand, if it to support the idea of openness, the best practices will exclude certain practices in the market like proprietary standards. Though traditionally meant to incentivize compliance by claiming a set of standards to be best practices, under this, some try to be unique in the market by adding on additional properties that are not a part of the open standards but claim that they implement "open standards" for strategic advantage. Others even defy the logic of having standards by claiming that their new additions embody open standards better.

91. For more see "Open Standards Requirements for Software – Rationale", Open Source Initiative, available at http://opensource.org/osr-rationale, last accessed on January 26, 2014.
92. See citation 1 above.
93. See citation 1 above.

As we have seen, due to the various conceptions of the good in open standards, there isn't a universally accepted definition of open standards. The FOSS community largely accepts the following definition with contention from the industry.

[S]ubject to full public assessment and use without constraints [royalty-free] in a manner equally available to all parties; without any components or extensions that have dependencies on formats or protocols that do not meet the definition of an open standard themselves; free from legal or technical clauses that limit its utilization by any party or in any business model; managed and further developed independently of any single vendor in a process open to the equal participation of competitors and third parties; available in multiple complete implementations by competing vendors, or as a complete implementation equally available to all parties.[94]

A standard can be considered open if it does the job of achieving the following goals. It has to increase the market for a particular technology by facilitating investment in that technology by both consumers and suppliers. It has to do this by making sure these investors don't have to pay monopoly rent or deal with trade secret, copyright, patent or trademark problems. In retrospect, we have learned that the only standards that have achieved these goals are ones that encourage an open-source philosophy.

Proprietary software manufacturers, vendors and their lobbyists often provide a definition of open standards that is not in line with the above definitions on two counts (Nah, 2006).

One, they do not think it is necessary for an open standard to be available on a royalty-free basis as long as it is available under a "reasonable and non-discriminatory" (RAND) licence. This means that there are some patents associated with the standard and the owners of the patents have agreed to license them under reasonable and non-discriminatory terms (W3C, 2002). One example is the audio format MP3, an ISO/IEC [International Organisation for Standardisation/International Electrotechnical Commission] standard where the associated patents are owned by Thomson Consumer Electronics and the Fraunhofer Society of Germany. A developer of a game with MP3 support would have to pay USD 2,500 as royalty for using the standard. While this may be reasonable in the United States (US), it is unthinkable for an entrepreneur from Bangladesh. Additionally, RAND licences are incompatible with most FOSS licensing requirements. Simon Phipps of Sun Microsystems says that FOSS "serves as the canary in the coalmine for the word 'open'. Standards are truly open when they can be implemented without fear as free software in an open source community" (Phipps, 2007). RAND licences also retard the growth of FOSS, since they are patented in a few countries. Despite the fact that software is not patentable in most parts of the world, the makers of various distributions of GNU/Linux do not include reverse-engineered drivers, codecs, etc., in the official builds for fear of being sued. Only the large corporation-backed distributions of GNU/Linux can afford to pay the royalties needed to include patented software in the official builds (in this way enabling an enhanced out-of-the-box experience). This has the effect of slowing the adoption of GNU/Linux, as less experienced users using community-backed distributions do not have access to the wide variety of drivers and codecs that users of other operating systems do (Disposable, 2004). This vicious circle effectively ensures negligible market presence of smaller community-driven projects by artificial reduction of competition.

94. For more see "An emerging understanding of Open Standards", available at http://blogs.fsfe.org/greve/?p=160, last accessed on January 26, 2014.

Two, proprietary software promoters do not believe that open standards should be "managed and further developed independently of any single vendor," as the following examples will demonstrate. This is equally applicable to both new and existing standards.

Microsoft's Office Open XML (OOXML) is a relatively new standard which the FOSS community sees as a redundant alternative to the existing Open Document Format (ODF). During the OOXML process, delegates were unhappy with the fact that many components were specific to Microsoft technology, amongst other issues. By the end of a fast-track process at the ISO, Microsoft stands accused of committee stuffing: that is, using its corporate social responsibility wing to coax non-governmental organisations to send form letters to national standards committees, and haranguing those who opposed OOXML. Of the twelve new national board members that joined ISO after the OOXML process started, ten voted "yes" in the first ballot (Weir, 2007). The European Commission, which has already fined Microsoft USD 2.57 billion for anti-competitive behaviour, is currently investigating the allegations of committee stuffing (Calore, 2007). Microsoft was able to use its financial muscle and monopoly to fast-track the standard and get it approved. In this way it has managed to subvert the participatory nature of a standards-setting organisation. So even though Microsoft is ostensibly giving up control of its primary file format to the ISO, it still exerts enormous influence over the future of the standard.

HTML, on the other hand, is a relatively old standard which was initially promoted by the Internet Engineering Task Force (IETF), an international community of techies. However, in 2002, seven years after the birth of HTML 2.0, the US Department of Justice alleged that Microsoft used the strategy of "embrace, extend, and extinguish" (US DoJ, 1999) in an attempt to create a monopoly among web browsers. It said that Microsoft used its dominance in the desktop operating system market to achieve dominance in the web-authoring tool and browser market by introducing proprietary extensions to the HTML standard (Festa, 2002). In other words, financial and market muscle have been employed by proprietary software companies – in these instances, Microsoft – to hijack open standards.

The Importance

There are many technical, social and ethical reasons for the adoption and use of open standards. Some of the reasons that should concern governments and other organisations utilising public money – such as multilaterals, bilaterals, civil society organisations, research organisations and educational institutions – are listed below.

Innovation/competitiveness: Open standards are the bases of most technological innovations, the best example of which would be the internet itself (Raymond, 2000). The building blocks of the internet and associated services like the world wide web are based on open standards such as TCP/IP, HTTP, HTML, CSS, XML, POP3 and SMTP. Open standards create a level playing field that ensures greater competition between large and small, local and foreign, and new and old companies, resulting in innovative products and services. Instant messaging, voice over internet protocol (VoIP), wikis, blogging, file-sharing and many other applications with large-scale global adoption were invented by individuals and small and medium enterprises, and not by multinational corporations.

Greater interoperability: Open standards ensure the ubiquity of the internet experience by allowing different devices to interoperate seamlessly. It is only due to open standards that consumers are able to use products and services from competing vendors interchangeably and simultaneously in a seamless fashion, without having to learn additional skills or acquire

converters. For instance, the mail standard IMAP can be used from a variety of operating systems (Mac, Linux and Windows), mail clients (Evolution, Thunderbird, Outlook Express) and web-based mail clients. Email would be a completely different experience if we were not able to use our friends' computers, our mobile phones, or a cybercafé to check our mail.

Customer autonomy: Open standards also empower consumers and transform them into co-creators or "prosumers" (Toffler, 1980). Open standards prevent vendor lock-in by ensuring that the customer is able to shift easily from one product or service provider to another without significant efforts or costs resulting from migration.

Reduced cost: Open standards eliminate patent rents, resulting in a reduction of total cost of ownership. This helps civil society develop products and services for the poor.

Reduced obsolescence: Software companies can leverage their clients' dependence on proprietary standards to engineer obsolescence into their products and force their clients to keep upgrading to newer versions of software. Open standards ensure that civil society, governments and others can continue to use old hardware and software, which can be quite handy for sectors that are strapped for financial resources.

Accessibility: Operating system-level accessibility infrastructure such as magnifiers, screen readers and text-to-voice engines require compliance to open standards. Open standards therefore ensure greater access by people with disabilities, the elderly, and neo-literate and illiterate users. Examples include the US government's Section 508 standards, and the World Wide Web Consortium's (W3C) WAI-AA standards.

Free access to the state: Open standards enable access without forcing citizens to purchase or pirate software in order to interact with the state. This is critical given the right to information and the freedom of information legislations being enacted and implemented in many countries these days.

Privacy/security: Open standards enable the citizen to examine communications between personal and state-controlled devices and networks. For example, open standards allow users to see whether data from their media player and browser history are being transmitted along to government servers when they file their tax returns. Open standards also help prevent corporate surveillance.

Data longevity and archiving: Open standards ensure that the expiry of software licences does not prevent the state from accessing its own information and data. They also ensure that knowledge that has been passed on to our generation, and the knowledge generated by our generation, is safely transmitted to all generations to come.

Media monitoring: Open standards ensure that the voluntary sector, media monitoring services and public archives can keep track of the ever-increasing supply of text, audio, video and multimedia generated by the global news, entertainment and gaming industries. In democracies, watchdogs should be permitted to reverse-engineer proprietary standards and archive critical ephemeral media in open standards.

Principles[95]

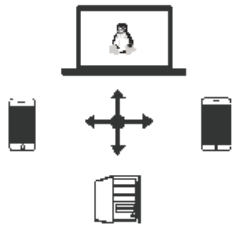
95. http://perens.com/OpenStandards/Definition.html

1. Availability
   Open Standards should be available for everyone to access.
2. Maximize End-User Choice
   Open Standards should lead to a competitive and fair market and shouldn’t restrict consumer choices.
3. No Royalty
   Open Standards should be free of cost for any entity to implement while there maybe some fee for certification of compliance.
4. No Discrimination
   Open Standards should not show preference to one implementer over another as previously discussed except for the tautological reason of the compliance with the standard. The authorities that are certifying these implementers should offer a low or zero-cost implementation scheme.
5. Extension or Subset
   Open Standards may be allowed in a subset or can allow for extensions form but certifying authorities can decline from certifying subset implementations and have specific conditions for extensions.

OPEN STANDARDS

HTTP, HTML, TCP/IP, SSL, etc.

are all royalty-free open standards and are the building blocks of the Internet



Open standards like these allow for interoperability between various devices and platforms.

Microsoft Tax

Can you imagine a situation where you'd have to pay a Microsoft Tax for accessing governmental services?

CIS with the help of other free software activists helped shaped the National Open Standards Policy, which now requires all central government departments to use open standards. We now have one of the best such policy in the world (better than the EU's), which requires usage of "Royalty-Free" standards (meaning ordinary citizens don't have to pay licence fees to a software company just to be able to interact with the government).

CIS has also helped the Iraqi government draft its open standards policy and its e-governance interoperability framework.

OPEN EDUCATIONAL RESOURCES

FREE ACCESS!

OER enable free (gratis + libre) access to textbooks, classroom lecture videos, etc., in which a core part of the aim is enabling re-contextualisation, translation, and other such transformations without having to ask for permission. In India, the classroom lectures from IITs have been filmed as part of the National Mission on Education and ICT (NMEICT), and these lectures are being used not only by students in other Indian universities, but by professors too.

North Countries ⟵ *Exchange of knowledge* ⟶ South Countries

Importantly, OERs can also help reverse the one-way flow of knowledge from North (rich/developed) countries to the South. For instance, a lecturer at the Kwame Nkrumah University of Science and Technology, Ghana, who happens to be a world authority on buruli ulcer has developed an OER module which is being used by the World Health Organisation and the University of Michigan.

CIS has engaged with the National Institute of Open Schooling (the world's largest open school) and the NMEICT in helping them with the copyright licensing of OER, and we wish to ensure the content created under the "Aakaash" tablet programme are also licensed openly.

OPENNESS

Innovation and creativity are fostered through openness and collaboration. The advent of the Internet radically defined what it means to be open and collaborative. The Internet itself is built upon open standards and free/libre/open source software.

OSI Criteria[96]:
In addition, to make sure that the Open Standards also promote an open source philosophy, the Open Source Initiative (OSI), which is the steward of the open source definition, has a set of criteria for open standards.

1. "**No Intentional Secrets:** The standard MUST NOT withhold any detail necessary for interoperable implementation. As flaws are inevitable, the standard MUST define a process for fixing flaws identified during implementation and interoperability testing and to incorporate said changes into a revised version or superseding version of the standard to be released under terms that do not violate the OSR.
2. **Availability:** The standard MUST be freely and publicly available (e.g., from a stable web site) under royalty-free terms at reasonable and non-discriminatory cost.

a. **Patents:** All patents essential to implementation of the standard must:
   - be licensed under royalty-free terms for unrestricted use, or
   - be covered by a promise of non-assertion when practiced by open source software

3. **No Agreements:** There must not be any requirement for execution of a license agreement, NDA, grant, click-through, or any other form of paperwork to deploy conforming implementations of the standard.
4. **No OSR-Incompatible Dependencies:** Implementation of the standard must not require any other technology that fails to meet the criteria of this Requirement."

W3C Criteria[97]:
The W3C also has a list of criteria in order to be called "Open Standards".

1. **Transparency** (due process is public, and all technical discussions, meeting minutes, are archived and referencable in decision making)
2. **Relevance** (new standardization is started upon due analysis of the market needs, including requirements phase, e.g. accessibility, multi-linguism)
3. **Openness** (anybody can participate, and everybody does: industry, individual, public, government bodies, academia, on a worldwide scale)
4. **Impartiality and consensus** (guaranteed fairness by the process and the neutral hosting of the W3C organization, with equal weight for each participant)
5. **Availability** (free access to the standard text, both during development and at final stage, translations, and clear IPR rules for implementation, allowing open source development in the case of Internet/Web technologies)
6. **Maintenance** (ongoing process for testing, errata, revision, permanent access)"

Case Study: Digital Colonialism
Imagine back to a world in which a foreign power leases out a piece of land and you grow crops on it. You have produced crops there for many seasons and used the sales to buy a nice windmill. One day, the lease expires and the foreign power come and seizes not only your crops but also your windmill. Now if we apply the same story in a proprietary standards regime, imagine you were to license a copy of Microsoft Office for 28 days. You have stored documents in .doc, .xls and .ppt format. On the day that the license expires, you will not only lose your ability to use Word, Excel and PowerPoint, you will in fact lose all your documents in .doc, .xls and .ppt formats!

96. For more see Open Standards Requirements for Software – Rationale, available at http://opensource.org/osr, last accessed on January 26, 2014.
97. See "Definition of Open Standards", available at http://www.w3.org/2005/09/dd-osd.html, last accessed on January 27, 2014.

Additional Readings

1. Internet Engineering Task Force, *OpenStandards.net*, http://www.openstandards.net/viewOSnet2C.jsp?showModuleName=Organizations&mode=1&acronym=IETF
2. Standards, *W3C*, http://www.w3.org/standards/
3. Open Standards, http://www.open-std.org/
4. Pranesh Prakash, "Report on Open Standards for GISW 2008", *Centre for Internet and Society*, 2008, http://cis-india.org/publications-automated/cis/sunil/Open-Standards-GISW-2008.pdf/at_download/file
5. Sunil Abraham, "Response to the Draft National Policy on Open Standards for e-Governance", *Centre for Internet and Society*, 2008, http://cis-india.org/openness/publications/standards/the-response
6. Pranesh Prakash, "Second Response to Draft National Policy on Open Standards for e-Governance", Centre for Internet and Society, 2008, http://cis-india.org/openness/publications/standards/second-response
7. Definition of "Open Standards", *International Telecommunication Union*, http://www.itu.int/en/ITU-T/ipr/Pages/open.aspx

Open Content

Definition

The premise of an Open Content license is that, unlike most copyright licenses, which impose stringent conditions on the usage of the work, the Open Content licenses enable users to have certain freedoms by granting them rights. Some of these rights are usually common to all Open Content licenses, such as the right to copy the work and the right to distribute the work. Depending on the particular license, the user may also have the right to modify the work, create derivative works, perform the work, display the work and distribute the derivative works.

When choosing a license, the first thing that you will have to decide is the extent to which you are willing to grant someone rights over your work. For instance, let us suppose you have created a font. If you do not have a problem if people create other versions of it, then you can choose a license that grants the user all rights. If, on the other hand, you are willing to allow people to copy the font and distribute it, but you do not want them to change the typeface or create versions of it, then you can choose a more restrictive license that only grants them the first two rights.

Most open content licenses share a few common features that distinguish them from traditional copyright licenses.

These can be understood in the following ways:

a. Basis of the license/ validity of the license. (Discussed above)
b. Rights granted. (Discussed above)
c. Derivative works.
d. Commercial/ non-commercial usage.
e. Procedural requirements imposed.
f. Appropriate credits.
g. They do not effect fair use rights.
h. Absence of warranty.
i. Standard legal clauses

Derivative Works

Any work that is based on an original work created by you is a derivative work. The key difference between different kinds of Open Content licenses is the method that they adopt to deal with the question of derivative works. This issue is an inheritance from the licensing issues in the Free Software environment. The GNU GPL, for instance, makes it mandatory that any derivative work created from a work licensed under the GNU GPL must also be licensed under the GNU GPL. This is a means of ensuring that no one can create a derivative work from a free work which can then be licensed with restrictive terms and conditions. In other words, it ensures that a work that has been made available in the public domain cannot be taken outside of the public domain.

On the other hand, you may have a license like the Berkeley Software Distribution (BSD) software license that may allow a person who creates a derivative work to license that derivative work under a proprietary or closed source license. This ability to control a derivative work through a license is perhaps the most important aspect of the Open Content licenses. They ensure, in a sense, a self perpetuity. Since a person cannot make a derivative work without your permission, your permission is granted on the condition that s/he also allows others to use the derivative work freely. In Open Content licenses, the right to create a derivative work normally includes the right to create it in all media. Thus, if I license a story under an Open Content license, I also grant the user the right to create an audio rendition of it. The obligation to ensure that the derivative work is also licensed under the terms and conditions of the Open Content license is not applicable, however, in cases where the work is merely aggregated into a collection / anthology / compilation. For instance, suppose that I have drawn and written a comic called X, which is being included in a general anthology. In such a case, the other comics in the anthology may be licensed under different terms, and the Open Content license is not applicable to them and will only be applicable to my comic X in the anthology.

Commercial / Non-Commercial Usage
Another important aspect of Open Content licenses is the question of commercial / non-commercial usages. For instance, I may license a piece of video that I have made, but only as long as the user is using it for non-commercial purposes. On the other hand, a very liberal license may grant the person all rights, including the right to commercially exploit the work.

Procedural Requirements Imposed
Most Open Content licenses require a very strict adherence to procedures that have to be followed by the end user if s/he wants to distribute the work, and this holds true even for derivative works. The licenses normally demand that a copy of the license accompanies the work, or the inclusion of some sign or symbol which indicates the nature of the license that the work is being distributed under, for instance, and information about where this license may be obtained. This procedure is critical to ensure that all the rights granted and all the obligations imposed under the license are also passed onto third parties who acquire the work.

Appropriate Credits
The next procedural requirement that has to be strictly followed is that there should be appropriate credits given to the author of the work. This procedure applies in two scenarios. In the first scenario, when the end user distributes the work to a third party, then s/he should ensure that the original author is duly acknowledged and credited. The procedure also applies when the end user wants to modify the work or create a derivative work. Then, the derivative work should clearly mention the author of the original and also mention where the original can be found.

The importance of this clause arises from the fact that, while Open Content licenses seek to create an alternative ethos of sharing and collaboration, it also understands the importance of crediting the author. Very often, in the absence of monetary incentive, other motivating factors such as recognition, reputation and honour become very important. Open Content licenses, far from ignoring the rights of the author, insist on strict procedures so that these authorial rights are respected. You may copy and distribute the Document in any medium, either commercially or non-commercially, provided that this License, the copyright notices, and the license notice saying this License applies to he Document are reproduced in all copies, and that you add no other conditions whatsover to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute.

Open content licenses do not effect fair use rights

Under copyright law, there is an exception to infringement and this is known as the fair use exception. Fair use exceptions generally include using portions for critique or review, and certain non-commercial or educational academic uses etc. Open content licenses make it clear that 48 49the terms and conditions of the license do not affect your fair use rights. Thus even if someone is in disagreement with the terms and conditions, and refuses to enter into the open content license, s/he may still have the freedom to use the work to the extent that is allowed by the principles of his/her fair use rights.

Absence of warranty

Since more often than not the work is being made available at no financial cost and also gives the user certain freedoms, most open content licenses have a standard clause which states that the work is being provided without any warranty or on an ‘as is’ basis. The licensor cannot be in a position to provide any warranty on the work. A few licenses however provide the end-user the option of providing a warranty on services, or a warranty on the derivative work so long as that warranty is one between the licensee and the third party.

Standard legal clauses

A few other clauses that appear at the end of most open content licenses are the standard legal clauses that are included in most legal agreements, and you don’t have to worry too much about them while choosing a license.

These generally include:

1. Severability: This means that even if one portion of the license is held to be invalid the other portions will still continue to have effect.
2. Limitation on liability: The licenses normally state that the licensor will not be liable for anything arising from the use of the work. Thus, for instance, an end-user cannot claim that he suffered mental trauma as a result of the work.
3. The licenses do not allow you to modify any portion of the license while redistributing works etc.
4. Termination: Most licenses state that the rights granted to the licensee are automatically terminated the moment s/he violates any obligation under the license.

Libraries as Content Providers and the Role of Technology

Content is for people’s use. First it was the library which facilitated access to knowledge for the use by the lay public. The first among the five laws enunciated by the famous Indian librarian Ranganathan [7] emphasizes this point: “Books are for use.” And it was technology which enabled large scale production of content in the form of books and subsequently facilitated ease of access.

Let us take text as content first. Before Gutenberg invented printing using movable types (c. 1436-1440) scribes used to write on vellum by hand. It was a painfully slow process and the reach was very limited. Gutenberg brought about probably the greatest game changing technology which within a very few years revolutionized many aspects of human life and history like never before. Peter Drucker has captured this revolution beautifully in an article in *The Atlantic* [8]

The public library became the content commons in the print era. Of course, long before Gutenberg there were some great libraries, e.g., Royal Library of Alexandria (Egypt), Taxila University Library, Nalanda University Library (Bihar, India), Bayt Al Hiqma (Baghdad, Iraq) and the Imperial Library of Library of Constantinople (in the capital of the Byzantine Empire). None of these could survive the ravages of time. Thanks to printing, the numbers increased rapidly and the library movement spread to far corners of the globe.

The major public libraries of today are performing a great job with huge collections. The US Library of Congress in Washington DC has 155 million items occupying 838 miles of shelf space, of which 35 million are print material, 68 million are manuscripts, and 5.4 million are maps. Besides these, LoC has 6.5 million pieces of sheet music, 13.6 million photographs and 3.4 million recordings.

The British Library in London has more than 150 million items with 3 million being added annually. If one reads 5 items a day, it will take 80,000 years to complete the current collection. The National Library of Russia stocks more than 36.4 million items. The Russian State Library, the legendary 'Leninka,' comprises a unique collection of Russian and foreign documents in 247 languages, stocking over 43 million items.

Now every major library emphasizes improved access. Here are some excerpts from Mission statements of some large institutions around the world.

1. British Library: “Enable access to everyone who wants to do research.”
2. National Library of the Netherlands: “Our core values are accessibility, sustainability, innovation and cooperation.”
3. German Federal Archives: “legal responsibility of permanently preserving the federal archival documents and making them available for use.”
4. Danish National Gallery: “Through accessibility, education, and exhibition.”
5. Victoria & Albert Museum: “To provide diverse audience with the best quality experience and optimum access to our collections, physically and digitally.”

I have included in this sample of galleries, archives, and museums as well as all of them deal with cultural content. Indeed the Open Knowledge Foundation has a major project called OpenGLAM.

In India the first network of public libraries covering a whole state was set up more than a hundred years ago by the Maharaja of Baroda (Sayaji Rao Gaekwad III), a truly benevolent king [9]. In the US though, the public library movement was essentially the gift of a ruthless industrialist who was believed to have been unfair to the workers in his steel mills. But the more than 2,000 libraries Andrew Carnegie helped set up are truly a democratizing force. Today the Bill and Melinda Gates Foundation promotes libraries in the developing and emerging economies and through their Access to Knowledge award they leverage the use of ICT in libraries.

While public libraries opened up a vast treasure of knowledge to a large number of people many of whom could not have had an opportunity to read even a few of the books in their collections, they had not provided 'open access.' That has to wait a little longer.

The Internet era not only helped traditional libraries to introduce new services but also gave birth to many free and open libraries such as Internet Archive and Project Gutenberg. The Internet Archive aims to provide 'universal access to all knowledge' and includes texts, audio, moving images, and software as well as archived web pages, and provides specialized services for adaptive reading and information access for the blind and other persons with disabilities. Project Gutenberg encourages the creation of ebooks.

The best known examples of more recent initiatives are Europeana and the Digital Public Library of America (DPLA) both of which take full advantage of the possibilities offered by the Internet. Europeana provides access to 22.6 million objects (from over 2,000 institutions). These include 14.6 million images – paintings, photographs, etc. and 8.4 million books, magazines, newspapers, diaries, etc. DPLA is not even a year old but it already provides access to more than 5.4 million items from a number of libraries, archives and museums.

In India there are efforts to digitize print material, paintings, images, music, films, etc. The Digital Library of India (DLI) and the Indira Gandhi National Centre for Arts (IGCNA) are two examples. Currently, the Ministry of Culture is toying with the idea of a setting up a National Virtual Library.

Apart from libraries which provide electronic access to millions, a very large number of newspapers and magazines and websites also are freely accessible on the net.

Perhaps one of the most important development in Open Content that has affected people's access to knowledge worldwide has been Wikipedia. Alexa rans it 6th among all websites globally and approximately 365 million users worldwide read Wikipedia content.

The Creative Commons System

Critiquing a system is merely one side of the coin. Offering viable alternatives or solutions to the lacunae identified in the status quo significantly buttresses critical claims. Alternatives have moved to the internet and understood the logic of its read-write culture. New media such as YouTube and platforms like WordPress have made each one of us not mere consumers of information but potential authors, film makers. Any viable alternative must contemplate this transformation of the read-only culture of the internet to the read-write culture.

Creative Commons (CC) is a non-profit organization that functions across the world to provide licensing tools to authors of creative works. The key distinguishing feature of this system is that the authors have the right to decide under what license they want to make their work available. The system was conceptualized by a number of individuals at the helm of the copyleft movement, of whom the most prominent was Professor Lawrence Lessig.

The creative commons system stands for 'Some Rights Reserved', a deviation from the 'all rights reserved' model of strict copyright law. The rights to be reserved are left to the discretion of the author.

Types of Licenses

1. Attribution License – CC BY
2. Attribution-ShareAlike : CC BY-SA
3. Attribution-NoDerivatives License : CC BY-ND

4. Attribution-NonCommercial License : CC BY-NC
5. Attribution-NonCommercial-ShareAlike : CC BY-NC-SA
6. Attribution-NonCommercial-NoDerivs- CC BY-NC-ND LICENSE

Exceptions to Open Content

There are two kinds of critiques that have been made about the limitations of Open Content initiatives. The first is a policy - level critique which argues that the voluntary nature of Open Content projects diverts from the larger issue of the need for urgent structural transformations in the global copyright regime. It is argued, for instance, that by relying on copyright, even in a creative variation of it, it still ends up strengthening the copyright system. The larger problem of access to knowledge and culture can only be solved through a long-term intervention in the global copyright regime from the Berne Convention to the TRIPS agreement.[67]

Open Content has also been criticized on the grounds that it privileges the traditional idea of the author at the center of knowledge / culture at the costs of focusing on users. By giving authors the right to participate in a flexible licensing policy, Open Content initiatives end up privileging the notion of the desirability of creating property rights in expressions; cultural and literary products are considered as commodities, albeit ones that the creator can decide to make accessible (or not0, much like a person can decide whether or not to invite someone into his / her house.[68]

A second-level critique asks the question of the relevance of Open Content projects, with their heavy reliance on the Internet. According to the Copysouth group:
It is unlikely that more than a tiny percentage of the works created on a global basis in any year will be available under Creative Commons (CC) licenses. Will the percentage be even less within the Southern Hemisphere? This seems likely. Hence, CC licenses will be of limited value in meeting the expansive access needs of the South in the near future. Nor do CC licenses provide access to already published works or music that are still restricted by copyright laws; these form the overwhelming majority of current material. Focusing on CC licenses may potentially sideline or detour people from analyzing how existing copyright laws block access and how policy changes on a societal level, rather than the actions of individual "good guys", are the key to improving access and the related problems of copyright laws and ideology which are discussed elsewhere in this draft dossier. Nor does it confront the fact that many creators (e.g. most musicians, most academic authors) may be required, because of unequal bargaining power, to assign copyright in their own work to a record company or publisher as a condition of getting their work produced or published.[69]

Finally, a number of Open Content initiatives have an uncomfortable take on other modes through which most people in developing nations have access to knowledge and cultural commodities, namely, piracy, and its critical relation to infrastructure. The emphasis of Open Content on the creation of new content of course raises the question of who uses the new content, and what is the relationship between such content and the question of democratization of infrastructure?

In most cases, the reason for the fall in price of electronic goods, computers, great access to material, increase in photocopiers (the infrastructure of information flows), etc. is not caused in any manner through any radical revolution such as Free Software or Open Content, but really through the easier availability of standard mainstream commodities like Microsoft software and Hollywood. Open Content is unable to provide a solution to the problem of content that is locked up within current copyright regimes. As much as one would like to promote new artists,

new books, etc., the fact remains that a bulk of the people do want the latest Hollywood / Bollywood films for a cheaper cost; they do want the latest proprietary software at a cheaper cost; and they do want to read Harry Potter without paying a ransom.

We can either take the moral higher ground and speak of their real information needs or provide crude theories of how they are trapped by false consciousness. Or, we can move away from these judgmental perspectives, and look at other aspects of the debate, such as the impact that the expansion of the grey market for these goods has on their general pricing, the spread of computer/IT culture, the fall in price of consumables such as blank CDs, DVDs, the growing popularity of CD-writing equipment, etc. [70]

There is no point in having a preachy and messianic approach that lectures people on the kind of access that should be given. While in an ideal world, we would also use Free Software and Open Content, this cannot be linked in a sacrosanct manner to the question of spreading access.

Wikipedia

History of Wikipedia

January 15th is known as Wikipedia Day to Wikipedians. On this day 13 years back in 2001, Jimmy Wales and Larry Sanger launched a wiki-based project after experimenting with another project called Nupedia. Nupedia was also a web-based project whose content was written by experts to have high quality articles comparable to that of professional encyclopedia. Nupedia approved only 21 articles in its first year, compared to Wikipedia posting 200 articles in the first month, and 18,000 in the first year.

In concept, Wikipedia was intended to compliment Nupedia by providing additional high quality articles. In practice, Wikipedia overtook Nupedia, becoming a global project providing free information in multiple languages.

As of January 2014, Wikipedia includes over 30.5mn articles written by 44 million registered users and numerous anonyms volunteers in 287 languages; including over 20 Indian languages.[1] Wikipedia is the world's sixth-most-popular internet property with about 450 mn unique visitors every month, according to Alexa Internet.[2]

Wikipedia in Indian Language

With one of the globe’s largest populations, world’s largest democracies, dozens of languages and hundreds of dialects, rich heritage, culture, religion, architecture, art, literature and music; India presents a remarkable opportunity for Wikipedia. For the Wikimedia movement, India represents a largely untapped opportunity to dramatically expand its impact and move toward the vision of a world where everyone can freely share in – and contribute to - the sum of human knowledge.

Although the Indian population makes up about 20% of humanity, Indians account for only 4.7% of global Internet users, and India represents only 2.0% of global pageviews and 1.6% of global page edits on Wikimedia's sites. Wikipedia projects in 20 Indic languages, will become increasingly important as the next 100 million Indians come onto the Internet, given that they are likely to be increasingly using the Internet in languages other than English. Demographically, Indic languages represent a good growth opportunity since estimates suggest only about 150 million of the total Indian population of 1.2 billion have working fluency in English.

To drive the growth of Indian language Wikipedias, WMF initiated Access to Knowledge Programme (A2K) with Centre for Internet & Society in 2012.

Challenges Faced by Indian Language Wikipedias

The current challenges of Indian language Wikipedias can be summarized as below:

1. Indian language Wikipedia's are under-represented in reader, editor & article counts.
2. Editor base is relatively low.Further, growth in editors and articles is still relatively low, even on a small base.
3. Technical barriers exist for use of Indian language Wikipedias, especially for editing.
4. Internet penetration low (~150mn) – though growing rapidly, and projected to double by 2015. [3]

Hari Prasad Nadig; a Wikipedian since 2004, an active Kannada Wikipedian, sysop on both Kannada Wikipedia and Sanskrit Wikipedia, talks about challenges and opportunities of Indian Language Wikipedias in a video.[98]

Development of Indian Language Wikipedias

Between 2002-04, about 18 Indian language Wikipedias had started. As of Jan 2014, Hindi Wikipedia is the largest project with over 1-lakh articles and Malayalam Wikipedia has the best quality articles amongst all Indian language Wikipedia projects.

In India there are two main organisational bodies that are:

First is Wikimedia India Chapter which is an independent and not-for-profit organization that supports, promotes and educate the general Indian public about the availability and use of free and open educational content, which includes the ability to access, develop and contribute to encyclopaedias, dictionaries, books, images, etc.The chapter helps coordinate various Indian language Wikipedias & other Wikimedia projects and spread the word in India. Chapter's latest updates can be accessed from its official portal wiki.wikimedia.in.

Second is Access to Knowledge Programme at Centre for Internet & Society (CIS-A2K) that provides support to the Indian Wikimedia community on various community-led activities, including outreach events across the country, meetups, contests, conferences, and connections to GLAMs and other institutions. CIS-A2K's latest updates can be accessed from its official portal Wiki.[99]

Some ideas for development of India language Wikipedias (also adopted by India Chapter and CIS-A2K) are:

Content addition/donation in Indian languages

Particular emphasis is placed on generating and improving content in Indic languages. The Indian language Wikipedias can be strengthened by finding content that is relevant and useful to the Wikimedia movement that is (a) already in the public domain and (b) contributed to the

98. Hari Prasad Nadig talking about Wikipedia Community building at Train the Trainer Program organised by CIS, November 29, 2013, available at http://www.youtube.com/watch?v=scEZewFJXUU, last accessed on February 1, 2014.
99. India Access to Knowledge meta page available at http://meta.wikimedia.org/wiki/India_Access_To_Knowledge , last accessed on February 1, 2014.

movement under an acceptable copyright license. Such content will include, but not be limited to, dictionaries, thesauruses, encyclopedias and any other encyclopedia-like compilations.

A precedent for content addition/donation exists in the gift of an encyclopedia to the Wikimedia movement by Kerala government in 2008 and Goa government in 2013.

Institutional Partnerships
To partner with higher education institutions in developing thematic projects and create a network of academicians that will actively use Indian language Wikipedias as part of their pedagogy. Conduct outreach workshops mainly with an intention to spread awareness and to arrive at possibilities for long-term partnerships.

An example of this would be 1600 students of Christ University undergraduate courses who study a second language as part of the course are enrolled in a program where they are building content on Hindi, Kannada, Tamil, Sanskrit and Urdu Wikipedias.

Strengthening existing community
Facilitate more qualitative interactions amongst current contributors, with an aim to a) foster creation of new project ideas; b) periodic review and mitigation of troublesome issues; c) foster a culture of collective review of the expansion of Indian language Wikipedias.

This is currently been done by capacity building meet-up or advanced user trainings organized for existing Wikimedia volunteers from different language communities.

Tapping into User Interest Groups
Setting up smaller special interest groups by tapping into existing virtual (Facebook pages/groups, bloggers communities, other open source groups/mailing lists), and physical communities and supporting key Wikipedians to bring new Wikipedians on board.

Building ties with DiscoverBhubaneshwar in Odisa [4] and Goa.me in Goa [5], which are photographer's communities. Useful pictures from different states can feed into Wikipedia articles there by enriching the content. Collaboration with Media lab at Jadhavpur University, Kolkota has helped create articles on Indian cinema and media, Indian film history etc.

Creating awareness
Creation of short online editing videos tutorials and editing guides to be published on Wikimedia commons, YouTube, Facebook and similar websites that could help us reach out to larger audiences. Production of videos in local language will avoid existing issues with global videos such as low comprehensions because of accents and relevance.

Hindi Wikipedia tutorial videos were produced in collaboration with the Christ University students, faculty and staff, as part of the Wikipedia-in-the-UG-Language-Classroom program. A total of 10 videos are thoughtfully produced to teach anyone how to edit Hindi Wikipedia.[100] Video tutorials on Kannada Wikipedia are currently in pipeline.

Technical support

100. What is Hindi Wikipedia?, CIS-A2K, available at http://www.youtube.com/watch?v=96Lzxglp5W4&list=PLe81zhzU9tTTuGZg41mXLXve6AMboaxzD, last accessed on February 1, 2014.

Liaising between language communities and WMF & Language Committee in finding effective solutions for any script issue, input method issue, rendering issues or any bugs.

Case Study: Wikipedians Speak

Netha Hussain is a 21-year-old medical student from Kerala, India. She first began editing Wikipedia in May 2010, contributing to English Wikipedia and Malayalam Wikipedia along with uploading photos to Wikimedia Commons. She said "I started editing Wikipedia every day. In school, we studied subjects like microbiology, pathology, pharmacology and forensic medicine. After class, I'd go straight to Wikipedia. I'd review the information related to the day's lecture, and add a few more facts and sources. It was a lot of work, and I always went to bed tired, but it was worth it. Everybody reads Wikipedia. If they want to learn something, they turn to Wikipedia first. I know I've helped a little — maybe even a lot. And that's the greatest feeling I know." [101]

Image Attribution: Netha Hussain by Adam Novak, under CC-BY-SA 3.0 Unported, from Wikimedia Commons.

Poongothai Balasubramanian is a retired Math teacher from Tamil Nadu, India. She began editing Wikipedia in 2010. Since then, she's created 250 articles and recorded pronunciations for 6,000 words. She has created several articles on quadratic functions, probability, charts, graphs and more on Tamil Wikipedia. She has over 7,000 Wikipedia edits. She said, "As a teacher and a mother, I was always busy. But now that I'm retired and my children are grown, my time is my own — all 24 hours of it! And I spend every day on Wikipedia. I'm a volunteer. No one pays me. But helping edit Wikipedia has become my life's work. Even though I'm

101. Interview with Netha Hussain at WikiWomenCamp in Buenos Aires 2012, available at http://commons.wikimedia.org/wiki/File:WWC-Netha-Hussain.ogv , last accessed on February 2, 2014.

not in the classroom, I'm still doing what I care about most: helping a newgeneration of students learn, in the language I love." [102]

Image Attribution: Balasubramanian Poongothai by Adam Novak, under CC-BY-SA 3.0 Unported, from Wikimedia Commons.

Additional Reading

1. Geert Lovink and Nathaniel Tkacz (eds.), "Critical Point of View: A Wikipedia Reader", *Centre for Internet and Society and the Institute of Network Cultures*, http://www.networkcultures.org/_uploads/%237reader_Wikipedia.pdf.
2. Links to 2 videos
3. Yochai Benkler

Open Access

Definition

Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions.

OA removes *price barriers* (subscriptions, licensing fees, pay-per-view fees) and *permission barriers* (most copyright and licensing restrictions). The PLoS shorthand definition —"free availability and unrestricted use"— succinctly captures both elements.

There is some flexibility about which permission barriers to remove. For example, some OA providers permit commercial re-use and some do not. Some permit derivative works and some

102. See interview of Poongothai Balasubramanian at http://wikimediafoundation.org/wiki/Thank_You/Poongothai_Balasubramanian, last accessed on February 1, 2014.

do not. But all of the major public definitions of OA agree that merely removing price barriers, or limiting permissible uses to "fair use" ("fair dealing" in the UK), is not enough.

Here's how the Budapest Open Access Initiative put it: "There are many degrees and kinds of wider and easier access to this literature. By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited."

Here's how the Bethesda and Berlin statements put it: For a work to be OA, the copyright holder must consent in advance to let users "copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship...."

The Budapest (February 2002), Bethesda (June 2003), and Berlin (October 2003) definitions of "open access" are the most central and influential for the OA movement. Sometimes I refer to them collectively, or to their common ground, as the BBB definition.

When we need to refer unambiguously to sub-species of OA, we can borrow terminology from the kindred movement for free and open-source software. Gratis OA removes price barriers alone, andlibre OA removes price barriers and at least some permission barriers as well. Gratis OA is free of charge, but not free of copyright of licensing restrictions. Users must either limit themselves to fair use or seek permission to exceed it. Libre OA is free of charge and expressly permits uses beyond fair use. To adapt Richard Stallman's famous formulation (originally applied to software), gratis OA is free as in 'free beer', while libre OA is also free as in 'free speech'.

In addition to removing access barriers, OA should be immediate, rather than delayed, and should apply to full texts, not just abstracts or summaries.

It is true that many libraries and other content providing organizations provide free access to vast quantities of textual (and other kinds of) information. Today a variety of contents is thrown open by the creators and these include hundreds of educational courses, open government data, open monographs, open images and so on.

But when we talk of ‘open access’ the term is restricted to science and scholarship and especially to research publications and in particular journal articles. Unlike most newspaper publishers, not all publishers of professional journals are ready to allow free use of the material they publish. Indeed, they levy hefty subscription prices and some journals cost in the range of US $ 20-30 thousand per year. Large publishing houses earn a profit of upwards of 35%. ”Elsevier's reported margins are 37%, but financial analysts estimate them at 40–50% for the STM publishing division before tax” [10].

Publishers protect their ‘rights’ with copyright and are ever vigilant in protecting those rights.

Case Study: Aaron Swartz

Let us begin with an extreme example – the case of Aaron Swartz, the hacker-activist, who was forced to end his life early this year after being pursued by the US Department of Justice.

What did Aaron do? He downloaded a very large number of full text papers from JSTOR, a database of scholarly journal articles, from an MIT server.

Why should anyone think downloading scholarly research articles was a crime in the first place? "Why, twenty years after the birth of the modern Internet, is it a felony to download works that academics chose to share with the world?" asks Michael Eisen, a renowned biologist at UC Berekeley and cofounder of the Public Library of Science [11].

The most important component of the Internet, the World Wide Web, was invented by CERN researchers essentially to help scientists communicate and share their research.
Today we can view thousands of videos on Indian weddings and pruning roses. But we are barred from downloading or reading research papers without paying a large sum! These are papers written by scientists, reviewed by scientists, their research often paid for by government agencies. And the knowledge therein is of relevance not only to other scientists but to the lay public as well. Especially, health related research.

And yet, JSTOR, a not-for-profit organization founded with support from Andrew Mellon Foundation, and MIT were keen to go to court, and the prosecutor was keen to argue for the severest punishment.

Case Study: Rover Research
Recently, Michael Eisen placed in his website four research papers resulting from the Rover exploration of Mars published in the AAAS journal *Science*. This is something no one has done before. His logic: the research was funded by NASA, a US government agency, and most of the authors were working in government institutions, and therefore the citizens have the right to access. While everyone was expecting AAAS and the authors to drag Eisen to court for violating copyright, the authors also made the papers freely available on their institutions' websites! But I wonder if Eisen could have got away so easily had he placed papers published in a journal published by Elsevier or Springer. Possibly not. Recently Elsevier had sent thousands of take down notices to Academia.edu for placing papers published in Elsevier journals (in the final PDF version) in their site. Elsevier had also sent similar missives to many individual scientists and universities including Harvard for a similar 'offence' [12].

Scientists do research and communicate results to other scientists. They build on what is already known, on what others have done – the 'shoulders of giants' as Newton said. Getting to know the work and results of others' research is essential for the progress of knowledge. Any barrier, including cost barrier, will hurt science or for that matter production of knowledge in any field.

When it comes to information (and knowledge) scientists everywhere face two problems, viz. Access and Visibility. These problems are acutely felt by scientists in poorer countries.

1. They are unable to access what other scientists have done, because of the high costs of access. With the nation's an annual per capita GDP of about US $3,500 (ppp) or even less, libraries in most developing countries cannot afford to subscribe to key journals needed by their users. Most scientists are forced to work in a situation of information

poverty. Thanks to spiraling costs many libraries are forced to cancel subscription to several journals making the situation even worse.

2. Scientists elsewhere are unable to access what developing country researchers are publishing, leading to low visibility and low use of their work. Take for example India. As Indian scientists publish their own research in thousands of journals, small and big, from around the world, their work is often not noticed by other scientists. even within India, working in the same and related areas. Thus Indian work is hardly cited.

Both these handicaps can be overcome to a considerable extent if open access is adopted widely both within and outside the country.

Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities[103]

Due to the changes that have come about in the production and distribution of scientific and cutlural knowledge in the age of the internet, there needed to be an agreement to move towards a global and interactive representation of human knowledge with worldwide access guarunteed. The Berlin Declaration of 2003 was an attempt at just that and it was in accordance with the spirit of the Declaration of the Budapest Open Access Initiative, the ECHO Charter and the Bethesda Statement on Open Access Publishing. The declaration lays down the measures that need to be adopted by research institutions, funding agencies, libraries, archives and museums among others in order to utilize the internet for open access to knowledge. There are more than 450 signatories including various government, funding agencies, academic and other knowledge based institutions.

According to the Declaration, open access contributions have to include:
"Original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material.

1. Open access contributions must satisfy two conditions:The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship (community standards, will continue to provide the mechanism for enforcement of proper attribution and responsible use of the published work, as they do now), as well as the right to make small numbers of printed copies for their personal use.
2. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, inter operability, and long-term archiving."

103. For more see Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, available at http://openaccess.mpg.de/286432/Berlin-Declaration, last accessed on February 1, 2014.

Open Access – Green and Gold

With the Internet and the Web becoming ubiquitous, we need not suffer these problems. If science is about sharing, then the Net has the potential to liberate the world of science and scholarship and make it a level playing field.

Till a few decades ago scholarly communication was a quite affair. Scientists and professors did research in their laboratories and sent the papers they wrote to editors of refereed journals. These journals were often published by professional societies, academies and in some countries government departments devoted to science. Many societies gave the responsibility to bring out the journals to commercial publishing houses. These publishers found in journal publishing a great business opportunity and started raising subscription prices. Initially no one seemed to notice or bother. But from around 1980, the rise in the cost of journals outstripped the general inflation by a factor of 3 or 4. Members of the Association of Research Libraries felt the pinch; many academic libraries had to cut down on their purchase of books and monographs so as to be able to subscribe to as many journals as possible. Then they had to cut down on the number of journals. Their levels of service to their academic clients fell badly. The 'serials crisis' forced them to protest. By then web technologies and online sharing of information had sufficiently advanced. Together these two developments led to the open access movement.

There are two ways research papers published in journals can be made open access: Open access journals and open access repositories.

Open Access Journals - The journal can allow free downloading of papers by anyone, anywhere without paying for it. Such journals are called open access journals. Making papers open by this method is referred to as the Gold route to open access. Traditionally, journals used to charge a subscription fee from libraries (or individuals who may choose to take personal subscriptions) and not charge authors submitting papers for publication. Occasionally, some journals may request authors to pay a small fee to cover colour printing of illustrations. Many open access journals do charge a fee from the authors, which is often paid by the author's institution. The APC collected by different journals varies from a few hundred dollars to a few thousands.

But not all OA journals levy an article publishing charge, e.g., journals published by the Indian Academy of Sciences, Council of Scientific and Industrial Research (CSIR-NISCAIR), Indian Council of Medical Research, and the Indian Council of Agricultural Research do not charge authors or their institutions.As of today, there are more than 9,800 OA journals published from 124 countries and these are listed in the Directory of Open Access Journals, [www.doaj.org], an authoritative database maintained at Lund University. On average four new journal titles are added to DOAJ every day.

Open Access Repositories - Authors of research papers may make them available to the rest of the world by placing them in archives or repositories. This is the 'Green route' to open access. There are two kinds of repositories: Central and distributed or institutional. arXiv is a good example of a central repository. Any researcher working in a relevant field can place his paper in arXiv and it can be seen almost instantaneously by other researchers worldwide. Developed in 1991 as a means of circulating scientific papers prior to publication, arXiv initially focused on e-Prints in High Energy Physics (HEP). In time, focus broadened to related disciplines. All content in arXiv is freely available to all users. Currently, it provides access to more than 900,000 "e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics." There are other central repositories such as SSRN (Social

Science Research Network;[104] abstracts on over 521,000 scholarly working papers and forthcoming papers and an Electronic Paper Collection of over 426,600 downloadable full text documents), Research Papers in Economics[105] (and ideas.RePEc.org; 1.4 million items of which 1.3 million are downloadable full texts), and CiteSeer^X (for computerand information science).[106]

Then there are institutional repositories. Registry of Open Access repositories[107] lists more than 2,900 repositories from around the world. The Directory of Open Access Repositories[108] lists more than 2,550 repositories, linking to more than 50 million items, growing at the rate of 21 thousand items per day, which can be searched through the Bielefeld Academic Search Engine search options. A database called SHERPA-RoMEO lists open access and self-archiving policies of journals.

These repositories are different from the usual websites that individual scientists may maintain. They have to use one of many standard software such as EPrints, DSpace, Fedora, or Greenstone. And they are all interoperable and 'OAI-compliant' which means that anyone searching for information need not know about a particular paper and the repository in which it is deposited; a mere keyword search will find the paper if it is relevant.

The Prophets of Open Access

The Net and the Web have not merely replaced print by speeding up things but have inherently changed the way we can do science (e.g. eScience and Grid computing), we can collaborate, we can datamine, and deal with datasets of unimaginable size. But the potential is not fully realized, largely because most of us are conditioned by our past experience and are inherently resistant to change. Our thinking and actions are conditioned by the print-on-paper era. Added to that is the apathy of science administrators.

Three individuals have made seminal contributions to realizing the potential of the Net in scholarly communication and may be considered pioneers in ushering in an era of open access. Tony Hey calls them 'prophets of open access.'

1. Paul Ginsparg, creator of arXiv, an open access repository for preprints of much of the physics and astronomy literature.
2. Lipmann, Director of the NCBI, known for his leadership in making biomedical data and health information publicly and easily available to all, including scientists, medical professionals, patients, and students.By organizing and integrating genomic data for developing diagnostic and clinical applications, NCBI serves as a bridge from research to the medical community. Each day, more than 3 million users access NCBI's 40 interlinked genomic and bibliographic databases and download more than 30 terabytes of data. NCBI is home to PubMed Central and PubChem, two essential databases for biomedical researchers. PMC is a full text (ePrints) database of published research papers and PubChem is a database of about 31 million biologically important chemical compounds and their bioassays.

104. See Social Science Research Network, available at http://www.ssrn.com/, last accessed on January 27, 2014.
105. RePEc, available at http://www.repec.org/, last accessed on January 26, 2014.
106. Cite Seer X, available at http://citeseerx.ist.psu.edu/, last accessed on January 26, 2014.
107. Registry of Open Access Repositories, available at http://roar.eprints.org/, last accessed on January 26, 2014.
108. The Directory of Open Access Repositories, available at http://www.opendoar.org/, last accessed on January 26, 2014.

3. Stevan Harnad, author of the subversive proposal, founder of Cogprints and tireless evangelist for Green Open Access [13]. Harnad has been writing frequently on all aspects of scholarly communication and open access in his blog 'Open Access Archivangelism,' addressing conferences and answering questions sent to him. There are also some institutions which have contributed substantially and these include the Open Society Institute (OSI), now rechristened Open Society Foundations, which facilitated the formulation of Budapest Open Access Initiative and the Budapest Declaration, and Association of Research Libraries.Surprisingly, Microsoft, not a great admirer of open source software, is promoting eScience through its External Research Division, especially formed for this purpose under the leadership of Prof. Tony Hey, former dean of Southampton University.

Open Access in India

The situation with accessing overseas journals has improved considerably thanks to many consortia which facilitate access to large groups of scientists in India (especially those in CSIR laboratories, Indian Institutes of Technology and Indian Institute of Science). Many universities have benefited through INFLIBNET. ICMR labs and selected medical institutions have formed ERMED, their own consortium. Rajiv Gandhi Health Sciences University, Bangalaore, provides access to literature through HELINET Consortia to a number of medical colleges in the South.

But the increased availability has not been taken full advantage by our researchers. A study of IISc in 2008 showed that the faculty and students have not used not even half the journals subscribed in their work – either for publishing their research or for quoting papers published in them. We seem to be paying for journals we do not use. Many of these journals are published by commercial publishers and they make huge profits. Publishers force consortia to buy journals as packages (bundling).

On the open course ware front the NPTEL programme under which top notch IIT and IISc professors produce both web-based and video lessons in many subjects, which are available on YouTube as well, has a huge worldwide following.

Many physicists in the better-known institutions use arXiv, which has a mirror site in India, both for placing their preprints and postprints and for reading preprints of others. But many others are not aware of it. What we need is advocacy and more advocacy.

Open access is gaining traction in India. For example, professors at National Institute of Technology, Rourkela, the first Indian institution to mandate open access for all faculty (and student) research publications, have received invitations to attend international conferences and for collaboration after their papers were made available through the institutional repository. Indian journals which embraced open access model started recording higher impact factors, e.g. *Indian Journal of Medical Research* and *Journal of Postgraduate Medicine*. MedKnow, publisher of JPGM, and Bioline International, have plenty of data to show the advantages of going open access.

And yet many researchers are reluctant to embrace OA. They fear that the journal publishers may sue them if they deposit their published papers in IRs. They have concerns about copyright violation.

Organizations such as the Open Society Foundations, ARL, SPARC and JISC (UK) and the seven research councils of UK are championing open access. Unfortunately some professional societies, notably ACS, are trying to stall the march of open access.

The best way to promote open access in India is to encourage self-archiving.

As Alma Swan says, we can do that by highlighting the increased visibility and impact, requiringauthors to self-archive and requiring them to self-archive in an institutional repository [14].

Why an institutionalrepository? Because it fulfils an institution's mission to engender, encourage and disseminate scholarly work; an institution can mandate self-archiving across all subject areas. It enables an institution to compile a complete record of its intellectual effort; it forms a permanent record of all digital output from an institution. It enables standardised online CVs for all researchers. It can be used as a marketing' tool for institutions [14].

An institutional repository provides researchers with secure storage (for completed work and for work-in-progress). It provides a location for supporting data yet to be published. It facilitates one-input-many outputs (CVs, publications) [14].

First, we must help institutions build an archive and teach researchers including students how to deposit (do it for them in the beginning if necessary) [14].

Eventually, in fact pretty soon, OA will be accepted by the vast majority of scientists and institutions. For only with OA scientific literature and data can be fully used. OA, making scientific literature and data free, is the only way to liberate the immense energy of distributed production. The moral, economic and philosophical imperatives for open access are indeed strong.

Even pharmaceutical companies like Glaxo SmithKline, Novartis and Novo Nordisk have started sharing their hard earned data in the area of drug development.

The openness movement in science and scholarship does not end with OA journals and OA repositories – both central and distributed. It includes the open data initiatives, escience and open science.

To learn more about open access please visit the Open Access Tracking Project led by Peter Suber, EOS [*www.**openscholarship**.org/*] and OASIS <openoasis.org> and join the GOAL discussion group moderated by Richard Poynder.

To know more about open science, read the articles by Paul David and Tony Hey.

What is Already There?

Thanks to the initiatives taken by Prof. M S Valiathan, former President of the Indian National Science Academy, the journals published by INSA were made OA a few years ago.

The Academy also signed the Berlin declaration. The Indian Academy of Sciences converted all its eleven journals into OA. The Indian Medlars Centre at the National Informatics Centre brings out the OA version of about 40 biomedical journals published mostly by professional societies.

All journals published by CSIR- NISCAIR (17), ICAR (2), ICMR and AIIMS are OA journals. No one needs to pay either to publish or read papers in these journals.

A Bombay-based private company called MedKnow brings out more than 300 journals, most of them OA, on behalf of their publishers, mostly professional societies. This company was acquired by Wolter Kluwers and they have decided to keep the journals OA.

Current Science and *Pramana*, the physics journal of the Indian Academy of Sciences, were the first to go open access among Indian journals. In all, the number of Indian OA journals is about 650.

The Indian Institute of Science, Bangalore, was the first to set up an institutional repository in India. They use the GNU EPrints software. Today the repository has about 33,000 papers, not all of them full text. IISc also leads the Million Books Digital Library project's India efforts under the leadership of Pro f. N Balakrishnan.

Today there are about 60 repositories in India (as seen from ROAR and OpenDOAR) including those at National Institute of Oceanography, and the National Aerospace Laboratories, Central Marine Fisheries Research Institute, Central Food Technology Research Institute, CECRI and the Raman Research Institute. The National Institute of Technology, Rourkela, was the first Indian institution to have mandated OA for all faculty publications.

Both ICRISAT and NIO have also mandated OA.

A small team at the University of Mysore is digitizing doctoral dissertations from select Indian universities under a programme called Vidyanidhi.

Problems and the Future

Despite concerted advocacy and many individual letters addressed to policy makers, the heads of government's departments of science and research councils do not seem to have applied their minds to opening up access to research papers. The examples of the research councils in the UK, the Wellcome Trust, the Howard Hughes Medical Institute and NIH have had virtually no impact. Many senior scientists and directors of research laboratories and vice chancellors of universities do not have a clear appreciation of open access and its advantages and implications.

Among those who understand the issues, many would rather like to publish in high impact journals, as far as possible, and would not take the trouble to set up institutional archives. Most Indian researchers have not bothered to look up the several addenda (to the copyright agreement forms) that are now available. Many scientists I spoke to are worried that a publisher may not publish their papers if they attach an addendum! Publishing firms work in subtle ways to persuade senior librarians to keep away from OA initiatives. There have been no equivalents of FreeCulture.org among Indian student bodies and no equivalent of Taxpayers‘ Alliance to influence policy at the political level.

Both the National Knowledge Commission and the Indian National Science Academy have recommended OA. IASc has set up a repository for publications by all its Fellows and it has more than 90,000 papers (many of them only metadata + abstracts). The Centre for Internet and Society has brought out a status report on OA in India. The Director General of CSIR has instructed all CSIR labs to set up and populate institutional repositories as soon as possible.

Director general of ICAR has come up with an OA policy. Dr Francis Jayakanth of IISc is the recipient of the EPT Award for Advancing Open Access in the Developing World in its inaugural year. That should encourage many librarians to take to promoting OA.

The Government should mandate by legislation self-archiving of all research output immediately upon acceptance for publication by peer-reviewed journals. The self-archiving should preferably be in the researcher's own institution's Institutional Repository.

The mandate should be by both institutions and funders.

Science journal publishers in the government and academic sectors should be mandated to make their journals OA (This can be achieved through adopting Open Journal Systems software developed at the University of British Columbia and Simon Fraser University and already in use by more than 10,000 journals. Expertise is available in India, or some journals can join Bioline International).

We should organize a massive training programme (in partnership with IISc, ISI-DRTC, NIC, etc.) on setting up OA repositories.

Authors should have the freedom to publish in journals of their choice; but they should be required to make their papers available through institutional repositories. In addition, they should use addenda suggested by SPARC, Science Commons, etc. while signing copyright agreements with journal publishers and not surrender copyright to (commercial) publishers. Some OA journals charge for publication. The Indian government or funders or institutions should definitely not offer to pay for journal publication charges.

Again, OA for all India's research output is covered by simply mandating OA self-archiving of all articles.

Brazil and the rest of Latin America have made great strides in open access. The excellent developments in Brazil, especially the government support (particularly in the state of Sao Paulo) and of the work of SciELO (for OA journals) and IBICT in supporting OA repository network are worthy of emulation in India and other developing countries.

Argentina has enacted a law that mandates OA to all research publications. India can follow their example.

Office of Science and Technology Policy Director John Holdren has issued a memorandum to make all research funded by major government funding agencies in the US insist on open access to government-funded research in USA. Indian funding agencies can do the same.
While our focus should be on digitizing and throwing open the current research papers and data, we may also make available our earlier work.

In particular, we may create an OA portal for the papers of great Indian scientists of the past: Ramanujan, J C Bose, S N Bose, M N Saha, K S Krishnan, Y Subba Rao, Sambhu Nath De, Mahalanobis, Maheshwari. C V Raman’s papers are already available on open access.

We may proactively advance OA in international forums such as IAP, IAC, ICSU and UNESCO. Two things can hasten the adoption of OA in India:

1. If the political left is convinced that research paid for by the government is not readily available to the people freely and what is worse the copyright to the research papers are gifted away to commercial publishers from the advanced countries, then they may act. The same way, the political right will come forward to support open access if we impress upon them that copyright to much of the knowledge generated in our motherland is gifted away to publishing houses in the West.
2. If the students are attracted to the idea that fighting for open access is the in thing to do, then they will form Free Culture like pressure groups and fight for the adoption of open access.

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Open (Government) Data
Definition

"Open data is data that can be freely used, reused and redistributed by anyone – subject only, at most, to the requirement to attribute and sharealike."[109] This has become an increasingly important issue in the age of the internet when governments can gather unprecedented amount of data about citizens and store various kinds of data which can actually be made available to people in an easier fashion.

Types of Government Data:

[110]

This does not necessarily mean that all the government's data should open according to the definition laid out above. There have been many arguments articulated against this.

1. Since the government is responsible for the efficient use of tax payers money, data that is commissioned and useful only for a small subsection (eg: corporations) of society should be paid for by that subsection.
2. There may be privacy concerns that limit the use of data to particular users or sub-sets of data.
3. Often times, the data may not be usable without further processing and analysis that requires more investment from other sources. Groups that would usually commission such projects lose their incentive to do so because everyone has access to the information. Eg: Biological, medical and environmental data.

However, this kind of utilitarian calculus is not possible while deciding which data should be open and which ones should not. Some theorists make the argument that government data should be open.[111]

1. An open democratic society requires that its citizens should know what the government is doing and that there is a high level of transparency. Free access is essential for this and in order for that information to be intelligible; the data should be reusable as well so it can be analyzed further.

109. For more see Why Open Data, available at http://okfn.org/opendata/, last accessed on January 26, 2014.
110. Image obtained from http://okfn.org/opendata/
111. For more see Glover Wright, Pranesh Prakash, Sunil Abraham, Nishant Shah and Nisha Thompson, "Report on Open Government Data in India, Version 2 Draft", *Centre for Internet and Society*, available at http://cis-india.org/openness/publications/ogd-draft-v2/, last accessed on January 25, 2014.

2. In the information age, commercial and even social activity requires data and having government data open can be a way to fuel economic and social activity within the society.
3. If public tax payer money was used to fund the government data, then the public should have access to it.

The open data handbook lays out the steps required in order to start making government data more open.[112] The summarized gist of it is to:

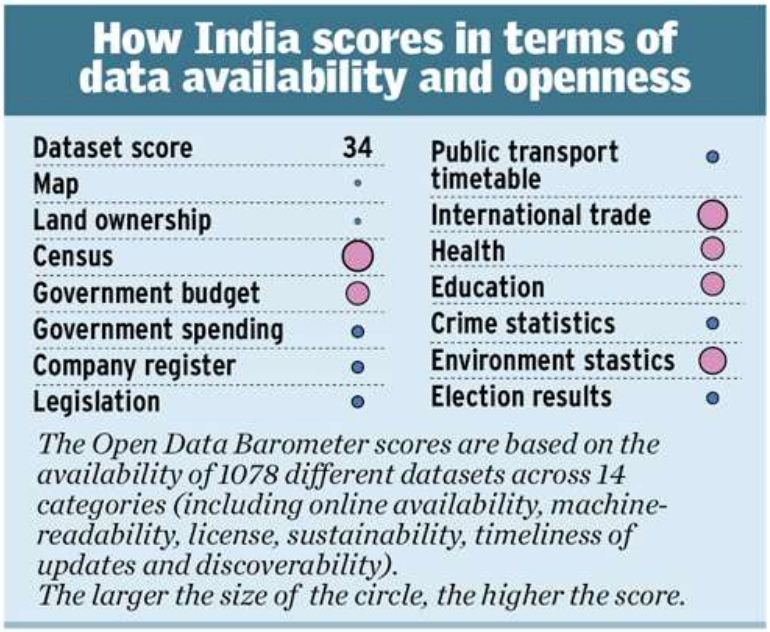
1. Chose the data sets that need to be made open.
2. Apply an open license:
    a. Find out what kind of intellectual property rights exist on that data.
    b. Select an appropriate open license that would incorporate all of the criteria (usability, reusability etc) discussed above.
3. Make the data available either in bulk or in Application Programming Interface (API) formats.
4. Make this open data discoverable by posting on the web or adding it to a list.

Application Programming Interface (API) vs. Bulk Data:[113]

1. Bulk is the only way to ensure that the data is accessible to everyone.
2. Bulk access is a lot cheaper than providing API access. (API specifies how some software components should interact with each other) Therefore, it is acceptable for the provider to charge for API access as long as the data is also provided in bulk.
3. An API is not a guarantee of open access but it is good if it's provided.

Open Government Data in India

At an annual summit in London recently where an open government data report was produced, India ranked 34th among 77 countries.



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112. For more see Open Data Handbook, available at http://opendatahandbook.org/en/ , last accessed on January 29, 2014.
113. For more see Janet Wagner, "Government Data: Web APIs vs. Bulk Data Files", *programmable web*, available at http://blog.programmableweb.com/2012/03/28/government-data-web-apis-vs-bulk-data-files/, last accessed on January 31, 2014.
114. Read more at http://www.thehindu.com/opinion/blogs/blog-datadelve/article5314288.ece

In India, open government data is currently about closing the loopholes and gaps in the Right to Information Act (RTI) and its promise of transparency as envisioned by the Knowledge Commission. In its 10th 5 year plan (2002-2007) the Indian Government announced its plan to become SMART (Simple, Moral, Accountable, Responsible and Transparent)[115]

In 2012, India launched an Open Government Platform, which is a software platform that attempted to enhance the public's access to government data. This was jointly developed by India and the US as a part of their Open Government Initiative.[116] Data.gov.in is a platform under this which provides a single-point access to datasets and apps published by the government's ministries, departments and organizations and it was in compliance with the National Data Sharing and Accessibility Policy (NDSAP). [117]

The Right to Information Act, 2005[118]

Around 82 countries around the world currently have laws in place that force the government to disclose information to its citizenry but this has been a rather recent phenomenon. In India, the RTI was passed in 2005 after a prolonged struggle from civil society. This act effectively replaces and overrides many state level RTI acts, the Freedom of Information Act (2002) and the Official Secrets Act, 1923. We have come to learn based on the responses of RTI requests that the government is not obliged to provide access to some pieces of information such as the minutes to a cabinet meeting.

The RTI Act defines information as:
'Any material in any form, including records, documents, memos, e-mails, opinions, advices, press releases, circulars, orders, logbooks, contracts, reports, papers, samples, models, data material held in any electronic form and information relating to any private body which can be accessed by a public authority under any other law for the time being in force.'

This capacious vision of the Act indicated a shift in the government's philosophy from secrecy to transparency. According to the Global Integrity report, in the category 'public access to government information' India went from 78 points to 90 points from 2006-2011. During the same time frame, the United States has only gone from 78 points to 79 points. However, according to a study conducted by PricewaterhouseCoopers, 75% of the respondents said they were dissatisfied with the information provided by the public authorities.

Government Copyright

The government owns the copyright to any work that is produced by the government or government employees in India as well any material produced by an Indian legislative or judicial body. This provision is laid down in the Copyright Act, 1957[119] (section 17(d) read with 2(k)) which gives a lifespan of 60 years for the copyright (section 28). The exceptions to the copyright are small and laid down in section 52(1)(q):

115. For more see Glover Wright, Pranesh Prakash, Sunil Abraham and Nishant Shah, "Open Government Data Study: India", *Centre for Internet and Society*, available at http://cis-india.org/openness/publications/open-government.pdf, last accessed on January 26, 2014.
116. Read more at http://pib.nic.in/newsite/erelease.aspx?relid=82025
117. Read the guidelines at http://data.gov.in/sites/default/files/NDSAP_Implementation_Guidelines-2.1.pdf
118. See the Right to Information Act, 2005, available at http://rti.gov.in/rti-act.pdf, last accessed on January 25, 2014.
119. See the Copyright Act, 1957, available at http://www.indiaip.com/india/copyrights/acts/act1957/act1957.htm, last accessed on January 25, 2014.

'52(1) The following acts shall not constitute an infringement of copyright, namely: (q) the reproduction or publication of — (i) any matter which has been published in any Official Gazette except an Act of a Legislature; (ii) any Act of a Legislature subject to the condition that such Act is reproduced or published together with any commentary thereon or any other original matter; (iii) the report of any committee, commission, council, board or other like body appointed by the Government if such report has been laid on the Table of the Legislature, unless the reproduction or publication of such report is prohibited by the Government; (iv) any judgement or order of a court, tribunal or other judicial authority, unless the reproduction or publication of such judgment or order is prohibited by the court, the tribunal or other judicial authority, as the case may be.'

Although this exception is small, in practice the government has rarely the government has rarely prosecuted to enforce copyright when data is requested by an individual or group even when the reason for request is commercial in nature.

IP Protection for the Government

Most of data compiled by or commissioned for by the government is raw data in the form of figures and statistics. Generally, non-original literary works are not protected by copyright law and this issue was decided upon in a landmark Supreme Court case in 2007. The standard of originality was changed from the labor expended on compiling the information (also known as the 'sweat of the brow' doctrine[120]) to the creativity, skill and judgment required in the process. This meant that most of the government's data would not qualify as creative enough to hold a copyright.

Case Study: The Department of Agriculture, Maharashtra

The Department of Agriculture (DoA) in Pune started using ICTs in 1986 itself when it used a computerized system to process census data. The DoA currently uses ICT for internal administrative word and also for processing and disseminating data to farmers across Maharashtra both online and through SMSs. The website is bilingual in both Marathi (the local language of the State) and English.

Some of the information available includes[121]:

1. The participation of Maharashtra farmers in the National Agriculture Insurance Scheme
2. Annual growth rates of agriculture and animal husbandry
3. Rainfall recording and analysis
4. Soil and crop, horticultural, soil/water conservation, agricultural inputs, statistical and district-wise fertility maps.
5. Farmers can sign up for SMS's that give information specific to the crop requested.

Even though information in 2010 was available on 43 different crops which was sent to 40,000 farmers, people don't have the technology to access all this information. Usually this is because of a lack of reliable electricity, internet and mobile phone access. The question is whether the open data responsibility ends as long as the data is made available by the government. Sometimes, the government has to make a discretionary decision to not make certain data available to the common man in the interest of public order. An example is if

120. See note 6 above.
121. See 6 note 6 above.

there is a crop that is infested with a disease or a pest, then it could cause a mass panic not only among farmers but also among the general consumers.

Case Study: Indian Water Portal[122]

The Indian Water Portal in Bangalore claims that it is an open, inclusive, web-based platform for sharing water management knowledge amongst practitioners and the general public. It aims to draw on the rich experience of water-sector experts, package their knowledge and add value to it through technology and then dissemin ate it to a larger audience through the Internet."[123]

Based the recommendations of the National Knowledge Commission (NKC), the IWP has established the best practices. It has been running on the open source software Drupal Software since 2007, and it is available in Hindi, Kannada and English. This portal also has an educational aspect to it as it provides reading material to students who wish to learn about water issues. Although this website was set up with the support of the national government, it hasn't gotten much support from ministries and departments which is problematic as they produce the most amount of information on water and sanitation.

This is, however, a great example of a partnership between private and public that has led to accessible open government data. The only problem here is that it is only accessible to people with access to the web but that may be a problem better solved by increasing access to the web.

Unit 6: Universal Access and Service

The terms that are so often used like the 'knowledge economy' and 'information society' are indicative of the saliency of information and communication technologies (ICTs), especially in the areas of social and economic development in this age. Governments all around the world and including the Indian one have started to view telecommunications as a basic necessity for quality of life along with water, transportation and sanitation. Not only this but the fact that the productivity of a country seem directly contingent upon the extent to which people are connected to each other in large networks. Phrases that weren't recognized as mainstream problems before like 'leapfrogging technologies', 'bridging the digital divide', 'information rich and information poor' and the like have become a part of serious policy deliberation for governments. The main aspects of consideration when extending the agency of communication to the people are Universal Access and Universal Service. While they have a similar principle of access governing them, they are different in the application and logistical goals. The concept of universal service exists in 125[124] countries, universal service obligation (USO) typically being defined as the requirement for an operator/s to provide a set of basic services to all consumers at an affordable cost. USO exists for industries such as telecommunication, energy, and postal services.[125] The services are mainly subsidised by universal service funds, which largely focus on the provision of services in rural and remote areas, but are increasingly

122. For more see Glover Wright, Pranesh Prakash, Sunil Abraham and Nishant Shah, "Open Government Data Study: India", *Centre for Internet and Society*, available at http://cis-india.org/openness/publications/open-government.pdf, last accessed on January 26, 2014.
123. For more see India Water Portal, available at http://www.indiawaterportal.org/, last accessed on January 26, 2014.
124. Deepti Bharthur, Axel Leblois and Nirmita Narasimhan, "Universal Service for Persons with Disabilities", *G3ict*, available at http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_0/id_193, last accessed on January 27, 2014.
125. Gradual network expansion and universal service obligations pg. 1

beginning to include other categories of marginalized populations such as persons with disabilities, illiterate persons, and the elderly. [126] Without monetary incentives for service provision, operators may abstain from providing services to lower revenue yielding customers, and focus on establishing networks for consumers that yield greater profits.[127]

InfoDev, a special program of the World Bank defines the terms as the following:

1. "Universal access (UA): ubiquitous access to the service e.g., at a public place, thus also called public, community or shared access.
2. Goal: Every person has affordable and reasonable public access to defined ICT services considered essential for social inclusion and economic development.
3. Universal service (US): every individual or household can have service, using it privately e.g., either at home or increasingly carried with the individual through wireless devices such as mobile phones or PDAs.
4. Goal: 100 per cent of individuals or households can afford ICT services categorized as part of US, and a majority of the population subscribes to these services.
   Universal access and service (UAS): the generic term when referring to both UA and US or the general concept. "[128]

The essential components of UAS are the availability, accessibility and affordability of these technologies and services. Usually, the objects of UAS's consideration involve telephony (voice calls and text messages), internet and broadband connectivity, and radio and television broadcasting. The level of a country's development is an important consideration in the establishment of USO. In general, USOs in developed countries include both basic telecommunications services as well as services which enable access to Information and Communication Technologies (ICTs) such as internet, fax, and data transmission. [129] In developing countries with low income levels, highly uneven income distribution, and shortage of resources to fund the USO, in general the USO services include public access points such as payphones, public phones at spaces such as schools or hospitals or through the creation of telecentres.[130]

Aspect	Universal Access	Universal Service
Availability	Focused coverage	Blanket coverage
	Public access (e.g., at a payphone or telecenter) Free emergency calls	Private service on demand Free emergency calls
Accessibility	Walking distance, convenient locations and hours	Simple and speedy subscription
	Inclusively designed premises (e.g., for wheelchair users); inclusively designed	Inclusively designed terminals and services

126. See Universal Service for Persons with Disabilities, G3ict, available at http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_0/id_193 , last accessed on January 29, 2014.
127. Critique of TRAI Consultation paper, pg. 5
128. For more see Universitat Pompeu Fabra, available at http://www.upf.edu/materials/bib/docs/3334/TTR/TTR2003.pdf PG 37, last accessed on January 29, 2014.
129. Virtual Training on Telecommunications Policy & Regulations, International Telecommunication Union, available at http://www.itu-coe.ofca.gov.hk/index_ns.htm, last accessed on January 28, 2014.
130. See note above.

	terminals or available assistance (e.g., for the blind or deaf)	(e.g., for blind or deaf people)
	Assistance from an attendant	Assistance through the terminal (e.g., by making calls or viewing help pages for the web)
	Adequate quality of service (e.g., having few failed call attempts)	Reasonable quality of service (e.g., having few dropped calls)
Affordability	Options of cash and card payment	Cost of average monthly usage is a small percentage of monthly GNI per capita
	Payment per use (e.g., for a single call or message or an hour of Internet access)	Options of cash, card and electronic payment
		Flat rate, bundles of services or low monthly subscription fee

For many decades now, policies have been designed and market structures have been changed to facilitate UAS, initially from telephony to other communications technologies recently. There is a common interest in this endeavour that doesn't involve just the interests of the marginalized. It is a recognized principle in communication theory that the more individuals, groups and institutions connected with public networks, the more the value of the network as a whole to each individual, the public and the operators and investors. This understanding of communications, known as network effects, is a practical and theoretical basis for universal access and service policy. This challenge cannot be addressed by the markets or the government while working alone and requires cooperation between the two entities in order to deliver communications services which is considered in many countries as a human right. This right is treated differently in different parts of the world and the ITU illustrates this point by simply comparing the obligations to service providers in the EU, Uganda and India.[131]

European Union	EU Member States must ensure the following: 1) Access at a fixed location upon request, to enable users to make and receive local, national and long distance calls, fax communications, and to enable them to have functional access; 2) At least one comprehensive directory and one comprehensive enquiry service comprising the numbers of all fixed and mobile subscribers who so wish; 3) Availability of public pay phones over the whole territory; 4) Measures that ensure that the disabled have access to the same services at an affordable price. 5) (since 2005) Required to supply connection that provides "functional" Internet access (FIA), which is limited to a single narrowband connection and does not extend to ISDN or broadband. 6) Must respond to all reasonable requests to install a telephone line, offering the same prices irrespective of location.

131. See table in Chapter 6: From Availability to Use: Universal Access and Service, available at http://www.infodev.org/infodev-files/resource/InfodevDocuments_1069.pdf, last accessed on January 28, 2014.

Uganda	(1) Ensure universal availability of connections by every person or individual households to public communication networks through inter alia pay phones, community telecentres, tele-boutiques, kiosks, cafes or community communications internet access terminals (2) Provide the following services: (i) connection to a fixed communication network able to support voice telephony, fax and data transmission,(ii) reasonable geographic access to public call boxes across Uganda, (iii) ability of consumers to access emergency and free services, operator assistance and directory inquiry services, (iv) ability to meet needs of people with disability,(v) delivery of affordable basic communication services to all customers on reasonable request, (vi) providing customers with disabilities with the same or equivalent services as all other customers so as to have access to the same level of universal service.
India	Stream I: Provision of Public Telecommunications and Information Services (a) Operate and maintain village public phones (VPT); (b) after target of one VPT per village achieved, provide additional public phone in villages of 2000+ without public call office; (c) replace multi access radio relay technology public phones; (d) upgrade public telephones to public tele-information centres; (e) install high speed public telecommunications information centres. Stream II: Provide household telephones in rural and remote areas as determined by the central government.

This shows that even though UAS principles have been adapted in countries and the importance of technological development (i.e, the internet) has been realized, the UAS objectives are still heavily dependent on the enhancement and expansion of wireline networks to extend access to remote areas. The level of a country's development is an important consideration in the establishment of USO. In general, USOs in developed countries include both basic telecommunications services as well as services which enable access to Information and Communication Technologies (ICTs) such as internet, fax, and data transmission. [132]

In developing countries with low income levels, highly uneven income distribution, and shortage of resources to fund the USO, in general the USO services include public access points such as payphones, public phones at spaces such as schools or hospitals or through the creation of telecentres.[133]

Let us now examine India's goals more closely.

Types of Basic Services and Access in India

In 1970's, the Indian Government instituted the provision of public phones as a policy measure which was carried out by the Department of Telecommunications. This entailed the provision of Long Distance Public Telephones (LDPT) according to the village population, which later expanded to involve the provision of a Public Telephone within five km of any settled area. This initiative was further broadened to administer a Public Telephone in every Village with a Gram Panchayat, and eventually a Village Public Telephone (VPT) in all villages.[134]

The National Telecom Policy 1994 put further focus on making telecom facilities available to every Indian citizen by mandating provisions of telecom facilities in all villages. NTP 1994 defined Universal Service as "the availability of certain 'basic telecom services at affordable

132. Virtual Training on Telecommunications Policy & Regulations, International Telecommunication Union, available at http://www.itu-coe.ofca.gov.hk/index_ns.htm, last accessed on January 28, 2014.
133. See note above.
134. TRAI recommendations, pg. 3

and reasonable prices', to all citizens." The objective of providing telecom services to all low teledensity areas was further reinforced though the National Telecom Policy of 1999.[135] The particular goals in relation to the Universal Service Obligation were:

1. "Provide voice and low speed data service to the balance 2.9 lac uncovered villages in the country by the year 2002"
2. "Achieve internet access to all district headquarters by the year 2000"
3. "Achieve telephone on demand in urban and rural areas by 2002"[136]

It was further outlined that a certain percentage of revenue earned by operators would be channelled into the universal access levy, which would fund the implementation of the universal service obligation (USO). The Government, seeking recommendations of TRAI, was to decide the amount of the revenue share going into the universal access levy. The provision of USO for rural and remote areas would be the responsibility of all fixed service providers, who would be reimbursed through the fund created from the universal access levy. Other service providers would also be encouraged to take part in USO provision based on technical feasibility and would be reimbursed from the same fund.[137]

The Indian Telegraph (Amendment) Act 2003 was passed by both Houses of Parliament, granting statutory status to the Universal Service Obligation Fund (USOF). The fund was administered under the Indian Telegraph (Amendment) Rules, 2004. The Indian Telegraph Act 1885 was further amended through the Indian Telegraph (Amendment) Rules 2006 to foster mobile services and broadband connectivity in rural and remote areas of India. On 18.7.2008 the rules have been altered again to facilitate USOF support for operational sustainability of rural wirelines which were set up before 1.4.02.[138]

USO are supported by the Universal Service Obligation Fund, which funds services as per six streams:[139]

Stream 1 deals with the Provision of Public Access Service. The services included under the stream are:

1. The operation and maintenance of Village Public Telephones (VPT) in every village in India.
2. The provision of Rural Community Phones (RCPs) after the achievement of the objective of one VPT in every village. If the village population exceeds 2000 and a public call office (PCO) does not exist, a second public phone will be installed.
3. The replacement of Multi Access Radio Relay Technology (MARR) VPTs installed before the 1st day of April 2002.

Stream 2 covers the provision of Household Telephones in Rural and Remote Areas as may be decided by the Central Government. This includes:

135. TRAI recommendations, pg. 4
136. New Telecom Policy, 1999, *Telecom Regulatory Authority of India*, available at http://www.trai.gov.in/Content/ntp_1999.aspx, last accessed on February 4, 2014.
137. Ibid.
138. Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication & Information Technology, available at http://www.usof.gov.in/usof-cms/usof_home_contd.htm, last accessed on January 28, 2014.
139. Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication & Information Technology, available at http://www.usof.gov.in/usof-cms/usof_schemes.htm, last accessed on January 28, 2014.

1. Reimbursement of support towards the difference in rental charged from rural users and rent assigned by the Telecom Regulatory Authority of India (TRAI) for rural household direct exchange lines (RDELs) installed before 1st day of April, 2002.
2. Support for RDELs set up after April 1, 2002.

Stream 3 provides for the establishment of infrastructure for the provision of Mobile Services in Rural and Remote Areas. The assets included in the infrastructure for the provision of mobile services are decided by the Central Government from time to time.

Stream 4 covers the provision of Broadband Connectivity to rural & remote areas. In particular, it provides for Wire Line Broadband and Rural Public Service Terminals (RPST).

Stream 5 includes the creation of general infrastructure for the development of telecommunication facilities in rural and remote areas. The specific items that will be developed will be determined by the Central Government. An Optical Fiber Cable (OFC) network for Assam is currently being developed by BSNL in Assam as part of this scheme.

Stream 6 encompasses support for new telecom-related technological developments in rural and remote regions. The Central Government will consider and approve pilot projects in this area.[140] Currently, funding is being provided for the provisions of Photo Voltaic Based Mobile Phone Charging Facilities in 5000 Villages by the Energy and Resources Institute (TERI).[141]

Apart from the 6 streams, USOF also supports a specialty gender based scheme which involves the creation of broadband connections to women's self-help groups (SHGs). The fund also incorporates the provision of broadband enabled Rural Public Service Terminals to SHGs. Through this connection, the SHGs will be able to provide banking, financial services, and other Value Added Services (VAS) to the rural/remote area inhabitants. Moreover, a specialty scheme for providing access to ICTs for persons with disabilities in rural areas is currently in the process of deliberation.

The latest contribution to the USOF is the Rs. 20, 000 crore funding assigned by the Prime Minister for the extension of broadband infrastructure to the 245,545 panchayats in India. The network will be set up by a Special Purpose Vehicle called Bharat Broadband Network Ltd (BBNL) which will combine the optical fibre cable infrastructure of public sector undertakings (PSUs) such as Bharat Sanchar Nigam Ltd, RailTel and Power Grid.Private players will be allowed to operate in the network at a later stage of the project. Through this network, the government aims to extend all e-governance services and projects to village populations. [142]

Universal Access and Service Affordability

Access Deficit

Access deficit amounts to the fees incurred by operators on services for which the charge for access does not cover the expenditure spent on providing the service. Access deficit charge

140. Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication & Information Technology, available at http://www.usof.gov.in/usof-cms/usof_schemes.htm, last accessed on January 28, 2014.
141. Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication & Information Technology, available at http://www.usof.gov.in/usof-cms/usof_SMCF.html, last accessed on January 28, 2014.
142. Joji Thomas Philip, "PMO gets cracking on national broadband project", *Economic Times*, June 26, 2012, available athttp://articles.economictimes.indiatimes.com/2012-06-26/news/32425017_1_optical-fibre-cable-e-governance-projects-pmo , last accessed on January 28, 2014.

(ADC) reimburses basic telecom operators for the services for which the cost of operation is not recovered. These services include telecom provision in rural areas, local call charges, provision for free calls, etc. ADC is implemented to make basic telecom services affordable for everyone, fostering universal access. [143]

An access deficit contribution scheme is one of the ways that telecom operators are compensated for access deficits. This measure obliges all operators within the market to contribute in covering the deficit in the access network.[144]

Another way of collecting funds for the ADC is through cross-subsidization.[145]

Cross-Subsidization

Before the liberalization of the telecom market, the UAS objectives were met by placing universal service obligations upon the dominant incumbent operator. Losses incurred from meeting USO targets would be financed through cross subsidization from revenue-generating network services such as long distance, international, and VAS.[146] Cross subsidization involves subsidizing prices for one group of consumers through funds obtained by increasing prices to another group of consumers.[147]

However, in the presence of competition within the telecommunications market, the cross-subsidies model become unsustainable, because other service providers establish services at market price in places where incumbent operators charge higher costs for the same services in order to cross-subsidize. This may lead to the incumbent operator losing business in profitable markets, and being forced into the unsustainable position of providing services only in unprofitable markets.[148]

USO Enabling Market Mechanisms

The presence of a vibrant private sector and competition within the telecommunications market can contribute to the attainment of universal service through enhancing the quality of services provided by competing operators, as well as increasing telecom penetration.[149] According to the World Bank, many telecommunication markets in Latin America responded to the introduction of competition through a growth of basic line rollout which was around three times faster than in countries having state monopolies and two times faster than in countries with private monopolies. Similarly, in Africa, it was estimated that the costs of Internet access in countries with liberalized markets was eight time lower than in countries with closed markets.[150] Beyond benefits of market competition, there are other market mechanisms that can enable the provision of universal service.

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143. "Know all about access deficit charge", *Financial Express*, January 17, 2005, available at http://www.financialexpress.com/news/know-all-about-access-deficit-charge/45846/ , last accessed on January 28, 2014.
144. Virtual Training on Telecommunications Policy & Regulations, *International Telecommunication Union*, available at http://www.itu-coe.ofca.gov.hk/index_ns.htm , last accessed on January 28, 2014.
145. See note above.
146. ICT Regulation Toolkit, available at http://www.ictregulationtoolkit.org/en/Section.3272.html , last accessed on January 28, 2014.
147. "Cross subsidization", *Wikipedia*, available at http://en.wikipedia.org/wiki/Cross_subsidization, last accessed on January 28, 2014.
148. Virtual Training on Telecommunications Policy & Regulations, *International Telecommunication Union*, available at http://www.itu-coe.ofca.gov.hk/index_ns.htm , last accessed on January 28, 2014.
149. Virtual Training on Telecommunications Policy & Regulations, *International Telecommunication Union*, available at http://www.itu-coe.ofca.gov.hk/index_ns.htm , last accessed on January 28, 2014.
150. Ibid.

Revenue-Sharing Concessions
Various countries in Asia, such as Indonesia, Vietnam, and Thailand have opted for Build Operate Transfer (BOT) schemes. BOT involves equipment suppliers or other investors financing, building, and operating network infrastructure. Ownership is transferred to the telecommunications operator upon the completion of the contract term. Alternatively, the Build Transfer Operate (BTO) scheme involves investors financing, building the network, transferring ownership, but continuing to manage and operate the system; receiving a share of the telecom operator's revenues in return.[151]

Tendering or Auctioning USO
Recently, policy makers have begun to tender or auction subsidies for the provision of services as part of USO, which are based on the lowest valuation of the bid. These measures have certain perceived advantages as opposed to the older model of having the incumbent operator provide USO services through government funding or internal cross-subsidies. These include:

1. The fast rate at which tenders or auctions can be executed, which accelerates the provision of USO;
2. The manner in which auctions show the bidding operator's actual valuation of the obligations;
3. Providing an incentive for operators to lower costs associated with service provision in order to bid for the least amount of subsidy. *[152]*

Winning bids often amount to less than the subsidy amount valued by the USF administrators. This has happened in Chile from 1995-1999, when the maximum subsidy amount in place was approximately 50 percent larger than the average winning subsidy. A similar scenario occurred in Peru and Colombia in 1999-2000, where winning bids were 25 percent and 45 percent of the maximum subsidies respectively.[153]

Other Options
Other options that regulators may consider for facilitating the provision of USO is through specifying rural build-out targets in the operator's license, as well as determining explicit universal access and service (UAS) targets in exchange for relieving operators from USOF levies or taxes. *[154]*

Universal Service Obligation Fund
The resources for the implementation of universal access and service measures can be channelled into a fund from which service providers receive subsidies for the provision of services that fit under the UAS scheme.

In India, 5% of the Adjusted Gross Revenue of all operators, except value added service providers (ex. internet service providers, e-mail, voice mail), go into the Universal Service Obligation Fund as Universal Access Levy (UAL). The government also periodically allocates grants and loans which are also put into the fund. All the funds channelled into the USOF are through appropriation by Parliament.[155]

151. Ibid.
152. Ibid.
153. http://www.indicus.net/media/index.php/2008/1245-indias-universal-service-obligation-for-rural-telecommunications
154. ICT Regulation Kit, available at http://www.ictregulationtoolkit.org/en/Section.3272.html, last accessed on January 28, 2014.
155. Ibid.

Administration of USOF

There are various models for the administration of USO funds. Funds may be administered by government ministries, as is the case in Colombia. In other countries, such as Peru, the funds are administered by regulators. Special agencies may also be set up for this purpose, such as it is in South Africa. It is commonly agreed that independent regulators and agencies that regulate USO funds are less prone to being influenced by political interests and remain more impartial.[156]

The Universal Service Obligation Fund (USOF) is administered in India through a separate administrative body which was established as an attached office of the Department of Telecommunications. [157]

USOF administration includes an Inter-Ministerial Advisory Committee with members from the Ministry of Finance, Minsity of Law and Justice, Planning Commission, TRAI, DOT, Indian Institute of Technology, Chennai, and Indian Institute of management, Ahmedabad. The committee was set up under the Chairmanship of Administrator USOF for recommending measures on issues regarding the USOF.[158]

The tender committee for USOF Schemes includes the Chairman (Telecom Commission), Administrator USOF, Member (F) and Member (P).[159]

A dedicated cell, which exists under Administrator USOF, consists of three Senior Administrative Grade (SAG) officers and other officers drawn from IP&T AFS and ITS cadres.[160]

The disbursement and verification of USO subsidies has been directed to the Controller of Communication Accounts (CCA) Offices.[161] The office is responsible for:

1. Claims and release of payments verification
2. Inspection and monitoring to ensure the accuracy of claims
3. Accounting of all transactions concerning the USOF
4. Submitting detailed returns and reports to USOF Administration at DOT HQ relating to the receipt of claims from Service Providers, claims settlement, requisition of funds, subsidy disbursement, and monitoring status and reports.[162]

USOF Subsidy Disbursing

The winners of the subsidy auctioning process based on the lowest bid, become eligible to receive the subsidies after their claims are scrutinized in detail by the CCA.[163] Eligible bidders include the Basic Service Operators (BSOs) Cellular Mobile Service Operators (CMSPs) and

156. Supra note 129 above.
157. Supra note 129 above.
158. Universal Service Obligation Fund, *Department of Telecommunications, Ministry of Communication & Information Technology*, available at http://usof.gov.in/usof-cms/usof_home_contd.htm, last accessed on January 28, 2014.
159. Ibid
160. Ibid
161. Ibid
162. "Role of the CCA Office", *Controller of Communications Accounts Haryana*, available at http://www.ccaharyana.gov.in/subsidyclaimants.asp#Role , last accessed on January 28, 2014.
163. Subsidy Disbursement from the Universal Service Obligation Fund, available at http://www.ccaharyana.gov.in/subsidyclaimants.asp , last accessed on January 28, 2014.

Universal Services Access Licensees (UASLs). The reserve price for the bids is set by an independent agency, which determines the price according to the fully allocated current costs for providing access in the areas covered. [164] USOF subsidies support the Net Cost of providing the service, which are the Capital recovery and Annual Operating expenses subtracted by the Annual Revenues. [165]

The winning service providers provide monthly Management Information System statements, as well as attend regular review meetings at various levels to address issues concerning the implementation of the scheme. The CCA checks the service provider's claims to ensure that they comply with the terms and conditions of the Agreement, seeking any clarifications that need to be made.[166]

Current Issues/Debates

As per the USOF subsidy auctioning process, each bidding unit includes only two players: the state-owned Bharat Sanchar Nigam Limited (BSNL),and one private player. BSNL has an advantage in the bidding process, as its costs are lower due to already having staff and infrastructure deployed across India. The private competitor companies, on the other hand, must incorporate the staff and infrastructure costs in its subsidy bids, as they are new entrants and lack the existing resources and capacity of BSNL. Hence BSNL is almost guaranteed a win. [167] It is not surprising then that BSNL has received 86% of subsidies from 2002-2011.[168] Furthermore, up to 2005-2006, USOF was reimbursing BSNL its license and spectrum fees.[169]

The infrastructure owned by BSNL was publicly funded. Many argue that permitting private operators to share this infrastructure would maximize public welfare, as companies will save money by not having to build duplicate infrastructure. The savings made by service providers would trickle down to lower service fees for consumers. [170]

Moreover, a large part of the funds collected through the Universal Access Levy paid by service providers lies unused.

Remaining USOF balance a per levy collected and subsidies disbursed[171]

Financial Year	Funds collected as Universal Access Levy	Funds Allocated And Disbursed	Reimbursement of Low Frequency and Spectrum	Balance

164. "The Universal Service Obligation Fund in India – An Overview", *International Telecommunication Union*, http://www.itu.int/ITU-D/treg/related-links/links-docs/USOF-India.pdf, last accessed on January 28, 2014.
165. Ibid.
166. Results Frameworks Documents (RFDs) in respect of USOF: the Responsibility Centre (RC) attached to the DoT for the year 2011-12 (Revised), available at http://usof.gov.in/usof-cms/GagendaPdf/bb/USOFs_VisionMissionObject_and_Functions.pdf, last accessed on January 28, 2014.
167. Mahesh Uppal, "Who deserves USOF subsidies most?", tele.net.in, available at http://www.tele.net.in/blogs/viewpost/47, last accessed on January 28, 2014.
168. "Disbursements from USO Fund", Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication and Information Technology, available at http://www.usof.gov.in/usof-cms/usof_subsidy_previous.html , last accessed on January 28, 2014.
169. Supra note 142 above.
170. Ibid.
171. "USOF Fund Status", Universal Service Obligation Fund, *Department of Telecommunications, Ministry of Communication & Information Technology*, available at http://usof.gov.in/usof-cms/usof_fundstatus.htm , last accessed on January 28, 2014.

			Charges to BSNL	
2002-2003	1653.61	300	2300	-946.39
2003-2004	2143.22	200	2300	-356.78
2004-2005	3457.73	1314.59	1765.68	377.46
2005-2006	3215.13	1766.85	582.96	865.32
2006-2007	3940.731500	1500	0	2440.73
2007-2008	5405.8	1290	0	4115.8
2008-2009	5515.14	1600	0	3915.14
2009-2010	5778	2400	0	3378
2010-2011	6114.56	3100	0	3014.56
2011-2012	6723.57	1687.96	0	5035.61
Total	43947.49	15159.4	6948.64	21839.45

Recently, the USOF administration turned down TRAI's proposal to grant further subsidy to BSNL for running its fixed line phones in rural areas. It was recommended to give Rs 2,750 crore to BSNL within a 2-year period. The fixed line rural network was built prior to April 2002, the construction of which was mainly funded by the government. The network has always been supported by USOF or Access Deficit Charges. Although BSNL reported that it has accrued a loss of *Rs.* 4,876 crore in 2011 as a consequence of running the network,TRAI's proposal was rejected on the ground that "*providing monetary support to BSNL would be tantamount to duplication of subsidy for the same activity.*"[172]

Case Study: Sanchar Shakti[173]

The Department of Telecom and USOF have a scheme for Mobile Value Added Service (VAS) and Information Communication Technology (ICT) related livelihood Skills for Women's SGHs in rural India. The then President Patil said that real development can't take place if it bypasses women, who represent the very pivot around which social change takes shape. She predicted that more women will become equal participants in the nation's affairs as progress is made on gender mainstreaming. This scheme, under which Mobile Value Added Services are being designed to give access to health issues, social issues and government schemes, will enable to rural women to become users and enablers of ICT services. The rural community in general will ultimately get access to facilities like locally available mobile repair and solar mobile charging centres. She finally suggested that Women's Self Help Groups can actually link amongst each other through ICT.

This is a multi-stakeholder process by nature since it includes SHG's, mobile service providers, handset and modem manufacturers, mobile VAS providers, National Bank for Agricultural and Rural Development (NABARD), Ministry of Rural Developmen and NGOs. It is a combined effort and is contributed to by the Department of Telecom (DoT), Universal Service Obligation Fund (USOF), Mobile Value Added Service Providers, Telecom Equipment Manufacturers and their partner NGOs

172. Thomas K. Thomas, "USOF Fund rejects proposal for more subsidy to BSNL", *Hindu Business Line*, May 23, 2012, available at http://www.thehindubusinessline.com/industry-and-economy/info-tech/uso-fund-rejects-proposal-for-more-subsidy-to-bsnl/article3449518.ece , last accessed on January 28, 2014.
173. For more see Press Information Bureau, Government of India, at http://pib.nic.in/newsite/erelease.aspx?relid=70578, last accessed on January 28, 2014.

Sachin Pilot, the Minister of State for Communications and Information Technology said that rural women, in order to get the benefits that are meant for them, will helped greatly helped by ICTs.

There are 4 different categories of schemes in the Sanchar Shakti:

1. Provision of subsidized mobile VAS subscription to SHGs with a service validity/warranty of at least one year
2. Setting up of SHG run mobile repair centers in rural areas
3. Setting up of SHG run modem repair centers in rural areas
4. Setting up of SHG run solar based mobile/CDMA FWT charging centers in rural areas

The focus of the mobile VAS projects is to provide the SHG members with information related to their livelihood/ entrepreneurial activities and lifestyles. This includes market information, financial products, skill enhancement, health, social issues and government schemes. The information is sent/ disseminated through SMS and Interactive Voice Response Systems (IVRS) with the content modified to cater to the literacy rates, socio-cultural background and gender sensitivity with training being an important prerequisite.

The success of the scheme would be an important step in the empowerment of rural women and important in the potential targeting of future government empowerment schemes directed at women.

Demographic Groups

Barriers to ICT access are prevalent among persons with disabilities, low income, little education and low literacy levels, the elderly, as well as inhabitants of rural and hilly/remote areas.[174] India has large demographic encompassing persons that fit within these groups; who are marginalized and often excluded from the vast socio-economic benefits offered through ICT penetration.

According to the 2001 census, 2.13% or 2.19 crore of India's population is disabled. However it is estimated that the 2011 census will generate a much larger number, being as high as 70 million persons. Much of the disabled population in India resides in rural areas. [175] Furthermore, the percentage of persons aged over sixty-years old is 8.2% for females and 7.0% for males as per UN data from 2010.[176] The literacy rate in India, as reported in the 2011 census, is 74.04%, with male literacy rate being 82.14% and female literacy rate at 65.46%. There is also a gap between rural and urban literacy rates, urban being 84.98% and rural 68.91%.[177]

India has more than 850 million mobile subscribers, but they are distributed quite unevenly across rural and urban areas. Thus tele-density (i.e. number of subscribers per 100 persons) in rural areas is only 41% whereas for urban areas it is 147%.

ICT's are increasingly used by governments, NGO's, multilateral organizations, and private companies to implement measures for poverty reduction and economic development.[178] It is

174. Knowledge Management Problems of Developing Countries, with special reference to India.
175. USF accessibility framework document-concept note
176. UN data, available at http://data.un.org/CountryProfile.aspx?crName=India#Summary , last accessed on January 28, 2014
177. Census Info India 2011, available at http://censusindia.gov.in/2011census/censusinfodashboard/index.html, last accessed on January 28, 2014.
178. Text-Free UI: Prospects and Challenges for ICT Access, available at http://research.microsoft.com/en-us/people/indranim/ifip_medhi_kuriyan.pdf , last accessed on January 28, 2014.

important to ensure that those living in the margins of society have access to ICTs and can enhance their quality of life through opportunities offered by new technologies and services.

The rural areas are, however the most marginalized and desperately in need of UAS. In the past, rural telecom growth has been fuelled by fixed line services as part of the USOF scheme deployed by BSNL, the incumbent operator. However, presently, private operators have come to occupy a large part of the rural market through deploying mobile networks. In fact, the growth of rural teledensity has been led by the strong adoption of mobile telephony. This trend has been driven by the decrease in handset prices and per-minute calling costs. [179]

While funding to private operators in rural circles is provided under the USOF scheme, BSNL up to this point has been the largest receiver of funds, having 86% share of all the disbursements according to data from 2002-2011.[180] Other receivers have been Reliance with 6% share, Tata Teleservices Limited having 5%, Tata Teleservices (Maharashtra Limited) with 2%, and 10 other companies whose combined share of the subsidy amount to 2%. Among these are Vodafone Essar South Limited, Bharti Airtel, Shyam Telelinks, etc.[181]

Nevertheless, according to an analysis of TRAI's recently released data conducted by the ET Intelligence Group, the presence of private operators in the rural telecom market is on the rise. The data, which measured the amount of net subscriber additions at the end of July 2011 over the year-ago levels, shows that the company promoted by the ADAG group is ahead of the competition, holding 23% of the total net additions in the semi-urban and rural markets. Reliance Communications holds 19% of the total net additions, Bharti Airtel accounts for 15%, and Vodafone for 13%.[182]

Market Demand

Tapping into rural/remote markets has large advantages for service providers. A Deloitte study predicts that rural consumers will lead the next wave of telecom growth. It is foreseen that 3G enabled VAS services will be a large factor in the growing demand. Telecom equipment manufacturers will also stand to gain from the expanding rural markets. Products specifically catered for rural needs are being introduced to rural buyers. For example, Micromax has developed a phone with a built-in solar charger to address rural electricity shortages. Nokia has produced the 1100 series phones which are designed to work around rural challenges such as dusty roads and power shortages. The phone has a dust-resistant keypad, an anti-slip grip, and a flash light. [183] Mobile-enabled services such as m-Health, m-Commerce, and M-Learning, fuel the demand for mobile devices and services in rural/remote regions. [184]

The National Optical Fibre Network (NOFN) for broadband connectivity to Panchayats will further expand the reach of ICT's in rural India and increase the demand for telecom service

179. Connecting rural India: untapped growth opportunity, pg. 36
180. Disbursements from USO Fund, Universal Service Obligation Fund, Department of Telecommunications, Ministry of Communication & Information Technology, http://usof.gov.in/usof-cms/usof_subsidy_previous.html , last accessed on January 28, 2014.
181. Ibid.
182. Ranjit Shinde, "Telecom sector to ring in the gains as rural India has more to spend", *The Economic Times*, September 19, 2011, available at http://articles.economictimes.indiatimes.com/2011-09-19/news/30175924_1_telecom-sector-rural-areas-telecom-services, last accessed on January 28, 2014.
183. Connecting rural India: the untapped growth opportunity, Capgemini, available at http://www.capgemini.com/resources/connecting_rural_india__the_untapped_growth_opportunity , last accessed on January 28, 2014.
184. http://telecomlead.com/inner-page-details.php?id=8294&block=News

provision. The aim of the project is to expand the current optical fibre network to every gram panchayat. The initial funding of Rs. 20 000 will come from the USOF. It is expected that an approximately equal investment will need to come from the private sector to set up the NOFN infrastructure and cover service provision.[185] The network will initially be deployed by BSNL and other institutions such as RailTel. Power Grid and Gas Authority of India will also take part in the project[186]. The Department of Telecommunications (DoT) will involve the private sector at a later time if the project falls behind the stipulated period of completion.[187]

Market Advantages

The rural telecommunications market has the advantage of stability. Rural buyers remain uninfluenced by fluctuations in the stock market, real-estate prices, or changes in bank lending, as they generally do not own land or borrow. Large companies are beginning to recognize the advantages of operating in rural regions. Rural customers "have been hungry for mobile phones for a long time, so demand will remain unaffected," said S.P. Shukla, chief executive officer of the mobile business at Reliance Communications India Ltd.[188] The comment came in light of the company's $2 billion nationwide network launch in January 2009. The network reaches over 24,000 towns and 600,000 villages. "If you go to the remote areas you don't have to be a genius to record huge growth," said, Mr. Ganani, the chief executive officer of Tower Vision India Pvt. Ltd., a company that builds and rents out cellular towers.

According to VNL, a telecom equipment manufacturer, the rural regions of India offer an attractive market for telecom service providers for a variety of reasons:[189]

1. Big population (about 70% of the total population[190])
2. Large and booming economy, contributing to over 50% of India's GDP
3. A parallel economy, rural inhabitants having the same needs as developed markets

USOF has a mandate of providing access to Telegraph (Telecommunications) Services to people in rural and remote areas at reasonable and affordable prices. The Fund has already rolled out a large number of schemes aimed at promoting public and individual access to telephony and broadband services in rural India. These include schemes for Village Public Telephones (VPTs), Rural Community Phones (RCPs), Rural Household phones (RDELs), Mobile Infrastructure and Services, Wire Line Broadband, Intra-district OFC Networks etc. In recognition of the requirements of Gender Responsive Budgeting (GRB), USOF has also undertaken gender specific initiatives; like preferential allocation of broadband connections to women's SHGs has been incorporated in the USOF Wire Line Broadband Scheme. A special scheme for provisions of broadband enabled Rural Public Service Terminals to SHGs has been incorporated in the Fund's activities. These terminals will enable SHGs to provide banking,

185. Sandeep Joshi, "Creation of National Optical Fibre Network approved", *The Hindu*, October 26, 2011, available at http://www.thehindu.com/news/national/creation-of-national-optical-fibre-network-approved/article2571353.ece, last accessed on January 28, 2014.
186. "Cabinet approves scheme for National Optical Fibre Network", *Deccan Herald*, available at http://www.deccanherald.com/content/200395/cabinet-approves-scheme-national-optical.html, last accessed on January 28, 2014.
187. V. Singh, "National Optical Fibre Network for Broadband Connectivity", Preserve Articles, available at http://www.preservearticles.com/2012032027857/national-optiscal-fiber-network-nofn-for-broadband-connectivity.html , last accessed on January 28, 2014.
188. Eric Bellman, "Rural India Snaps Up Mobile Phones", *The Wall Street Journal*, February 9, 2009, available at http://online.wsj.com/news/articles/SB123413407376461353, last accessed on January 28, 2014.
189. Bringing Telecom to Rural India, available at http://www.vnl.in/whitepapers/vnl_wp_telecom_rural_india.pdf pg. 2, last accessed on January 28, 2014.
190. Indian Rural Market, India Brand Equity Foundation, available at http://www.ibef.org/industry/consumermarket/ruralmarket.aspx, last accessed on January 28, 2014.

financial services and other broadband enabled Value Added Services (VAS) to the rural population.

Case Study: Village Public Telephones[191]
BSNL, on getting the green signal from the DoT, started installing public telephones in villages with the goal to have the service in every village in India by the end of 2009. The USOF provided the subsidies to BSNL to implement this scheme, known as 'Bharat Nirman'. Approximately 5000 remote villages are being given the telephone service using satellite technology. Apart from this, BSNL is covering villages using its WLL network and has been providing high-speed broadband services in many villages as well.

Universal Service[192]
As mentioned earlier, telecom companies have been paying 5% of their adjusted gross revenues to the Universal Service Obligation Fund (USOF). The purpose of this was to provide affordable telecom services to all households. However, the telecom revolution has done this by providing decent coverage in all the 28 states and Union territories including the rural areas, which mean that as of today, approximately Rs. 30,000 crores remains in the coffer. This money will be utilized for the national fiber optic project (NFOP) whose aim is to lay down high bandwidth cable for 6.4 lakh villages and for erecting 20,000 mobile towers in Naxal affected districts. The NFOP is a project to provide broadband to more than 2 lakh Gram Panchayats in order to make internet access available by extending the existing optical fibrers. The project cost is Rs. 20,000 crore but it is necessary to meet the long term goals of providing e-services and e-applications nationally.

The National Informatics Center (NIC) was commissioned by the DoT/ USOF to do a detailed Geographical Information System (GIS) study to map out the area of the existing optical fiber cable. This allows for the calculation of the remaining length of the cable required to connect the 2.5 lakh villages. The technology used for this is the Gigabit Passive Optical Network (GPON) which was developed by C-DOT (Hyperlink to Module 4). The project is planned to be completed by 2014 which is when he national rollout will be.The ultimate goal for the government is for every home in India to have a mobile phone with internet access. The involves the provision of a free phone with three years warranty, a SIM card and monthly free recharge of Rs.30 for two years. It seems likely now that every Indian will have a mobile phone before an Aadhaar number or a voter ID card. In fact, because of this scheme, for more than 50% of Indians, their first experience of the Internet will be through their mobile phones.

Unit 7: Freedom of Expression

Introduction
Freedom of Speech is a fundamental right and a part of substantive law which means that it stands only to be undermined by procedure. The advent of the internet has created many procedural difficulties in upholding this right that already exists. If we look at the struggle for upholding this right in many democratic countries, we can see how important it has been to a free society and that it will continue to be at the heart of any discussion of rights on the internet. The American Bill of Rights, arising from the smoke and fog of revolution for freedom would

191. For more see "Every village to have public telephone service by 2009-end", The Economic Times, September 13, 2008, available at http://articles.economictimes.indiatimes.com/2008-09-13/news/28385693_1_villages-telephone-service-wll-network, last accessed on January 28, 2014.
192. For more see Ajit Ranade, "What if every Indian had a mobile?" , Bangalore Mirror, October 18, 2013, available at http://www.bangaloremirror.com/columns/views/What-if-every-Indian-had-a-mobile/articleshow/24350192.cms, last accessed on January 28, 2014.

have been a much respected set of values in whichever order, despite Alexander Hamilton's best attempts, but there is a certain symbolic importance of having the Freedom of Expression as the First Amendment. This is because in a way, it is the freedom from which all the other freedoms flow since freedoms that aren't consistently argued for and are imposed, aren't really freedoms at all. From the dawn of human history, individuals or groups have declared themselves or certain entities beyond question and sacred. The term sacred itself comes with a warning not to exercise free expression in that particular context. The edifice of absolutism (an idea or entity beyond rational enquiry) stands only until someone decides to question it and we have seen in the past that it has tended to crumble quite quickly after. Therefore, people who claim themselves to be First Amendment Absolutists do so knowing the irony riddled in term because it not only reminds them of their unshakeable allegiance to a principle, but also that absolutism is incompatible with free expression.

Rosa Luxemburg once famously said, "Freedom is always and exclusively freedom for one who thinks differently". Free expression in a land can only be tested by the way the people are treated who think differently. Often times, attitudes towards free speech are difficult to gauge unlike the right to education, arms, health care or even free speech in Orwellian settings like Belarus or Iran. They often come in cracks and leaks in the legal systems manifested by the amount they are exploited because of a nation's will to compromise for things like public safety or decency. This right is understood not just as an individual right but as a collective right and hence the larger utility, often calculated myopically, is a factor in decisions on free speech issues. The idea of free expression, as delineated in classics; John Milton's Areopagitica, Thomas Paine's introduction to The Age of Reason and John Stuart Mill's essay On Reason, is that it's not just the right of the person who speaks but the right of everyone else to hear. The right to hear is as important in most of these cases as the right to speak and hence people who stifle others' ability to speak make themselves a prisoner of their own actions.

Internationally, the right to free expression has been tested many times against the sentiment of the masses and cross cultural sensibilities. The famous case of David Irwing, a British historian's arrest will make the point about free speech laws being undermined through legislations. In Austria, the National Socialism Prohibition Law (NSPL) was passed in 1947 and underwent further amendments in 1992. It states that

He who operates in a manner characterized other than that in § § 3a – 3f will be punished (revitalising of the NSDAP or identification with), with imprisonment from one to up to ten years, and in cases of particularly dangerous suspects or activity, be punished with up to twenty years imprisonment.[15]

§ 3h. As an amendment to § 3 g., whoever denies, grossly plays down, approves or tries to excuse the National Socialist genocide or other National Socialist crimes against humanity in a print publication, in broadcast or other media.[1

David Irwing is one of the important historians of the Third Reich along with Hugh Trevor Roper and AJP Taylor. Although the latter two have written without straying too much from the mainstream, David Irwing is a revisionist and has been considered by many as a Holocaust denier.[193] When he visited Austria in 2005, Irwing was arrested before he even said anything on the issue on Austrian soil for the possibility that he may say something that violated the amendment to the NSPL and then sentenced to 13 months in prison. Though this is a flagrant

193. See more on David Irving at http://www.theguardian.com/irving/, last accessed on January 28, 2014.

violation of free speech, the number of people rushing to his aid was a scant few compared to the masses building a fort around Salman Rushdie when the Satanic Verses was attacked. While Salman Rushdie is considered by many to be a symbol for free speech, David Irwing just served his sentence in a cell in Vienna and came out remaining a pariah for the crime of thinking and writing. Christopher Hitchens argued that because of Irwing's proficiency in German, he unearthed many documents from Nazi controlled Germany that make his reading indispensible and he goes further to say that people can make up their own mind about the holocaust or the flat earth theory.

It is still much disputed whether the YouTube video "The Innocence of Muslims" was the cause of the attacks on the US embassy in Benghazi, Libya. However, the furor that it caused led YouTube to block the video in Egypt, Libya, Saudi Arabia, Malaysia and Singapore. Interestingly enough, the video was also blocked in India due to local laws.[194]

194. For more see "Innocence of Muslims: a dark demonstration of the power of film", *The Guardian*, available at http://www.theguardian.com/film/filmblog/2012/sep/17/innocence-of-muslims-demonstration-film, last accessed on January 28, 2014.

Freedom of Speech in India

In India, Article 19(1)(a) of the Constitution guarantees to every citizen the fundamental right to freedom of speech and expression, and this right may only be limited by way of reasonable restrictions as detailed in Article 19(2). Any restriction falling outside the strictly defined scope of Article 19(2) is constitutionally impermissible, and liable to be struck down as such.

Legislations on Free Speech

Various legislations impose restrictions on the freedom of speech and expression, and make certain kinds of speech illegal, with attendant legal consequences. While conventional channels of free speech are traditionally regulated by the more general enactments such as the Indian Penal Code, The Indian Evidence Act and The Code of Criminal Procedure, freedom of speech and expression on the Internet is largely dealt with by the Information Technology Act, 2000. This enactment was originally designed to recognize and facilitate electronic transactions and electronic commerce. It dealt only cursorily with cyber crimes such as illegal access, manipulation of computer accounts, introduction of viruses, tampering with computer code and the like.

Later Developments

However, with the proliferation of the Internet and its perceived potential to be abused, the law was amended in 2008 to include penal provisions to deal with emerging crimes such as publishing sexually explicit material electronically, Internet frauds and scams (e.g. phishing scams, identity theft), violation of privacy, leakage of information by intermediaries etc. In 2011, four sets of guidelines were issued, of which the IT (Intermediary Guidelines) Rules, 2011 is relevant for our current purpose. And although intermediaries are not made *per se* liable for the content they host, these Rules require intermediaries to comply with "due diligence" standards and remove unlawful content upon receiving actual notice of it. Interestingly, Section 79 of the IT Act empowers the government to determine the "due diligence" standards. These Rules, along with the amendments of 2008 have given rise to much debate and discussion over, *inter alia*, whether they are an encroachment on an individual's right to free speech, and whether they merit a place in the world's largest democracy.

Historical Background

As it originally stood, Article 19(2) empowered the government to restrict the freedom of speech on grounds of "libel, slander, defamation, contempt of court, any matter offending decency or morality, or which undermines the security of the State." Such as it was, the interpretation of this clause by the Apex Court to strike down various laws was not received well by the government, and as a response to the decisions in a some high profile cases, *Romesh Thapar* v. *State of Madras*[195] and *Brij Bhushan* v. *State of Delhi*[196], the scope of Article 19(2) was amended and redefined to comprise the following elements and interests:

1. The security of the State
2. Friendly relations with Foreign States
3. Public order
4. Decency or morality
5. Contempt of Court
6. Defamation
7. Incitement to an offence.

195. AIR 1950 SC 124.
196. 1950 Supp SCR 245

Later, in 1963, “sovereignty and integrity of India” was drafted into the Article to address rising territorial tensions within the country.

Importantly, the amended Article did, and does, require any restrictions imposed on the fundamental right to freedom of speech and expression to protect any of the aforementioned interests to be “reasonable”. This qualification safeguards against arbitrary deprivation of this right by an overzealous government, something that has become an increasingly common and contentious issue with the advent of the Internet the virtually limitless canvas it provides for speech and expression.

public order IIPM, Public order, Religious sentiments, sacrilege, blasphemous, offensive, lascivious, scandalous, D.H. Lawrence, Dissent Lady Chatterley's Lover, Ranjit Udeshi, prurient minds, Happy Book Stall, Caravan, copyright, access, obscenity, Sikhim, Protest Bandit Queen, Hicklin Test, present and imminent danger, A Tale of Four Cities, Salman Rushdie, Satanic Verses

FREEDOM OF EXPRESSION

ban block censorship take-down interception surveillance due process transparency anonymity privacy nudity sedition hate speech

inflammatory morality decency pornography facebook twitter social media orkut heresy K.A. Abbas 66A expression art defamation Vishwaroopam Sadda Haq

Jaipur Film Festival, Jashn-e-Azadi, Cartoon Against Corruption, Amit Trivedi, Savita Bhabhi, Parrhesia, Arundhati Roy, creative freedom, contempt, tolerance, right to offend, Frank La Rue, Sikkim, Vinay Rai, Intermediary Liability, John Doe order,access to knowledge, Delhi University, Reasonable Restrictions, Maqbul Fida Hussain, First Amendment, profanity

Freedom of speech and Expression
Article 19(1)(a), constitution of India

All citizens shall have the right to freedom of speech and expression.

"The Freedom to receive and communicate information and ideas without interference is an important aspect of the freedom of free speech and expression"
- Cricket Association of Bengal (1995) 2 SCC 161

"In democracy it is not necessary that everyone should sing the same song."
- S. Rangarajan (1989) 2 SCC 574

"Freedom of expression is a preferred right which is always very zealously guarded"
- Odyssey (1988) 3 SCC 410

Reasonable Restrictions on Freedom of speech
Article 19(2), constitution of India

"Very narrow and stringent limits have been set to permissible legislative abridgement of the right of free speech and expression"
- Romesh Thapar AIR 1950 SC 124

"But we cannot simply balance the two interests as if they are of equal weight. Our commitment to freedom of expression demands that it cannot be suppressed unless the situations created by allowing the freedom are pressing and the community interest is endangered. The anticipated anger should not be remote, conjectural or far-fetched"
- S. Rangarajan (1989) 2 SCC 574

"Restraints on the freedom of speech and expression are permissible under our Constitution, is not to say that any particular restraint is desirable or ought to be imposed."
– H.M Seervai, Leading Authority on Constitutional Law in India

The freedom of speech and expression guaranteed by Article 19(1)(a) of the Constitution can be limited by way of reasonable restrictions under Article 19(2) in the "interests of the

Laws imposing restrictions on statements or expressions which challenge the sovereignty and integrity of India which is likely to cause violence.

sovereignty and integrity of India,

Legislature can enact laws which would impose restrictions on expressions which endanger the security of the State and is intended to overthrow the government or waging a war or rebellion against the government.

the security of the State,

friendly relations with foreign states,

The State can put restriction on forms of expression if they are considered to be indecent, immoral or obscene. The Supreme Court in India while deciding whether the novel Lady Chatterley's Lover contained obscene material, upheld the Hicklin Test.

public order,

Public order means public peace, safety and tranquility of the people at large. The absence of public order is an aggravated form of disturbance of public peace, which affects the general life of the public. Any speech which intends to disturb public order can be restricted by enacting laws.

decency or morality,

Defamation is an intentional false statement either published or publicly spoken that injures another person's reputation or good name.

or in relation to

contempt of court,

The legislature has enacted laws which restrict the exercise of one's right of freedom of speech and expression if it interferes with due course of justice or lowers the authority or stature of the court. Although criticism of the judicial system or judges is not restricted, it must not impair or hamper the administration of justice.

This ground permits legislations to punish or prevent incitement to commit an offence including serious offences like murder which lead to breach of public order.

defamation or

incitement to an offence".

Security of the State

The phrase "security of the State" covers aggravated forms of disturbance of peace, which threaten the foundations of the state or tend to overthrow it. In *Kedar Nath* v. *State of Bihar*[197] criticism of government action, however strongly worded, is consistent with the fundamental right to freedom of speech and expression. It is only when the words have the pernicious tendency to create a disturbance or pose a threat to the security of the nation that they can be restricted on this ground. However, for the purposes of Article 19(2), the Supreme Court in *Shailabala Devi* v. *State of Bihar*[198] held that any speech or expression which encourages or incites the commission of violent crimes such as murder, undermines the security of the state and as such, falls within the ambit of this exception.

Censorship has long been used by the Indian government as a tool to both contain the conflicts[199] that emanate from India's tremendous diversity and to ensure its homogeneous social, moral and political development.[200] At the time of Independence, there was a widespread fear[201] among India's lawmakers that unrestricted freedom of speech and expression would become a barrier to the social reforms perceived to be necessary to put India on Nehru's path to development. And while the restrictions detailed in our Constitution are *per se* acceptable internationally, only a handful of other modern democratic States see fit to include them in the basic laws of the land.

With the Internet age and the coming of social media networks, the number of potential authors and speakers has increased exponentially. Further, the cost effectiveness of publishing online has made it cheap and easy for everyone to share opinions or thoughts.

Consequently, the role of the gatekeeper in traditional media has been greatly reduced,[202] and the erstwhile mantra "filter first, then publish" has been reversed to favour publication first, and filtering later. This is often the basis for much government intervention, where it allegedly steps in to protect Constitutional interests. In fact, in 2011, Google released a Transparency Report which showed that of 358 items that it had been requested to remove between January and June 2011, only eight requests pertained to hate speech, while as many as 255 complaints were against "government criticism",[203] in flagrant disregard of the Supreme Court's ruling holding that such criticism is permissible.[204] In this regard, one source revealed that when Mr. Kapil Sibal met with executives from various Internet companies, he showed them a Facebook page which was critical of Sonia Gandhi, and told them, "this is unacceptable".[205]

The amendment to the IT Act in 2008 introduced the offence of "cyber terrorism"[206], a term whose broad and badly worded definition defies any logical understanding of the concept, so

197. AIR 1962 SC 955.
198. AIR 1952 SC 329.
199. Anja Kovacs, "The Present — and Future — Dangers of India's Draconian New Internet Regulations", *The Caravan*, available at http://www.caravanmagazine.in/perspectives/shut-your-mouth, last accessed on January 28, 2014.
200. Ibid.
201. Anja Kovacs, "You Have the Right to Remain Silent", *Sunday Guardian*, April 17, 2011, available at http://www.sunday-guardian.com/artbeat/you-have-the-right-to-remain-silent, last accessed on January 28, 2014.
202. Ibid.
203. Sunil Abraham, "That's the unkindest cut, Mr Sibal", *Deccan Chronicle*, December 12, 2011, available at http://cis-india.org/internet-governance/unkindest-cut-mr-sibal, last accessed on January 28, 2014.
204. AIR 1962 SC 955.
205. Supra note 178 above.
206. Section 66F, IT Act.

much so that it borders on being ludicrous. Apart from encompassing obvious Constitutional exceptions, it broadly classifies the unauthorized penetration of a computer system leading to defamation or injury to decency and morality and contempt of court as acts of cyber terrorism. What's worse is that there exists no precedent[207] for any such definition of this activity.

The amended law[208] also confers the government with unbridled power[209] to block access to websites as well as control and monitor their activities so long as they are justifiable on grounds enumerated therein, which *inter alia*, replicate the grounds in Article 19(2). For the current purposes, this means that where the government perceives a threat to the security of the State, it may exercise its powers in respect of "cyber terrorism" under S.66F, as well as the extensive powers of censorship, blocking and monitoring under S. 69 of the IT Act. However, while conferring the government with such wide powers, the new law fails to provide adequate safeguards against possible misuse. Most tellingly, there is no right to be heard before a website is taken down nor is there an in-built mechanism for the website owner to appeal.[210] Thus, questioning the government's decision necessarily involves engaging in a costly and lengthy legal battle.

Proponents of the amended laws justify these measures by pointing to the safety and security threats that the Internet poses. And while it is true that it is a State's core obligation to protect its citizens, democracy demands that it carefully balances any measures to do so with the continued guarantee of its citizens' fundamental rights.[211]This remains absent in India, despite the enormous changes and challenges to free speech that the Internet has brought with it. Instead, poorly thought out laws combined with unfettered governmental discretion are ripe to wreak havoc on the freedom of speech and expression and render this right meaningless by stifling and stymieing the free flow of information.

Case Study: Hynniewtrep National Liberation Council

The Hynniewtrep National Liberation Council (HNLC) is an illegal, minor separatist group that claims to represent the Khasi-Jaintia people in Meghalaya. It was banned in November 2000 by Home Ministry and Kynhun, a group on Yahoo which was linked to the HNLC started discussing the plight of the Khasi tribe on the group. The Computer Emergency Response Team (CERT-in) banned the group and asked Yahoo to close it under its CERT-in law in September 2003. On a lack of compliance from Yahoo, they blocked all of the Yahoo groups. On the CERT discussion board itself, some users pointed fingers at technical incompetence by the IT ministry while others blamed the ISP's. Due to lack of competence, what it important to note is that the CERT deferred to excessive censorship when they were technically handicapped from censorship in moderation. When they couldn't ban one discussion group which was what was required for the purpose of national security, the side that was erred on was a mass ban instead of no ban. This shows a general trend to compromise free speech when national security concerns exist, even if that connection is specious.

207. Pranesh Prakash, "Primer on the New Act", *Centre for Internet and Society*, available at http://cis-india.org/internet-governance/blog/primer-it-act, last accessed on January 28, 2014.
208. Ss. 66F, 69A and 69B.
209. Supra note 182 above.
210. Supra note 182 above.
211. Anja Kovacs, "You Have the Right to Remain Silent", *Sunday Guardian*, April 17, 2011, available at http://www.sunday-guardian.com/artbeat/you-have-the-right-to-remain-silent, last accessed on January 28, 2014.

Relations with Foreign States and Sovereignty and Integrity of India

Over the last decade, the Internet has opened up channels of expression like never before, and has proven a valuable outlet for dissent, which previously, for want of a medium of expression, might well have remained unheard. However, under the amended Information Technology Act, the government is empowered to block websites on grounds of "cyber terrorism"[212]. This offence, made punishable with life imprisonment is defined to include virtually all the grounds of restrictions present in the Constitution (unity and integrity of India, security of state, friendly relations with other states etc.), and even includes unauthorised access to information on a computer with a belief that that information may be used to cause injury to decency or morality or defamation.

While it can be argued that safeguarding the nation's sovereignty and integrity, and preserving its ties with other States against malicious dissidents is especially important in India, where the atmosphere is rife with divisive politics and myriad territorial tensions, defining cyber-terrorism loosely and vaguely is especially prone to misuse by suspicious authorities. The Internet affords all users the opportunity not only to air their views, but also to have them heard by more people than ever before. In this regard, the "cyber terrorism" provision's place in a modern day democracy is dubious at best. As Anja Kovacs has pointed out, "If more and more people are now getting an opportunity to speak, what we need to make sure is that they end up having a conversation."[213] And as she suggests, what is needed is not a mechanism of suppression, but rather a culture of respectful disagreement and debate across the nation's various social and political groups.

Friendly Relations with Foreign States

This ground was introduced via the First Amendment to the Constitution in 1951, with the intention of restricting persistent and malicious propaganda against a foreign power that would cause embarrassment to India and adversely affect its friendly relations with such a foreign State. However, this ground is of wide import and must therefore be employed cautiously, lest it be used to support legislation that restricts or stifles legitimate criticism of the government's foreign policy.[214] With the amendment to the IT Act, this danger is especially acute, since the legislation confers the government with virtually unbridled power to block access to websites – for instance, if a website expresses views against an Indo-US nuclear deal,[215] it may be blocked through the cyber terrorism provision.

Sovereignty and Integrity of India

A citizen's right to free speech and expression under the Constitution is not absolute. *Inter alia*, it may be reasonably restricted in the interests of the sovereignty and integrity of India. Thus, if the exercise of the right of free speech advocates or espouses secession of any territory from the Union, or threatens the integrity of the State in any way, Parliament can place suitable restrictions to prevent the same. This clause is aimed at preventing the freedom of speech and expression from being subverted towards assailing the sovereignty and territorial integrity of the Union, and restricting such activities in pursuance thereof which were outside the scope of "security of the State". This clause also serves to confer power upon Parliament to legislate on the subject without the constitutionality of the legislation being challenged at each step of the way.

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212. Section 66F, Information Technology Act, 2000 (as amended in 2008), hereinafter, "IT Act".
213. Supra note 186 above.
214. M.P. Jain, *Indian Constitutional Law* 1012 (Nagpur: Wadhwa, 2005).
215. Pranesh Prakash, "Primer on the New IT Act", *Centre for Internet and Society*, July 29, 2009, available at http://cis-india.org/internet-governance/blog/primer-it-act, last accessed on January 28, 2014.

Article 19(2), as amended in 1951, did not include the "sovereignty and integrity" of India as a grounds for restriction of the rights contained in Article 19(1)(a). This ground was added to Article 19(2) through the Sixteenth Amendment to the Constitution in 1963, and was motivated by political tensions within the country – the increasing Chinese incursions in North East, the calls for a separate Sikh homeland by Master Tara Singh and the Plebiscite Front in Kashmir, and the Dravida Munnetra Kazhagam's (DMK) demands for Dravida Nadu, a separate state independent of India, to name a few. When introducing the bill into Parliament, the Law Minister at the time, Ashok Kumar Sen, described its object as conferring appropriate powers on authorities to impose restrictions on individuals or organisations who sought secession from India or the disintegration from India for political purposes, such as contesting elections. This amendment also paved the way for such laws as the Criminal Law Amendment Act, 1961 and the Unlawful Activities (Prevention) Act, 1967, which punish acts or words intending or supporting the cession or secession of any part of India's territory.[216]

Case Study:
Under the IT Act, the government can force intermediaries such as cyber cafes, search engines, etc., to cooperate with censorship or decryption of the data using broad definitions like "interest of the sovereignty or integrity of India", "security of the state", "friendly relations with foreign States", etc. The government doesn't have to show due cause and if the intermediary decided to stand up for free speech, then they would be liable to be imprisoned for up to 7 years. For example, if a blog expresses opinions that are critical of India's policy with Iran, the government can block the access to the websites. There is no right to be heard before the website is taken down and there is no built in mechanism to appeal except to sink into an expensive legal battle with the government. If the intermediary doesn't cooperate, they can be imprisoned.

From the banning of *Viswaroopam* to cowing down an all-girl Kashmiri rock band, from yet another controversy surrounding Salman Rushdie to the Ashis Nandy FIR, the freedom of speech and expression in India has been under serious threat this year. The instruments used to accomplish these purposes vary – bullying from members of society, informal governmental action with overhanging threats of law and of course, the direct use of law. Increasingly, our laws facilitate intolerant groups to trample upon people's right to freedom of speech and expression, and the state is proving itself unable to protect it against such an onslaught.

Breach of Public Order
This ground was inserted into the Constitution to overcome the Apex Court's decision in *Romesh Thapar v. State of Madras*[217], which declared that ordinary breaches of public order were insufficient grounds to restrict the fundamental right to free speech. In this case, the court observed, "*nothing less than endangering the foundations of the state or threatening its overthrow could justify curtailment of the rights to freedom of speech and expression*." In response, Parliament amended the Constitution to expand the grounds on which free speech could be restricted to include "public order". The problem with this, as Chinmayi Arun has

216. *Supra*.note 1, at 31-32.
217. 1950 SCR 594.

astutely pointed out, is the intolerant are now able to silence speakers by creating a public order problem. [218]

Reading hate speech into the "public order" exception has only exacerbated the situation. The Code of Criminal Procedure empowers the government to declare publications "forfeited" if they contain any matter punishable under sections of the Indian Penal Code relating to sedition, the promotion of disharmony and tranquility between different racial, religious, linguistic or other groups, and outraging or insulting the religious sentiments of any class.[219] Sadly, as several instances in the recent past indicate (arrests of Dr. Binayak Sen, Aseem Trivedi, S.A.R. Geelani etc.), these penal provisions have been employed arbitrarily and unjustifiably to stifle legitimate criticism of the government and suppress dissenting voices. The Code of Criminal Procedure also arms a Magistrate with the power to issue orders in "urgent cases of nuisance or apprehended danger"[220], a provision that lends itself too easily to misuse in the respect of the Internet, especially in a climate where governmental paranoia is increasingly used to justify suppressing free speech.

In *O.K. Ghosh* v. *E.X. Joseph*[221] the Court declared that "public order", as used in this clause, is synonymous with public peace, safety and tranquility. In *Ramji Lal Modi v. State of U.P.*[222] that the phrase "in the interests of public order" is of broader import that "for the maintenance of public order" – while a law may not be designed directly for the maintenance of public order, it may well have been enacted in the interests of the same. Further, has also clarified that since the "security of the state" has already been specifically provided for (as a ground for restriction), the term "public order" cannot encompass to include the security of the state. Rather, In *Superintendent, Central Prison* v. *Ram Manohar Lohia*[223],the Court went on to clarify that the connection between the impugned act and public order must be real, reasonable and rational, as a remote or fanciful nexus between the two would be insufficient to sustain the restriction.

Institutionalizing Intolerance: The Heckler's Veto

Using the law to bully people into silence has aptly been termed "the heckler's veto"[224] – when police action silences speakers for fear that offended listeners will create a public order problem, the listeners can effectively veto what the speaker has to say. However, rather than erring on the side of caution to protect an important fundamental right, sloppily drafted laws like the Information Technology Act, are doing just the opposite. Laced with wide, sweeping provisions and ambiguous phrasing, only expand the scope for external suppression of free speech and cast the blanket of criminality much farther than would seem appropriate[225] (e.g.

218. Chinmayi Arun, "Freedom of expression gagged", *Hindu Business Line*, February 15, 2013, available at http://www.thehindubusinessline.com/opinion/freedom-of-expression-gagged/article4419285.ece?homepage=true , last accessed on January 28, 2014.
219. See Ss. 124A, 153A, 153B, 292, 293 and 295A of the Indian Penal Code, 1860.
220. Section 144, Code of Criminal Procedure, 1973.
221. AIR 1962 SC 812.
222. AIR 1957 SC 620.
223. AIR 1960 SC 633.
224. *O.K. Ghosh v. E.X. Joseph*, AIR 1963 SC 812, available at http://indiankanoon.org/doc/1681994/ , last accessed on January 28, 2014.
225. Malavika Jayaram, "Civil Liberties and the amended Information Technology Act, 2000", *Centre for Internet and Society*, available at http://cis-india.org/internet-governance/blog/information-technology-act, last accessed on January 28, 2014.

the ITA's criminalisation of "annoyance" and "inconvenience", amongst others[226]), and in doing so, encourage a disturbing tendency towards institutionalized intolerance.

Case Study: Viswaroopam

When a group of Yiddish speaking socialists was passing around anti-war pamphlets in Yiddish, opposing Woodrow Wilson's participation in the First World War, they were arrested. In the judgment, Oliver Wendell Holmes wrote the famous "crying fire in a crowded theatre" phrase that is often used for undermining free speech for public order problems. That itself is a questionable test but we have moved so far since then that now in India, if something is expressed without the intention of causing a disruption in the public order, but ends up causing it, we stifle the speech act, not the mob act.

During the recent controversy over the film Vishwaroopam by veteran South Indian star Kamal Hassan, some Islamic organizations had expressed concerns over the depictions of their community in the film. However, before they could have a special screening to decide on the matter, the Government of Tamil Nadu put the film on hold for 15 days under Section 144 of the Indian Criminal Procedure Code which empowers the government to issue orders "in urgent cases of nuisance or apprehended danger". The leader of the Tamil Nadu Muslim Munnetra Kazagham (TMMK) claimed that "there is a danger that the public may view any Muslim with a beard as a terrorist waiting for an opportunity to plant a bomb." When Hassan appealed to the Madras High Court seeking an immediate removal of the governments ban on the basis of an approval by the Central Board of Film Certification, Justice K. Venkatraman stayed the screening and later upheld the ban. The reaction of the governments was similar ranging from Andhra Pradesh to Karnataka to Sri Lanka to Malaysia. One of the exceptions was Kerala which saw an unlimited release of the screening and the some protesting groups were arrested by their police for disrupting the screening. Hassan made many statements that he meant no harm and that the depictions were fair. Finally, in February 2013, an agreement was arrived at where Hassan agreed to mute five scenes in the movie after the Chief Minister Jayalalitha said they couldn't provide security across all 524 theatres where the film was supposed to be screened. This shows that this form of exception to free speech is deployable preemptively. Since there were no claims of religious sentiment being hurt as the ban was before the Muslim groups were able to view it, the movie was banned in anticipation of unrest which depicts an ultimate capitulation to the threat of barbarism. The purpose of the constitution is to protect whatever freedoms and values it claims to protect at all costs. If Article 21, the right to life was threatened by violent groups then there would be enough protection in maybe even more than 524 locations but a failure to protect a right to free expression shows the potency of the public order problem in India.

Decency or Morality

A citizen's right to freedom of speech and expression may be restricted in the interests of "decency or morality". And since these terms have not been defined, the protection of decency and morality is often synonymous with the regulation of obscenity. For instance, the IPC criminalises activities such as selling of obscene books, committing an obscene act, selling obscene materials to young persons or even singing obscene songs in a public place.[227] The constitutionality of these provisions was upheld in *Ranjit Udeshi* v. *State of Maharashtra*[228],

226. See Section 66A, IT Act.
227. Ss. 292 – 294, IPC.
228. AIR 1965 SC 881.

where the court declared that the law on obscenity seeks nothing more than to promote public decency and morality.

Test for Obscenity

Obscenity is most often the yardstick by which the protection of decency and morality is judged. In *Chandrakant* v. *State of Maharashtra*[229], the Apex Court held the test for obscenity is the "likely reader test" – whereby obscenity is judged based on the impact that the impugned object would have on those who could reasonably be expected to gain access to it, rather than its effect on a person into whose hands it might have fallen by chance.[230]

Before *Chandrakant*[231], obscenity was judged according to the *Hicklin test*. Formulated in the English case of *R.* v. *Hicklin*,it purported to test obscenity based on whether the impugned matter tended to "deprave and corrupt those whose minds are open to such immoral influences, and into whose hands publications of this sort is likely to fall." Interestingly, this test was laid to rest with the enactment of the English Obscene Publications Act, 1959. However, in *Ranjit Udeshi*[232], the Indian Supreme Court chose not to discard this test because it laid emphasis on the obscenity of an object in relation to "the potentiality of the impugned object to deprave and corrupt by immoral influences." However, this test has been replaced by the "likely reader test" described above, and this has been afforded statutory recognition under Section 292(1) of the Indian Penal Code.

The amended Information Technology Act, 2000 contains several provisions purporting to regulate electronic speech and communications against obscenity. Critics often argue that the government has used the vague phrasing present in the Constitution to clamp down on a wider array of Internet material,[233] a move that threatens India's democratic traditions by negatively impacting fundamental rights and personal liberties. [234]

Section 66A criminalises the sending of information that is "grossly offensive" in character, while conveniently failing to define this already vague term. And lacking a definition, the law is left wide open to interpretation and abuse.[235] As Pranesh Prakash has observed,[236] "It's (Section 66A) clearly in violation of Article 19(1)(a) of our Constitution that guarantees freedom of speech. The fact that some information is 'grossly offensive' cannot be a reason for curbing freedom of speech unless it is directly related to violating decency [or] morality…"

Further, the Indian Penal Code already deals with offences such as committing obscene acts in public, and in this context, enacting a provision such as Section 66A only makes the burden on

229. (1969) 2 SCC 687.
230. (1969) 2 SCC 687.
231. *Chandrakant Kalyandas Kakodar vs The State of Maharashtra*(1969) 2 SCC 687, http://www.indiankanoon.org/doc/25099/ , last accessed on February 2, 2014.
232. AIR 1965 SC 881.
233. R Jai Krishna and Rumman Ahmed, "New Delhi Expands Curbs on Web Content", *The Wall Street Journal*, August 23, 2012, available at http://online.wsj.com/news/articles/SB10000872396390444270404577607282527697346?mg=reno64-wsj&url=http%3A%2F%2Fonline.wsj.com%2Farticle%2FSB10000872396390444270404577607282527697346.html , last accessed on January 28, 2014.
234. Supra note 200 above.
235. Kavita Shanmugham, "Post and be Damned", The Telegraph, November 14, 2012, available at http://www.telegraphindia.com/1121114/jsp/opinion/story_16193233.jsp#.UKmmGmfm71V, last accessed on January 28, 2014.
236. Ibid.

the accused harsher. [237] Justice A.P. Shah, former Chief Justice of the Delhi High Court, is also of the opinion that this provision's ambivalence and breadth, when unrestricted, is violative of the fundamental right to freedom of speech and expression.[238]

Section 66F deals with cyber terrorism. Ambivalently worded, this provision casts a wide net and seeks to catch things that have little or nothing to do with the named offence. In addition to the usual grounds of offence against sovereignty, national security, defence of India, etc., regards the unauthorised access to information that is likely to cause injury to decency or morality as an act of cyber terrorism. What is more worrying is that these offences have been shoehorned into a clause that imposes the stiffest penalty within the entire ITA (life imprisonment).[239]

Section 67 criminalises and punishes the transmission of obscene materials in the electronic form. The wording of this provision is almost identical to the corresponding provision in the Penal Code, defining obscenity in terms of the material's lascivious appeal and its impact on those people who are likely to access it. Section 67A punishes the transmission of any material containing a sexually explicit act respectively. Section 67B deals with the publishing or transmission of materials depicting children in sexually explicit acts. It is heartening to note that unlike Section 66A, Sections 67A and 67B are drafted tightly enough to guard against arbitrary interpretations that adversely impact the right to free speech, although what exactly is 'sexually explicit' may still be open to debate.

Overly broad laws and regulations such as the IT Act, 2000 and the Intermediary Rules, 2011 have a chilling impact on the freedom of speech and expression[240] – without any precision to allow people to regulate their behaviour in accordance with the law, people begin to censor themselves rather than engaging with issues at hand. And with India's troubled past of vigilante and moral policing groups enforcing restrictions on free speech, the impact of these rules is all the more frightening. And with its new legislations, the Indian government continues on the beaten track, apparently preferring suppression to engagement and debate.

In this context, the draconian crackdown on fringe content is likely to have the counterproductive result of the general society developing an unhealthy obsession for exactly such content.[241] For instance, in Saudi Arabia, despite the comprehensive censorship controls, pornography consumption is rampant with users accessing material via pirated satellite TV and circulating using personal computing devices and mobile phones.

237. Press Coverage of Online Censorship Row, *Centre for Internet and Society*, available at http://cis-india.org/internet-governance/blog/press-coverage-online-censorship, last accessed on January 31, 2014.
238. Supra note 210 above.
239. Supra note 200 above.
240. Anja Kovacs, "The Present — and Future — Dangers of India's Draconian New Internet Regulations", *Centre for Internet and Society*, available at http://cis-india.org/internet-governance/blog/the-present-and-future-dangers-of-indias-draconian-new-internet-regulations , last accessed on January 31, 2014.
241. Supra note 178 above.

Case Study: IT Act Section 66A

There is a rising intolerance in the contemporary India. The paintings of eminent artists have been ransacked and destroyed, libraries have been burned because of the nature of research there, school text books have been changed to suit what is acceptable for children to know and performing artists have been threatened by audience members for the content of the plays. The right wing 'Hindutva' has been harassing and threatening the great painter M.F Hussain for the only fact that he is a Muslim. Hindu goddesses have been depicted in a risqué fashion for thousands of years but a Muslim apparently doesn't have the right to depict them that way. In Maharashtra, where the Shiva Sena was in power, it was easy to start legal proceedings against Hussain in 1996. On the nod of the Minister of Culture, the Bombay police filed a criminal case against Hussain under the IPC for "promoting enmity between different groups on the grounds of religion…and doing acts prejudicial to the maintenance of harmony". Not much has changed since then in the State of Maharashtra.

Recently, two girls were arrested for a post on Facebook questioning the total shutdown of the city of Mumbai for the death of Bal Thackeray. One of the girls commented saying people like Thackeray are born and die daily and we should not observe a bandh for that. The other girl merely 'liked' the comment. They were booked under 295 A of the Indian Penal Code "outraging religious feelings of any class" and Section 66A of the IT Act 2000 "sending offensive messages through communication service, etc." There are many implications of these events. First of all, this is a misapplication of 295A of the IPC since neither a party, let alone its leader represents a religion even in its loosest sense. They shouldn't either in democracies as the instances of this are in totalitarian societies like Hirohito's Japan and Kim IL Sung's North Korea. Also, in a democracy, a leader doesn't represent a particular class in an official manner recognized by the law. This loose interpretation merely shows the slippery slope of making way for offence and religious sentiment by undermining the freedom of expression. The second problem this poses is the exposure of the nebulous wording in the IT Act. 'Liking' a post is an expression act that is clearly protected under 19(1) (a) of the Constitution. It is indeed a stretch to argue that merely 'liking' a post constitutes "sending offensive messages..." enough to undermine a fundamental right. 66(A) criminalizes many things online that are not offline. For example it criminalizes "causing annoyance" online but not in a newspaper. This begs the larger question of whether speech should be more stringently regulated online or offline or the same amount. Speech online doesn't have the immediate effect of screaming in a rally nor is what you say on a discussion group better syndicated than a newspaper. However, the online space can be used to reach more people and can be visible to a wider audience. Regulating speech any differently online than offline is also to an extent classist in that certain classes which don't access the internet have different rights than others.

A human rights activist A Marx filed a petition to the Madras High Court claiming that 66A of the IT Act 2008 was ambiguous and unconstitutional and hence should be precluded from implementation. He claimed that the law did not define the terms offensive or menacing but attempts to ban both. This allows for the widest possible interpretation of the terms.

Contempt of Court

Like the freedom of speech and expression, an independent judiciary is an integral component of a democratic society. Therefore, it becomes necessary to strike a balance between the freedom of expression and the independence and integrity of the judiciary and the preservation of public confidence in the administration of justice. Under the Constitution, the various High

Courts[242] and the Supreme Court[243] are empowered to punish for their contempt. Article 19(2) also lists 'contempt of court' as a ground for reasonably restricting a citizen's right to free speech.

The Contempt of Courts Act, 1952 confers High Courts with the authority to punish for the contempt of other (lower) courts. Under this enactment, contempt may be civil or criminal[244]. Civil contempt is committed when there is willful disobedience to any judgment, decree, order, writ or any other process of a court. Criminal contempt proceedings, on the other hand, are occasioned when a publication (written, spoken or by visible representation) lowers the authority of a court or scandalizes it, prejudices or interferes with the course of judicial proceedings or when it obstructs the administration of justice.

The underlying idea behind such provisions (in the context of fundamental rights) was explained *Namboodripad E.M. Shankaran* v. *Narayan Nambiar*[245]. Here, the Court held that in the exercise of one's right to freedom of speech, no one could be permitted to interfere with the due course of justice or to lower the prestige or authority of the Court. Thus, while the Constitution guarantees the right to freedom of speech and expression, this right cannot be used to commit contempt of court.

On the Internet, where there are a multitude of voices and opinions, a 'contempt of court' provision, if not employed cautiously, can be used to thwart spirited discussion and legitimate criticism by categorizing them as contemptuous speech. However, in *Duda v. Shivshankar*[246], the Apex Court seemed on guard against this, declaring that judges shouldn't invoke contempt jurisdiction to uphold their own dignity. Rather, in the free market place of ideas, criticism of the judicial system or judges should be welcomed so long as the administration of justice is left unimpaired. Still, whether these guidelines and safeguards will actually be effective is open to question. This is especially so in light of the poorly drafted ITA, which casts a net so wide that it robs the law of its predictability, making it virtually impossible to tell with any certainty when and where certain speech may be called into contempt.

Today more than ever, the government is displaying an increasing propensity for suppressing dissent and stifling voices and opinions that are not in accord with its own. The ill conceived amendments to the ITA in 2008 and the new Rules and Guidelines of 2011 serve only to demonstrate how hapless the government is in the face of advancing technology and a constantly evolving society, and conjure an image of a government that is desperately clutching at straws.

Case Study: Trial by Media

One of the main concerns with regards to press coverage during a trial is that there shouldn't be a 'prejudgment', thus causing a trial by media. This is because the constitutional function of dispensing justice lies solely in the hands of the court and it cannot allow any other entity to usurp that role. This poses a problem for the press in that it cannot merely restrict itself to clinical reporting of just the facts without talking about the merits of allegations. This poses an important question for cases like the *Bhopal Gas Tragedy* case. On February 14th 1989, the case was compromised on terms that were inadequate at best when compared to the

242. Article 215.
243. Article 129.
244. Section 2(a), (b) and (c).
245. AIR 1970 SC 2015.
246. AIR 1988 SC 1208

consequences of the gas leak. Could it be considered contempt if the press had exposed the compromise before the official order had come through and would it be contempt for the press to have expressed moral indignation prior to the judgment? In a case where the right and wrong is so transparent to the public, should the view that the Union of India and Union Carbide had no case and they should pay compensatory and maybe even punitive damages ranging in the billions instead of prolonging the litigation be considered as contempt of the court?

Similarly, in the *Dowry Harassment Death* case of 2005, the father of the deceased girl gave his account of the case in a magazine called 'Saga'. The court deprecated the interview stating that "We deprecate this practice and caution the publisher, editor and the journalist who were responsible for the said article against indulging in such trial by media when the issue is sub judice"

Though this doesn't say contempt of court, this acts as a warning against investigative or morally sympathetic journalism across the board.

Defamation

The law of defamation seeks to strike a balance between an individual's right to freedom of expression and his right to preserve and protect his reputation. In this context, it is a reasonable restriction on the right to freedom of speech and expression guaranteed by the Constitution, and laws penalizing defamation do not constitute an impingement on the fundamental right to freedom of speech and expression.

The wrong of defamation is constituted by the publication of a false or defamatory statement about another person without lawful justification. It can assume two forms – libel and slander. Libel occurs when a defamatory statement is published in some permanent form (writing, printing, pictures etc.), whereas slander is defamation through some transient form such as speech or by gestures.

In India, defamation is both a tort and a criminal wrong. As a tort, it has been described by Winfield as "the publication of a statement which reflects on a person's reputation or tends to lower him in the estimation of right thinking members of society generally or tends to make them shun or avoid him." India's treatment of the tort of defamation borrows heavily from the common law tradition in the UK,[247] which contain exceptions where the law cannot be used.

As a criminal offence, defamation is defined under Section 499 of the Indian Penal Code, and made punishable with a fine and/or term of imprisonment that may extend to two years. And while the Indian law on defamation is built on robust legal principles, some would argue that it's far reaching effects on free speech justify doing away with it.[248] It reads: "Whoever by words either spoken or intended to be read, or by signs or by visible representations, makes or publishes any imputation concerning any person intending to harm, or knowing or having reason to believe that such imputation will harm, the reputation of such person, is said, except in the cases hereinafter excepted, to defame that person."

The parameters by which content that is alleged to be defamatory are as below:

247. Sunil Abraham, "Don't SLAPP Free Speech", *Tehelka*, Volume 10 Issue 9, March 2, 2013, available at http://www.tehelka.com/dont-slapp-free-speech/ , last accessed on January 28, 2014.
248. Ibid.

1. **The statement must be defamatory** – In order for an action for defamation to succeed, the statement must be injurious to another's reputation, though there is no need for the moral or intellectual disparagement of the individual concerned.
2. **The statement must refer to the plaintiff** – The defamatory statement must identify the plaintiff as the person defamed, and this may be done by name, description or any other reasonable inference.
3. **The statement must be published by the defendant** – Publication may be accomplished through a variety of means such as verbally, through gestures, in writing, through television or the Internet.

Many parts of the Internet are public spaces and constitute an online public sphere. The provisions of the amended IT Act and the Intermediary Guidelines are flagrantly violative of an individual's right to free speech, as they allow for complaints to be brought forth on very divergent grounds, while not providing the alleged violator with a chance to be heard[249]thereby violating the cardinal rule of natural justice. Seen from this perspective, the aforementioned laws and rules are unconstitutional[250] insofar as they fall require private parties to curb their speech in a public space, something that doesn't fall within Art.19(2) of the Constitution. Further, intermediaries are made liable for not taking down content, and have no reason to uphold the principles of free speech. Instead, taking down content without the proper application of mind is incentivized under the new Rules.

Section 66A punishes the sending of "offensive messages". Such messages are divided into three categories, all of which are broadly worded and peppered with use of 'or' everywhere instead of 'and'. And while it can be argued that some of the words used are familiar from other laws (such as the Indian Penal Code), they are never used this loosely.[251] One need only look to the case of Ambikesh Mahapatra, a professor at Jadhavpur University for evidence of misuse. Picked up and detained for almost 40 hours on defamation charges for forwarding an e-mail that contained a cartoon of Trinamool Congress leaders for alleged "defamation" under this provision, Mahapatra rightly observed,[252] "Section, 66A of the IT Act is being used for suppression of the freedom of speech. In my opinion, it is being misused by the state government, repeatedly. The section does not empower anyone to arrest those who voice their opinion and never meant to harm anybody's image. Prompt action is needed to check the misuse of law."

What gives more cause for concern[253] is that everything from online threats wishing sexual assault (the Chinmayi case) to harmless cartoons are sought to be covered under this should give one cause for concern. And since this provision is cognizable, i.e. requiring no warrant for arrest, it is increasingly becoming the tool of choice for those wishing to harass others into not speaking.

Section 66F(1)(B) contains the dreaded and dubious "cyber terrorism" provision. The clunky drafting of this section ensures that it is a catch-all provision. Indeed, under the amended ITA,

249. Pranesh Prakash, "Killing the Internet Softly with its Rules", *Indian Express*, May 9, 2011, http://cis-india.org/internet-governance/blog/killing-the-internet-oped, last accessed on January 28, 2014.
250. Ibid.
251. Pranesh Prakash, "Draft Nonsense", *The Times of India*, November 24, 2012, available at http://www.timescrest.com/opinion/draft-nonsense-9274, last accessed on January 31, 2014.
252. Nishant Shah, "So Much to Lose", Indian Express, available at http://www.indianexpress.com/news/so-much-to-lose/1038938/0, last accessed on January 31, 2014.
253. Supra note 239 above.

cyber terrorism includes wrongfully accessing restricted information[254] that one believes can be used for defamation, and this is punishable by imprisonment for life – a punishment that is as disproportionate as it is ill conceived, considering that the same offence under the IPC is punishable with two years in prison.

With all the dissatisfaction and controversy surrounding the IT Act, the Delhi High Court has set an encouraging precedent.[255] Applying the Bonnard Rule (an English principle), in *Tata Sons Pvt Ltd* v. *Greenpeace International*, the Courtheld that interim injunctions should be held to a higher standard because such an injunction could infringe on freedom of expression, and thereby potentially violate the Article 19(1). This century-old rule states that "until it is clear that an alleged libel is untrue… the importance of leaving free speech unfettered is a strong reason in cases of libel for dealing most cautiously and warily with the granting of interim injunctions…"

In the same case, the Court rejected the argument that since it was published online and thus had wider reach and greater permanence, an injunction should be granted. It observed that "publication is a comprehensive term, embracing all forms and mediums — including the Internet", thus ruling out special treatment for the Internet in cases of defamation.

The Indian populace is growing increasingly thin skinned. This, together with the volatile backdrop of great diversity of religion, political opinions, views on sexuality, morality, obscenity and other highly subjective values and beliefs, there is immense extra-legal pressure on free speech.[256] With the proliferation of the Internet as a means of expression and communication, there is greater space to have one's voice heard. Yet, rather than welcoming the increasing space for expression, the powers that be in India choose to treat it with suspicion and regard it as a threat to the *status quo*. Thus, there is now a need for greater vigilance so that the thought police do not wield the stick of harsh penalties under the ITA without reason and due process.

Case Study: Defamation

*"*Human beings are human beings. They say what they want, don't they? They used to say it across the fence while they were hanging wash. Now they just say it on the internet.*"* –Dennis Miller

It must be remembered that there isn't a specific crime known as "internet defamation" or "e-libel" as opposed to the normal defamation crimes. Despite this, the online space has quickly started to become a hot space of contention. Recently, many pro Shive Sena groups asked for the banning of Orkut, an online social network for hosting an anti-Sena community. In a similar vein, Ajith D was a 20 year and computers student based in Kerala when he started an online Anti-Sena community on Orkut. He received summons from a Thane court in Maharashtra after an FIR was filed there against him. Interestingly, he was charged under the IPL 506- criminal intimidation and 295 A- hurting religious sentiment. The complaint

254. Pranesh Prakash, "Fixing India's anarchic IT Act", Livemint, November 28, 2012, available at http://cis-india.org/internet-governance/blog/livemint-opinion-november-28-2012-pranesh-prakash-fixing-indias-anarchic-it-act , last accessed on January 31, 2014.

255. Sunil Abraham and Snehashish Ghosh, "Don't SLAPP Free Speech", *Tehelka*, Issue 9, Volume 10, March 2013, available at http://www.tehelka.com/dont-slapp-free-speech/ , last accessed on February 1, 2014.

256. Malavika Jayaram, "Civil Liberties and the amended Information Technology Act, 2000", Centre for Internet and Society, August 5, 2010, available at http://cis-india.org/internet-governance/blog/information-technology-act , last accessed on February 1, 2014.

against Ajith did not come because he created the community but because of some comments that other made under it. When this case first hit the media, it was incorrectly reported as a defamation case which served the important purpose of starting a national dialogue about defamation. It went up to the Supreme Court where Ajith's lawyer argued that it was a closed community so he couldn't have known that it would go to the public. This was the wrong strategy as Chief Justice KG Balakrishnan ruled that as a computer student, Ajith should have had the clairvoyance to know the long reach of online speech and had to defend his speech and thus dismissed the petition. Had the argument been along the lines that the judgment was untenable prima facie because it infringed upon his right to free speech, the final judgment may have been different. One of the news reports, on hearing the judgment, concluded that ""Bloggers may no longer express their uninhibited views on everything under the sun."

Subsequently, however, the IT Act of 2000 was amended in 2008 which has a provision that doesn't hold the website, forum or server owner liable for what is said on their platform. This is important because the relationship between a publisher of newspaper and a journalist is different in that the newspaper has experience and vast legal resources to fight defamation cases that they would be slapped with. There is, in fact a category of cases called SLAPP (Strategic Lawsuit Against Public Participation) which is when powerful bodies file lawsuits or criminal cases against individuals to attenuate their financial and legal resources until they stop their criticism or opposition. The case of Ajith D was certainly one such case where the Shiv Sena youth wing's State Secretary filed a charge against a lone student in Kerala which was not just meant to silence him but have the chilling effect of silencing many other critics out of the now legitimate fear of reprisal.

Incitement to an Offence

According to general principles of criminal law, the inciting and abetting of a crime are offences in themselves, punishable by law. In the context of the Indian Constitution, the Supreme Court has ruled in *Shailabala Devi* v. *State of Bihar*[257], that the incitement to serious and aggravated offences (such as murder) is punishable as a crime threatening the security of the state. Similarly, the incitement to many other offences can be subsumed within the public order exception in Article 19(2). However, there are many offences (such as bribery and cheating), which involve neither a public order element nor a threat to state security. To overcome this, the term "incitement to an offence" was inserted into Article 19(2) to empower the state to define and punish offences that would otherwise fall outside the scope of Article 19(2). Interestingly, the term "offence" is afforded no constitutional definition; rather, it is defined by the General Clauses Act[258] to mean any act or omission made punishable by law in force. Reading this definition into Article 19(2), it is clear that the government is at liberty to carve out new offences and make the incitement to them punishable – a process that can be subverted to unjustly restrict the freedom of speech and to preclude public discussion on any subject simply by making it an offence.

Under the Information Technology Act, the phrase "incitement to an offence" appears as an element of cyber terrorism[259], as a ground for monitoring, intercepting or decrypting information through a computer source[260] and as a justification for blocking public access to

257. AIR 1952 SC 329.
258. Section 3(38) of the General Clauses Act, 1897.
259. IT Act, S. 66F(1)(B).
260. IT Act, S. 69.

information online[261]. That this dubious phrase finds a place in the ITA should come as no surprise – a residual catch all provision such as this is right at home along with all the other ambivalent terms and phrases.

Given that it is possibly the freest space for discussion and debate of all hues, the Internet presents as the ideal medium for such a provision to be abused to encroach upon the freedom of speech and expression by cleverly disguising censorship as restricting speech to prevent the "incitement to an offence". The devil in this provision, therefore, is in the lack of detail: "offence" is an extremely broad and malleable term, capable of encompassing all the offences in the Indian Penal Code as well as any other law!

This tendency towards suppression, coupled with a baseless paranoia borne out of a lack of understanding of the Internet, is increasingly coming to manifest in blatant disregard for the right to free speech and expression, a disturbing trend that threatens the erosion of our democratic values.

Case Study: Radio Ban

Red FM's morning show is hosted by an RJ named Nitin who has a listenership in Delhi up to 600,000. While talking about the Indian Idol winner Prashant Tamang, the host 'made fun' of the Gorkha community. This created a huge controversy which led to an apology issued by the station and the host going incommunicado.

News radio in India is banned for reasons like the incident above. The government cannot adequately regulate radio stations and the news that they pump out so in case there is an incitement to an offence they are all banned. A vast majority of the country gets its news from the radio and cant access television, newspaper or the internet. This ban is therefore classist and attempts to control what the masses think.

261. IT Act, S. 69A.

Poster of Intermediary Liability and Freedom of Expression

Conclusion

Freedom of speech maybe an individual right but the application of it relies on huge infrastructures and intermediaries. The ecology of free speech includes newspapers, broadcast media, large auditoriums and the like. In the history of India, these spaces, especially the cinema hall have hotbeds of contention for different groups. The government sought power and influence, the diverse groups sought dignity and honor through threats of unrest and violence and the artists sought to influence the vagaries of social consciousness. The internet is a changed sphere with many utopian myths surrounding it. Many claim that its model of information disbursement is changed from the one to many traditional model to a many to many model that is free of structural barriers. However, even the internet is subjected to intermediaries like twitter, youtube and facebook. What we can learn, especially from the recent developments of the IT Act is that these intermediaries are very much vulnerable to structural control. Section 79 of the IT Act originally provided a safe haven for these intermediaries as long as they exercised due diligence to prevent the offence from occurring. However, the IT Act rules (intermediaries guidelines) 2011 has undermined this safe harbor. Lawrence Liang explains the rules succinctly when he says "The rules clarify what standard of due diligence has to be met by intermediaries and Sec. 3(2) of the rules obliges intermediaries to have rules and conditions of usage which ensure that users do not host, display, upload, modify, publish, transmit, update or share any information that is in contravention of the Section. This includes the all too familiar ones (defamatory, obscene, pornographic content) but also a whole host of new categories which could be invoked to restrict speech ("grossly harmful," "blasphemous," "harassing," "hateful")."

The intermediaries have largely commercial interests so they usually comply and have no incentive to fight the system. We find more and more often that the standard of speech protection on the internet is ill defined and jumps from being less restrictive to more restrictive than offline.

Unit 8: Privacy

Introduction

Internet privacy encompasses a wide range of issues and topics. It can be understood as privacy rights that an individual has online with respect to their data, and violations of the same that take place online. Given the dynamic nature of the online sphere, privacy concerns and issues are rapidly changing.

The Changing Nature of Information

For example – the way in which the internet allows data to be produced, collected, combined, shared, stored, and analyzed is constantly changing and re-defining personal data and what type of protections personal data deserves and can be given. For example, seemingly harmless data such IP address, key words used in searches, websites visited, can now be combined and analysed to identify individuals and learn personal information about an individual. From information shared on social media sites, to cookies collecting user browser history, to individuals transacting online, to mobile phones registering location data – information about an individual is generated through each use of the internet. In some cases the individual is aware that they are generating information and that it is being collected, but in many cases, the individual is unaware of the information trail that they are leaving online, do not know who is accessing the information, and do not have control over how their information is being handled, and for what purposes it is being used. For example, law enforcement routinely troll social media sites for information that might be useful in an investigation.

The Blurry Line between the Public and Private Sphere

The above example also highlights how the "sphere" of information on the internet is unclear i.e. is information posted on social media public information – free for use by any individual or entity including law enforcement, employees, data mining companies etc. or is information posted on social media – private, and thus requires authorization for further use. For example, in India, in 2013 the Mumbai police established a "social media lab" for the purposes of monitoring and tracking user behavior and activities.[262] Authorization is not required for the lab to monitor individuals and their behavior, and individuals are not made aware of the same, as the project claims to analyze only publicly available information. Similar dilemmas have been dealt with by other countries. For example, in the U.S, individuals have contested the use of their tweets without permission,[263] while courts in the US have ruled that tweets, private and public, can be obtained by law enforcement with only a subpoena, as technically the information has been shared with another entity, and is therefore no longer private.[264] Indian Courts have yet to deal directly with the question of social media content being public or private information.

The Complication of Jurisdiction

The borderless nature of information flows over the Internet complicates online privacy, as individual's data is subjected to different levels of protection depending on which jurisdiction it is residing in. Thus, for example an Indian using Gmail, will be subject to the laws of the United States. On one hand this could be seen as a positive, if one country has stronger privacy protections than another, but could also be damaging to privacy in the reverse situation – where one company has lower privacy standards and safeguards. In addition to the dilemma of different levels of protection being provided over data as it flows through different jurisdictions, access by law enforcement to data stored in a different jurisdiction, or data from one country accessible to law enforcement because it is being processed in their jurisdiction, are two other complications that arise. These complications cannot be emphasized more than with the case of the NSA Leaks. Because Indian data was residing in US servers, the US government could access and use the data with no obligation to the individual.[265] In response to the NSA leaks, the government of India has stated that all facts need to be known before any action is taken, while citizens initially sought to hold the companies who disclosed the data to US security agencies such as Google, Facebook etc. accountable.[266] Despite this, because the companies were acting within the legal limits of the United States where they were incorporated, they could not be held liable. In response to the dilemma, many actors in India, including government and industry are asking for the establishment of 'domestic servers'. For

262. Nitin Puri, "India sets up social media monitoring lab", *ZD Net*, March 19, 2013, available at http://www.zdnet.com/in/india-sets-up-social-media-monitoring-lab-7000012758/, last accessed on January 28, 2014.
263. "Investigative Journalist Claims Her Public Tweets Aren't 'Publishable;' Threatens To Sue Blogger Who Does Exactly That", *techdirt*, available at http://www.techdirt.com/articles/20130203/18510621869/investigative-journalist-claims-her-public-tweets-arent-publishable-threatens-to-sue-blogger-who-does-exactly-that.shtml, last accessed on January 28, 2014.
264. Daniel Zwerdling, "Your Digital Trail: Does The Fourth Amendment Protect Us?",*npr*, October 2, 2013, available at http://www.npr.org/blogs/alltechconsidered/2013/10/02/228134269/your-digital-trail-does-the-fourth-amendment-protect-us, last accessed on January 28, 2014.
265. "India plans to restrict email use after NSA leaks", *BBC*, October 30, 2013, available at http://www.bbc.co.uk/news/technology-24744695, last accessed on January 28, 2014.
266. "SC to hear PIL on US surveillance of Internet data", *The Hindu*, June 19, 2013, available at http://www.thehindu.com/news/national/sc-to-hear-pil-on-us-surveillance-of-internet-data/article4829549.ece , last accessed on January 28, 2014.

example, Dr. Kamlesh Bajaj, CEO of Data Security Council of India was quoted in Forbes magazine promoting the establishment of India centric social media platforms.267 Similarly, after the PRISM scandal became public, the National Security Advisor requested the Telecom Department to only route traffic data through Indian servers.[268]

In these contexts, the internet is a driving force behind a growing privacy debate and awareness in India.

Current Policy for Internet Privacy in India

Currently, India's most comprehensive legal provisions that speak to privacy on the internet can be found in the Information Technology Act (ITA) 2000. The ITA contains a number of provisions that can, in some cases, safeguard online privacy, or in other cases, dilute online privacy. Provisions that clearly protect user privacy include: penalizing child pornography,[269] penalizing hacking and fraud,[270] and defining data protection standards for body corporate.[271] Provisions that serve to dilute user privacy speak to access by law enforcement to user's personal information stored by body corporate272, collection and monitoring of internet traffic data273, and real time monitoring, interception, and decryption of online communications.274 Additionally, legislative gaps in the ITA serve to weaken the privacy of online users. For example, the ITA does not address questions and circumstances like the evidentiary status of social media content in India, merging and sharing of data across databases, whether individuals can transmit images of their own "private areas" across the internet, if users have the right to be notified of the presence of cookies and do-not track options, the use of electronic personal identifiers across data bases, and if individuals have the right to request service providers to take down and delete their personal content.

Online Data Protection

Since 2010, there has been an increasing recognition by both the government and the public that India needs privacy legislation, specifically one that addresses the collection, processing, and use of personal data. The push for adequate data protection standards in India has come both from industry and industrial bodies like DSCI – who regard strong data protection standards as an integral part of business, and from the public, who has voiced increasing concerns that governmental projects, such as the UID, involved with collecting, processing, and using personal data are presently not adequately regulated and are collecting and processing data in such a way that abuses individual privacy. As mentioned above, India's most comprehensive data protection standards are found in the ITA and are known as the

267. Rohin Dharmakumar, "India's Internet Privacy Woes", *Forbes India*, August 26, 2013, available at http://forbesindia.com/article/checkin/indias-internet-privacy-woes/35971/1, last accessed on January 28, 2014.
268. Thomas K. Thomas, "Route domestic Net traffic via India servers, NSA tells operators", *Hindu Business Line*, August 14, 2013, available at http://www.thehindubusinessline.com/industry-and-economy/info-tech/route-domestic-net-traffic-via-india-servers-nsa-tells-operators/article5022791.ece, last accessed on January 28, 2014.
269. ITA section 67
270. ITA section 43, 66, and 66F
271. Information Technology (Reasonable security practices and procedures and Sensitive personal data or information) Rules, 2011.
272. Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011, section 6(1).
273. Information Technology (Procedure and Safeguards for Monitoring and Collection of Traffic Data or Other Information) Rules 2009.
274. Information Technology (Procedure and Safeguards for Intercepting, Monitoring, and Decryption) Rules 2009.

Information Technology "Reasonable security practices and procedures and sensitive personal data or information" Rules 2011.275 The Rules seek to provide rights to the individual with regards to their information and obligate body corporate to take steps towards protecting the privacy of consumer's information. Among other things, the Rules define "sensitive personal information' and require that any corporate body must publish an online privacy policy, provide individuals with the right to access and correct their information, obtain consent before disclosing sensitive personal information ' except in the case of law enforcement, provide individuals the ability to withdraw consent, establish a grievance officer, require companies to ensure equivalent levels of protection when transferring information, and put in place reasonable security practices. Though the Rules are the strongest form of data protection in India, they have not been recognized by the European Union as meeting the EU standards of "data secure"276 and many gaps still exist. Forexample, the Rules apply only to:

1. Body corporate and not to the government
2. Electronically generated and transmitted information
3. A limited scope of sensitive personal information.

A body corporate when a contractual agreement is not already in place.

These gaps leave a number of bodies unregulated and types of information unprotected, and limits the scope of the Rules. It is also unclear to what extent companies are adhering to these Rules, and if they are applying the Rules only to the use of their website or if they are also applying the Rules to their core business practices.

Cyber Cafés

In 2011 the Guidelines for Cyber Café Rules were notified under the Information Technology Act. These Rules, among other things, require Cyber Café's to retain the following details for every user for a period of one year: details of identification, name, address, contact number, gender, date, computer terminal identification, login time, and log out time. These details must be submitted to the same agency as directed, on a monthly basis.[277] Cyber Cafes must also retain the history of websites accessed and logs of proxy servers installed at the cyber café for a period of one year.[278] Furthermore, Cyber Café's must ensure that the partitions between cubicles do not exceed four and half feet in height from floor level.[279] Lastly, the cyber café owner is required to provide every related document, register, and information to any officer authorized by the registration agency on demand.[280] In effect, the identification and retention requirements of these rules both impact privacy and freedom of expression, as cyber cafes users cannot use the facility anonymously and all their information, including browser history, is

275. Ibid footnote 6.
276. Anand Sharma, "Data secure status for India is vital: Sharma on FTA with EU", *Business Standard*, September 3, 2013, available at http://www.business-standard.com/article/economy-policy/data-secure-status-for-india-is-vital-sharma-on-fta-with-eu-113090300889_1.html, last accessed on January 29, 2014.
277. Guidelines for Cyber Cafe Rules 5(2) & 5(3), available at http://deity.gov.in/sites/upload_files/dit/files/GSR315E_10511%281%29.pdf, last accessed on January 28, 2014.
278. Guidelines for Cyber Cafe Rules 5(4), available at http://deity.gov.in/sites/upload_files/dit/files/GSR315E_10511%281%29.pdf, last accessed on January 28, 2014.
279. Guidelines for Cyber Cafe Rules 5(6), available at http://deity.gov.in/sites/upload_files/dit/files/GSR315E_10511%281%29.pdf, last accessed on January 28, 2014.
280. Guidelines for Cyber Café Rules 7(1), available at http://deity.gov.in/sites/upload_files/dit/files/GSR315E_10511%281%29.pdf, last accessed on January 28, 2014.

stored on a-priori basis. The disclosure provisions in these rules also impact privacy and demonstrate a dilution of access standards for law enforcement to users internet communications as the provision does not define:

1. An authorization process by which the registration agency follows to authorize individuals to conduct inspections.
2. Circumstances on which inspection of a Cyber Café by an authorized officer is necessary and permissible.
3. The process for which information can be requested, and instead vaguely requires cyber café owners to disclose information "on demand".

Online Surveillance and Access

The ITA also allows for the interference of user privacy online by defining broad standards of access to law enforcement and security agencies, and providing the government with the power to determine what tools individuals can use to protect their privacy. This is most clearly demonstrated by provisions that permit the interception, monitoring, and decryption of digital communications[281]; provide for the collection and monitoring of traffic data[282], and allow the government to set the national encryption standard.[283] In particular, the structure of these provisions and the lack of safeguards incorporated, serve as a dilution to user privacy. For example, though these provisions create a framework for interception they are missing a number of internationally recognized safeguards and practices, such as notice to the individual, judicial oversight, and transparency requirements. Furthermore, the provisions place extensive security and technical obligations on the service provider – as they are required to extend all facilities necessary to security agencies for interception and decryption, and hold the service provider liable for imprisonment up to seven years for non-compliance. This creates an environment where it is unlikely that the service provider would challenge any request for access or interception from law enforcement. Interception is also regulated through provisions and rules under the Indian Telegraph Act 1885 and subsequent ISP and UAS licenses.

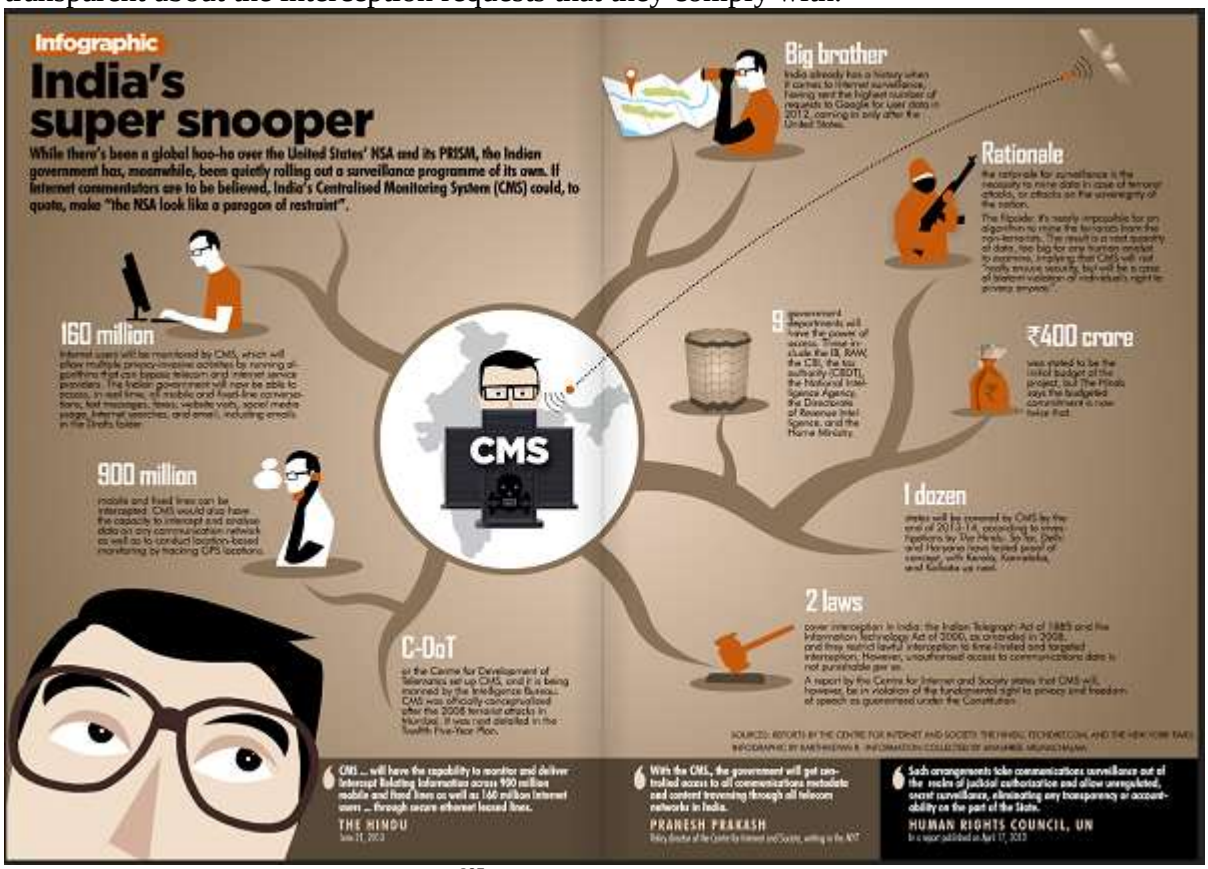
Scope of Surveillance and Access

The extent to which the Government of India lawfully intercepts communications is not entirely clear, but in 2011 news items quoted that in the month of July 8,736 phones and e-mail accounts were under lawful surveillance. 284 Though this number is representative of authorized interception, there have been a number of instances of unauthorized interceptions that have taken place as well. For example, in 2013 it was found that in Himachal Pradesh 1371 phones were tapped based on verbal approval, while the Home Ministry had only authorized interception of 170.285 This demonstrates that there are instances of when existing safeguards for interception and surveillance are undermined and highlights the challenge of enforcement for even existing safeguards.

281. Ibid footnote 9
282. Ibid footnote 8
283. ITA section 84A.
284. Bharti Jain, "8,736 phone and e-mail accounts tapped by different government agencies in July", *The Economic Times*, September 17, 2011 available at http://articles.economictimes.indiatimes.com/2011-09-17/news/30169231_1_phone-tap-e-mail-accounts-indian-telegraph-act, last accessed on January 28, 2014.
285. Press Trust of India, "Action to be taken in 'phone tapping' during BJP rule: Virbhadra Singh", *TheEconomic Times*, March 6, 2013, available at http://articles.economictimes.indiatimes.com/2013-03-06/news/37500338_1_illegal-phone-virbhadra-singh-previous-bjp-regime, last accessed on January 28, 2014.

Demonstrating the tensions between right to privacy and governmental access to communications, and at the same time highlighting the issue of jurisdiction was the standoff between RIM/BlackBerry and the Indian Government. For several years, the Indian Government has requested that RIM provide access to the company's communication traffic, both BIS and BES, as Indian security agencies have been unable to decrypt the data. Solutions that the Indian Government has proposed include: RIM providing the decryption keys to the government, RIM establishing a local server, local ISPs and telcos developing an indigenous monitoring solution. In 2012, RIM finally established a server in Mumbai and in 2013 provided a lawful interception solution that satisfied the Indian Government.[286]

The implementation of the Central Monitoring System by the Indian Government is another example of the Government seeking greater access to communications. The system will allow security agencies to bypass service providers and directly intercept communications. It is unclear if the system will provide for the interception of only telephonic communications or if it will also allow for the interception of digital communications and internet traffic. It is also unclear what checks and balances exist in the system. By removing the service provider from the equation the government is not only taking away a potential check, as service providers can resist unauthorized requests, but it is also taking away the possibility for companies to be transparent about the interception requests that they comply with.



Above: A picture of India's super snooper[287]

Justice A.P. Shah Report

286. Apurva Chaudhary, "BlackBerry's Tussle With Indian Govt Finally Ends; BB Provides Interception System", *Medianama*, July 10, 2013, available at http://www.medianama.com/2013/07/223-blackberrys-tussle-with-indian-govt-finally-ends-bb-provides-interception-system/ , last accessed on January 28, 2014.

287. Image source: Reditt, available at http://www.reddit.com/r/privacy/comments/1jyc7s/central_monitoring_system_cms_indias_surveillance/

In October 2012 the Report of the Group of Experts on Privacy was published by a committee of experts chaired by Justice A.P. Shah.[288] The report creates a set of recommendations for a privacy framework and legislation in India. Most importantly, the Report recognizes privacy as a fundamental right and defines nine National Privacy Principles that would apply to all data controllers both in the private sector and the public sector. This would work to ensure that businesses and governments are held accountable to protecting privacy and that legislation and practices found across sectors, states/governments, organizations, and governmental bodies are harmonized. The privacy principles are in line with global standards including the EU, OECD, and APEC principles on privacy, and include: notice, choice & consent, collection limitation, purpose limitation, access and correction, accountability, openness, disclosure of information, security.

The Report also envisions a system of co-regulation, in which the National Privacy Principles will be binding for every data controller,but Self-regulatory Organizations at the industry level will have the option of developing principles for that specific sector. The principles developed by industry must be approved by the privacy commissioner and be in compliance with the National Privacy Principles. In addition to defining principles, the Report recommends the establishment of a privacy commissioner for overseeing the implementation of the right to privacy in India and specifies that aggrieved individuals can seek redress either through issuing a complaint the privacy commissioner or going before a court.

The nine national privacy principles include:
Notice: Principle 1: Notice
A data controller shall give simple to understand notice of its information practices to all individuals, in clear and concise language, before any personal information is collected from them. Such notices should include:
During Collection

1. What personal information is being collected;
2. Purposes for which personal information is being collected;
3. Uses of collected personal information;
4. Whether or not personal information may be disclosed to third persons;
5. Security safeguards established by the data controller in relation to the personal information;
6. Processes available to data subjects to access and correct their own personal information;
7. Contact details of the privacy officers and SRO ombudsmen for filing complaints.

Other Notices

1. Data breaches must be notified to affected individuals and the commissioner when applicable. Individuals must be notified of any legal access to their personal information after the purposes of the access have been met.
2. Service providers would have to explain how the information would be used and if it may be disclosed to third persons such as advertisers, processing.
3. Individuals must be notified of changes in the data controller's privacy policy.
4. Any other information deemed necessary by the appropriate authority in the interest of the privacy of data subjects.

288. Justice A. P. Shah, "Report of the Group of Experts on Privacy", *Planning Commission*, available at http://planningcommission.nic.in/reports/genrep/rep_privacy.pdf, last accessed on January 28, 2014.

Example of Implementation: A telecom service provider must make available to individuals a privacy policy before any personal information is collected by the company. The notice must include all categories of information as identified in the principle of notice. For example, the service provider must identify the types of personal information that will be collected from the individual from the initial start of the service and during the course of the consumer using the service. For a telecom service provider this could range from name and address to location data. The notice must identify if information will be disclosed to third parties such as advertisers, processers, or other telecom companies. If a data breach that was the responsibility of the company takes place, the company must notify all affected customers. If individuals have their personal data accessed or intercepted by Indian law enforcement or for other legal purposes, they have the right to be notified of the access after the case or other purpose for the data has been met.

Principle 2: Choice and Consent

A data controller shall give individuals choices (opt-in/opt-out) with regard to providing their personal information, and take individual consent only after providing notice of its information practices. Only after consent has been taken will the data controller collect, process, use, or disclose such information to third parties, except in the case of authorized agencies. When provision of information is mandated by law, it should be in compliance with all other National Privacy Principles. Information collected on a mandatory basis should be anonymized within a reasonable timeframe if published in public databases. As long as the additional transactions are performed within the purpose limitation, fresh consent will not be required. The data subject shall, at any time while availing the services or otherwise, also have an option to withdraw his/her consent given earlier to the data controller. In such cases the data controller shall have the option not to provide goods or services for which the said information was sought if such information is necessary for providing the goods or services. In exceptional cases, where it is not possible to provide the service with choice and consent, then choice and consent should not be required.

Example of implementation: If an individual is signing up to a service, a company can only begin collecting, processing, using and disclosing their data after consent has been taken. If the provision of information is mandated by law, as is the case for the census, this information must be anonymized after a certain amount of time if it is published in public databases. If there is a case where consent is not possible, such as in a medical emergency, consent before processing information, does not need to be taken.

Principle 3: Collection Limitation

A data controller shall only collect personal information from data subjects as is necessary for the purposes identified for such collection, regarding which notice has been provided and consent of the individual taken. Such collection shall be through lawful and fair means.

Example of Implementation: If a bank is collecting information to open an account for a potential customer, they must collect only that information which is absolutely necessary for the purpose of opening the account, after they have taken the consent of the individual.

Principle 4: Purpose Limitation

Personal data collected and processed by data controllers should be adequate and relevant to the purposes for which they are processed. A data controller shall collect, process, disclose, make available, or otherwise use personal information only for the purposes as stated in the notice after taking consent of individuals. If there is a change of purpose, this must be notified

to the individual. After personal information has been used in accordance with the identified purpose it should be destroyed as per the identified procedures. Data retention mandates by the government should be in compliance with the National Privacy Principles.

Example of Implementation: If a bank is collecting information from a customer for opening a bank account, the bank can only use that information for the purpose of opening the account and any other reasons consented to. After a bank has used the information to open an account, it must be destroyed. If the information is retained by the bank, it must be done so with consent, for a specific purpose, with the ability of the individual to access and correct the stored information, and in a secure fashion.

Principle 5: Access and Correction
Individuals shall have access to personal information about them held by a data controller; shall be able to seek correction, amendments, or deletion such information where it is inaccurate; be able to confirm that a data controller holds or is processing information about them; be able to obtain from the data controller a copy of the personal data. Access and correction to personal information may not be given by the data controller if it is not, despite best efforts, possible to do so without affecting the privacy rights of another person, unless that person has explicitly consented to disclosure.

Example of Implementation: An individual who has opened a bank account, has the right to access the information that was initially provided and subsequently generated. If there is a mistake, the individual has the right to correct the mistake. If the individual requests information related to him that is stored on a family member from the bank, the bank cannot disclose this information without explicit consent from the family member as it would impact the privacy of another.

Principle 6: Disclosure of Information
A data controller shall only disclose personal information to third parties after providing notice and seeking informed consent from the individual for such disclosure. Third parties are bound to adhere to relevant and applicable privacy principles. Disclosure for law enforcement purposes must be in accordance with the laws in force. Data controllers shall not publish or in any other way make public personal information, including personal sensitive information.

Example of Implementation: If a website, like a social media site, collects information about how a consumer uses its website, this information cannot be sold or shared with other websites or partners, unless notice of such sharing has been given to the individual and consent has been taken from the individual. If websites provide information to law enforcement, this must be done in accordance with laws in force, and cannot be done through informal means. The social media site would be prohibited from publishing, sharing, or making public the personal information in any way without obtaining informed consent.

Principle 7: Security
A data controller shall secure personal information that they have either collected or have in their custody, by reasonable security safeguards against loss, unauthorised access, destruction, use, processing, storage, modification, deanonymization, unauthorized disclosure [either accidental or incidental] or other reasonably foreseeable risks.

Example of Implementation: If a company is a telecommunication company, it must have security measures in place to protect customers communications data from loss, unauthorized

access, destruction, use, processing, storage, modification, denanonmyization, unauthorized disclosure, or other forseeable risk. This could include encrypting communications data, having in place strong access controls, and establishing clear chain of custody for the handling and processing communications data.

Principle 8: Openness
A data controller shall take all necessary steps to implement practices, procedures, policies and systems in a manner proportional to the scale, scope, and sensitivity to the data they collect, in order to ensure compliance with the privacy principles, information regarding which shall be made in an intelligible form, using clear and plain language, available to all individuals.

Example of Implementation: If a hospital is collecting and processing personal information of, for example, 1,000 patients, their policies and practices must reflect and be applicable to the amount, sensitivity, and nature of information that they are collecting. The policies about the same must be made available to all individuals – this includes individuals of different intelligence, skill, and developmental levels.

Principle 9: Accountability
The data controller shall be accountable for complying with measures which give effect to the privacy principles. Such measures should include mechanisms to implement privacy policies; including tools, training, and education; external and internal audits, and requiring organizations or overseeing bodies extend all necessary support to the Privacy Commissioner and comply with the specific and general orders of the Privacy Commissioner.
Example of Implementation: To ensure that a hospital is in compliance with the national privacy principles, it must undertake activities like running trainings and providing educational information to employees on how to handle patient related information, conducting audits, and establishing an officer or body for overseeing the implementation of privacy.

Public Discourses on Privacy
In India, there have been a number of important discourses related to privacy around various projects and topics. These discourses have been driving public awareness about privacy in India, and represent an important indication of public perception of privacy and privacy concerns.

The Unique Identification Project
One of these discourses is a public dialogue and debate on the Unique Identification Project. Since 2009 the Government of India has been rolling out an identity scheme known as UID or Aadhaar.

Above: Image of India's Aadhar Card[289]

The scheme is applicable to all residents in India, and seeks to provide individuals with an identity based on their fingerprints, iris scans, and photograph. The project has been heavily supported by some, and at the same time, heavily critiqued by others. Of those critiquing the project, which included a Parliamentary Standing Committee on Finance,[290] privacy has been a driving force behind the concerns about the project. Arguing that not only does the UID Bill not have sufficient privacy safeguards in its provisions[291], but the design of the project and the technology of the project places individual privacy at risk. For example, the project relies on centralized storage of biometrics collected under the scheme; it does not account for or address how transaction data that is generated each time an individual identifies himself/herself with the UID will be stored, processed, and shared; and does not provide adequate security measures to protect sensitive information like biometrics.

The Human DNA Profiling Bill

In 2006 the Department of Biotechnology piloted a draft human DNA Profiling Bill with the objective of creating DNA databases at the national and regional levels, and enabling the creation and storage of DNA profiles for forensic purposes. Since 2006 there have been two more drafts of the bill released to the public, and an expert committee has been created to finalize the text of the bill. Individuals, including the Centre for Internet and Society, publicly

289. Image source: Kemmannu.com, available at http://www.kemmannu.com/index.php?action=headlines&type=569

290. Standing Committee on Finance (2011-12), "The National Identification Authority of India Bill, 2010" *Ministry of Planning*, Forty-second Report, December 13, 2011, available at http://164.100.47.134/lsscommittee/Finance/42%20Report.pdf, last accessed on January 28, 2014.

291. Swaraj Thapa, "UID bill skips vital privacy issues", *The Indian Express*, September 27, 2010, available at http://archive.indianexpress.com/news/uid-bill-skips-vital-privacy-issues/688614/, last accessed on January 28, 2014.

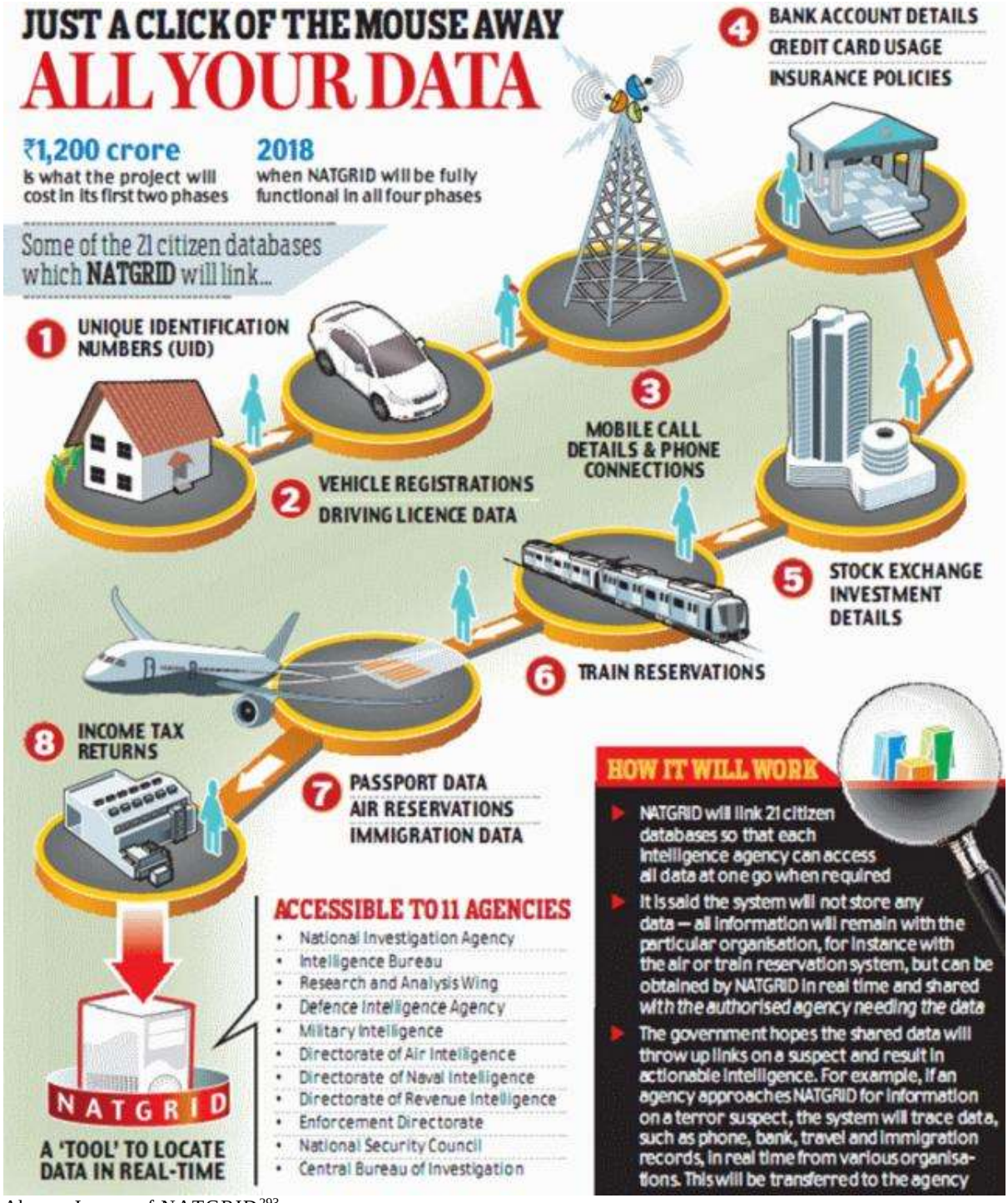
raising concern about the bill, cite a lack of privacy safeguards in the provisions, and expansive circumstances and reasons that the bill permits the creation and storage of DNA profiles.[292]

Surveillance

For many years there has been running public discourse about the surveillance that the Indian government has been undertaking. This discourse is growing and is now being linked to privacy and the need for India to enact a privacy legislation. As discussed above, the current surveillance regime is lacking on many fronts, while at the same time the government continues to seek greater interception powers and more access to larger sets of information in more granularity. Projects like the Central Monitoring System, NATGRID, and Lawful Interception Solutions have caused individuals to question the government on the proportionality of State surveillance and ask for a comprehensive privacy legislation that also regulates surveillance.

The need for strong and enforceable surveillance provisions is not unique to India, and in 2013 the International Principles on the Application of Human Rights to the Surveillance of Communications were drafted. The principles lay out standards that ensure that surveillance is in compliance with international human rights law and serve as safeguards that countries can incorporate into their regimes to ensure the same. The principles include: legality, legitimate aim, necessity, adequacy, proportionality, competent judicial authority, due process, user notification, transparency, public oversight, integrity of communications and systems, safeguards for international cooperation, safeguards against illegitimate access. Along with defining safeguards, the principles highlight the challenge of rapidly changing technology and how it is constantly changing how information can be surveilled by governments and what information surveilled by governments, and how information can be combined and analysed to draw conclusions about individuals.

292. Elonnai Hickok, "Rethinking DNA Profiling in India", *Economic & Political Weekly*, Vol. XLVII No. 43, October 27, 2012, available at http://www.epw.in/web-exclusives/rethinking-dna-profiling-india.html, last accessed on January 28, 2014.



Above: Image of NATGRID[293]

A Privacy Legislation for India

Since 2010, there has been a strong public discourse around the need for a privacy legislation in India. In November 2010, a "Privacy Approach" paper was released to the public which envisioned the creation of a data protection legislation.[294] In 2011, the Department of Personnel

293. Image source NATGRID available at http://mrunal.org/2012/09/polity-natgrid.html/comment-page-1

294. "Approach Paper for a Legislation on Privacy", Department of Personnel Training, Ministry of Personnel, PG & Pensions, October 18, 2010, available at http://ccis.nic.in/WriteReadData/CircularPortal/D2/D02rti/aproach_paper.pdf, last accessed on January 28, 2014.

and Training released a draft privacy bill that defined a privacy regime that encompassed data protection, surveillance, and mass marketing, and recognized privacy as a fundamental right.[295] In 2012 the Report of the Group of Experts on Privacy, as discussed above, was published.[296] Presently, the Department of Personnel and Training is drafting the text of the Governments Privacy Bill. In 2013, the Centre for Internet and Society drafted the Citizen's Privacy Protection Bill – a citizen's version of a privacy legislation for India.[297]From April 2013 – October 2013, the Centre for Internet and Society, in collaboration with the Federation of Indian Chambers of Commerce and Industry and the Data Security Council of India, held a series of seven Privacy Roundtables across India. The objective of the Roundtables was to gain public feedback to a privacy framework in India. Topics discussed during the meetings included, how to define sensitive personal information vs. Personal information, if co-regulation should be a model adopted as a regulatory framework, and what should be the legal exceptions to the right to privacy.[298]

Conclusion

Clearly, privacy is an emerging and increasingly important field in India's internet society. As companies collect greater amounts of information from and about online users, and as the government continues to seek greater access and surveillance capabilities, it is critical that India prioritizes privacy and puts in place strong safeguards to protect the privacy of both Indians and foreigners whose data resides temporarily or permanently in India. The first step towards this is the enactment of a comprehensive privacy legislation recognizing privacy as a fundamental right. The Report of the Group of Experts on Privacy and the government considering a draft privacy bill are all steps in the right direction.

295. Apar Gupta, "Analysis of the Privacy Bill, 2011", *India Law and Technology Blog*, available at http://www.iltb.net/2011/06/analysis-of-the-privacy-bill-2011/, last accessed on January 28, 2014.
296. Justice A. P. Shah, "Report of the Group of Experts on Privacy", *Planning Commission*, available at http://planningcommission.nic.in/reports/genrep/rep_privacy.pdf, last accessed on January 28, 2014
297. Bhairav Acharya, "Privacy (Protection) Bill, 2013: Updated Third Draft", *Centre for Internet and Society*, September 30, 2013, available at http://cis-india.org/internet-governance/blog/privacy-protection-bill-2013-updated-third-draft , last accessed on January 28, 2014.
298. Bhairav Acharya, "The National Privacy Roundtable Meetings", *Centre for Internet and Society*, September 19, 2013, available at http://cis-india.org/internet-governance/blog/national-privacy-roundtable-meetings , last accessed on January 28, 2014.

Module 3: Technologies and the Internet

There are two main ways of information/resource exchange (served by two different types of network architecture) within a network: the *client-server model* and *peer-to-peer*.

In a client-server model, there is one machine (called the *server*) which is connected to many *client* machines. The server has, or has access to, resources which the client machines do not: files like email, music or movies; hardware, such as a printer; or computing resources, like that offered by a supercomputer in a scientific institution[299]. The client sends the server a request and the server responds to it, a process that's repeated multiple times during, say, the loading of a webpage when you (the client) access a webserver somewhere on the Word Wide Web. What makes the WWW possible is the abstraction offered by a *communications protocol*, which roughly means that whatever happens within a server on the WWW, all clients see is the same Applications Programming Interface, or API: the API fulfils the role of a translator between the server's underlying machinery and the client. Not all API's, even within a particular network, have to be the same: the W3C[300] has this to say about a set of API's over the WWW called *web services*:[301]

"A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards."

There are many web services out on the WWW, but standardizing the way they 'talk' to a client makes the 'conversation' between webserver and client possible. A server cannot, however, talk to all its clients at the same time, and has to carry out some form of time-sharing between its clients. This, and the fact that a server has to listen to any incoming request makes it vulnerable to a Distributed Denial of Service attack, or DDOS, where so many clients (invariably compromised and made puppets of some malicious external actor) request the server for resources at the same time that the server is overloaded and cannot respond to its legitimate clients.

A peer-to-peer (or 'P2P') network, in contrast to the centralized client-server, is a distributed network architecture where the erstwhile clients can communicate to their peers - each other - directly, without the intervention of a server, or at least with peers that follow the same communication protocol. Though they can communicate, to minimize the lookup time, they usually need a centralized repository to know who to communicate with - a server - which is vulnerable to takedown. A peer-to-peer network where searching or exploration is done between peers, negating the need for a server, is slower and, because a node can only see its neighboring nodes, and relies on their inputs for information on the world beyond, could be subject to routing attacks where for malicious nodes can 'lie' to their neighbours. All this makes peer-to-peer networking a rich field of contemporary study.

P2P is more common than commonly thought - it is used by Akamai technologies, for example, to deliver content such as Flash.

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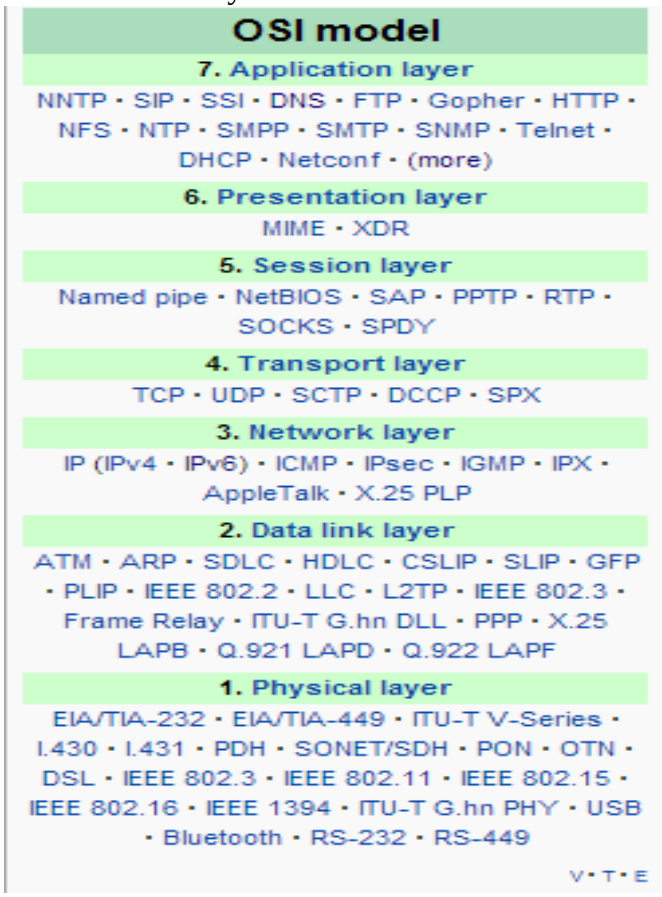
299. As one can see, some tasks are inherently centralized and thus suited to the client-server model
300. The World Wide Web Consortium, or W3C, is responsible for coming up with the standards that make communication over the WWW work, a sort of 'grammar' of the WWW
301. Read more at http://www.w3.org/TR/2004/NOTE-ws-gloss-20040211/#webservice

Network Layers

The OSI model of the network layers is a conceptual model that allows you to understand the internal mechanisms and functions of a communication model by managing all the elements into 7 essential layers.



Exercise:

As you go through this module, identify which layer the topics in the units cover.

Unit 9: Critical Internet Resources

The Internet is in simple terms a global collection of networks. A network is a group of computers connected together. Networks connect together in many different ways to form an entity we all know as the Internet. The name Internet is derived from 'interconnected networks'.

The **Defense Advanced Research Projects Agency** (**DARPA**) was established in 1958 in response to the launch of the Soviet Sputnik satellite.

Although many individuals can be credited for the development of the Internet, without DARPA the Internet as we know today simply wouldn't exist.

In August 1962, JCR Licklider's paper entitled "On-Line Man Computer Communication" described a connected global network, and by October he'd been appointed director of the new Information Processing Techniques Office (IPTO) at ARPA. His brief was to create a network to connect Department of Defense computers at three disparate locations.

The first host-to-host connection between PCs on the new ARPANET started on 29 October 1969, creating the world's first fully operational packet-switching network. In December 1969, a four-node network was up and running, the first email was sent across it in 1972, and people started referring to it as the Internet in 1973.

Case Study: SITE Experiment[302]

The advent of modern technology has been extremely beneficial for inclusivity, especially of knowledge. The Satellite Instructional Television Experiment which was an experimental satellite communication project launched in India in 1975 is a fine example of the possibilities. It was jointly designed by NASA and the Indian Space Research Organization (ISRO). The purpose of the project was to screen information programmes in rural India. These broadcasts ran from 1 August 1975 to 31 July 1976 in more than 2400 villages in 6 states and territories. The programmes were produced by All India Radio and broadcasted by NASA's ATS-6 satellite which spent a year above India during the project. With the support of the UNDP, UNESCO, UNICEF and the ITU, this project was successful and culminated in the development of India's own satellite program called the Indian National Satellite System (INSAT). This project showed that advancing technology could be directed and used specifically for subalternity in knowledge and derivatively, power. When impact assessments were made, it was found that in the first few months, clusters of villagers (200 to 600 people per TV set) gathered around TV sets and watched the programs with great interest but the numbers declined (60-80 people per TV set) over the later months. Though this was mostly attributed to technical problems in hardware, the agricultural cycles were also part of the problem. Almost 52% of the viewers surveyed said the new knowledge acquired by them would be useful in even application.

These technical problems can easily be overcome today with the advent of the internet. Massive Open Online Course (MOOCs) is an example of an online course that tries to achieve unlimited participation through open access. MOOCs have the usual course materials and videos but also utilize interactive forums to form communities between the students and professors. MOOCs emphasize open access features and open licensing of content.

Here, we will learn about the basic underlying structure of the Internet, network access points/internet exchanges, points of presence (POP) and backbones. To do that, we have to understand how an individual computer such as ours connects to another computer.

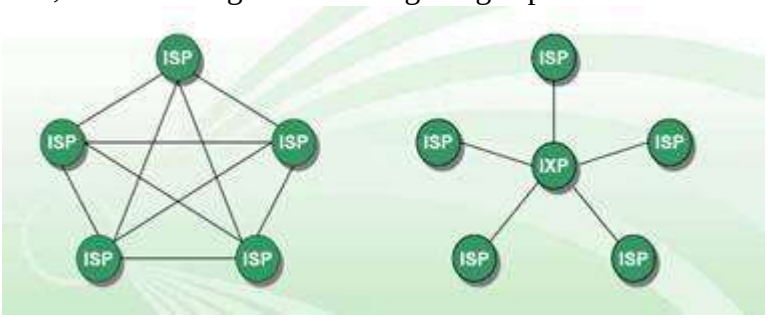
Network of Networks

Every computer that is connected to the Internet is part of a network. When you use a modem to connect to the Internet your machine is becoming a part of an Internet Service Provider's network. An ISP is a company that provides web access to its clients by connecting to the next layer in the network hierarchy – it connects to a larger network. The Internet is thus a network of networks.

[302] . For more see Evaluation Report on Satellite Instructional Television Experiment (SITE) – 1981, available at http://planningcommission.nic.in/reports/peoreport/cmpdmpeo/volume2/erosi.pdf,last accessed on January 26, 2014.

These networks[303] 'talk' to each other via bundles of data called packets. The biggest challenge in moving packets around the world is the question of trest, solved by a " digital handshake" between different networks

This packet transfer across the Internet is made easier by Internet eXchange Points (IXP) where local networks efficiently exchange information at a common point within a country. At an IXP, ISPs exchange traffic using a high speed network switch.;



The figure above depicts the ISP scenario both without an IXP (left) and with an IXP (right).

In case of an IXP, every ISP has to buy just one single connection from their ISP to the IXP instead of several connections to every other ISP. This decreases the complexity as well as the cost of maintaining multiple connections between ISPs. Through the IXP, traffic is exchanged locally within the country rather than being routed through servers abroad. This is further explained below.

Point-of-Presence (POP)

On the Internet[304], a point-of-presence (POP) corresponds to a physical access point from one place to the rest of the Internet. A POP necessarily has a unique Internet Protocol (IP) address. An ISP, depending on its size, will have between one and a few thousand POPs.

Internet Exchange Points

An Internet Exchange Point, or IXP (also called a Network Access Point, or NAP), is a physical piece of infrastructure through which ISPs exchange Internet traffic between their networks according to peering agreements. Peering agreements are agreements between two ISPs of roughly equal size, without payment by either party. The primary purpose of an IXP is to allow networks to interconnect directly, via the exchange, rather than through one or more third-party networks. Direct interconnections help save cost and bandwidth.

303. Read more at http://www.engineersgarage.com/contribution/experts/understanding-internet-architecture
304. Read more at http://searchtelecom.techtarget.com/definition/point-of-presence-POP

Case Study: National Internet Exchange of India (NIXI)

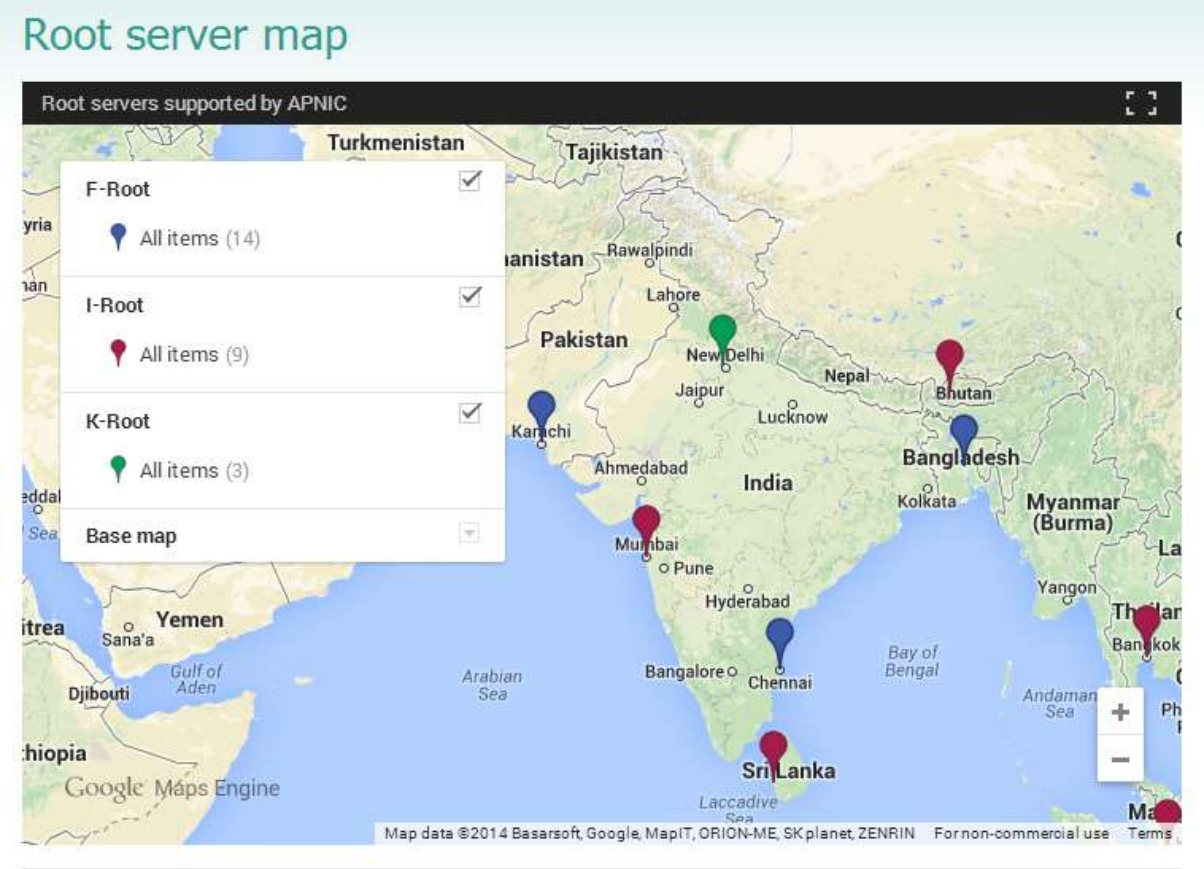
The National Internet Exchange of India (NIXI) is the only Indian IXP. It is a non-profit company established in 2003. Before NIXI came along, Indian ISPs were connecting to each other through servers outside India via Singapore, Europe etc.

NIXI established exchanges in key cities (Delhi (Noida), Mumbai, Hyderabad, Bangalore, Chennai, Kolkata and Ahmedabad) This enables more efficient use of international bandwidth, saving foreign exchange. It also improves the Quality of Service for the customers of member ISPs, by avoiding multiple international hops and thus reducing latency. We can use the Looking Glass Tool on NIXI's website to gather data and perform analyses on ISPs.

Looking Glass provides a public view of routing information available at an IXP by making route collector routes available for global view. It also provides a web interface for running a limited set of commands on routers. While NIXI has played a crucial role in avoiding multiple international hops, the cost factor at NIXI per GB of data transferred is on the higher side making it economically unviable for smaller ISPs to connect via NIXI.

Root Servers

Domain name servers store a dictionary of domain names and their corresponding IP addresses, mapping, say, the domain name www.wordpress.com to a number that can then be used to identify the physical server where Wordpress's data can be accessed from. ".com" is an example of a top level domain, and Wordpress's IP address would be stored in an *authoritative domain name server* - a domain server with a high degree of trust associated with it, and the first place your computer would look to find wordpress.com; the addresses of all such servers in a root zone (the set of top level domain names) are stored in that zone's *root server*.



Map of root servers in India[305]

Backbone

An Internet Backbone refers to data routes between large, interconnected networks and core routers on the Internet.

Internet backbones are the largest data connections on the Internet. They require high bandwidth connections and high-performance servers/routers. Backbone networks are primarily owned by commercial, educational, government and military entities because they provide a consistent way for Internet service providers (ISPs) to keep and maintain online information in a secure manner.[306]

Additional Readings

1. Point of Presence,https://en.wikipedia.org/wiki/Point_of_presence
2. Network Access Point,http://en.wikipedia.org/wiki/Network_access_point
3. Backbone,http://www.techopedia.com/definition/20115/internet-backbone

Sources – Further Readings

1. How do hubs, switches, routers and access points differ? - http://windows.microsoft.com/en-in/windows-vista/how-do-hubs-switches-routers-

305. Image source: APNIC available at http://www.apnic.net/community/support/root-servers/root-server-map
306. From Internet Backbone – definition at http://www.techopedia.com/definition/20115/internet-backbone

and-access-points-differ

Unit 10: Internet Service Provider (ISP)

The primary function of an Internet Service Provider, or ISP, is to connect your computer to the Internet. A secondary function may be as an email provider.

To connect your computer to the Internet, you'll need an Internet Service Provider (ISP). Some ISPs are large and well known, while others are literally one-person operations. Some companies offer just internet services while others such as Airtel, BSNL, MTNL, Hathway, etc., may offer it along with telephone and cable services.

If you have limited technical expertise, you may want to start with one of the well-known ISPs. They usually offer good services and also have a good support helpline for technical difficulties if things go wrong.

Above is an image depicting the top ten countries by internet speed[307]

Choosing an ISP

Consider these factors when selecting a provider:

1. **Internet Connection Types** – This depends on what the Internet is primarily used for – surfing web pages, email, watching movies etc. Since this is a factor that involves deeper understanding about bandwidth limits and internet speeds, it is described in detail below.
2. **Equipment and Installation Charges** – This depends on the hardware that you opt for from the ISP. Most of the times all that is needed is a basic modem to connect one's

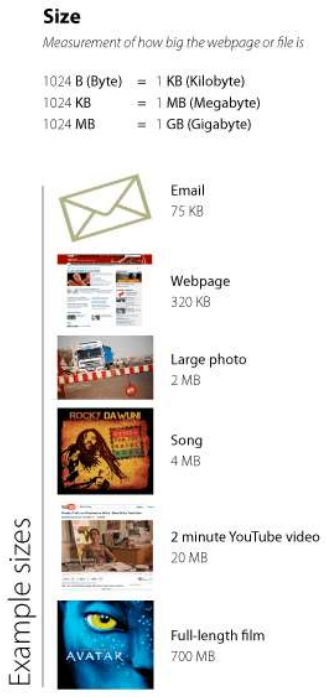
307. Image source: Economic Times

computer to the Internet. Small businesses may need a gateway that includes a router with Ethernet ports, firewall protection, or even a built-in Wi-Fi router. So, depending on the set-up required these costs may vary from one provider to another. Installation or activation fees charged by the ISP is another cost to consider.

3. **Tech Support** - Comparing different ISPs' technical support offerings is very important. Nearly all of the big companies say that they offer around-the-clock, 24/7/365 support but one needs to check whether that assistance is live or automated. Some companies offer a commitment to fix errors/faults within a specified time limit and have good SLIs.
4. Uptime commitments

Internet Connection Types

Bandwidth is defined as the maximum data-carrying capability in devices. In simpler terms, this means how much data can go across to a computer at any given time. The more bandwidth you have, the faster you can surf the web and use other services. Having a lot of bandwidth is very important depending on what you would like to do with the internet. If you are sharing your internet with others and you watch a lot of YouTube videos and have a lot of downloading to do then a dial-up connection may not suffice and you need a higher bandwidth connection.



Figure**ERROR! NO SEQUENCE SPECIFIED.** - The above picture shows various types of typical internet usage. It also indicates the amount of data used for emailing, viewing web pages, listening to music, watching YouTube videos, full-length movies etc.

DSL

DSL(Digital Subscriber Line) transmits data over the wires of a local telephone network. DSL uses high frequency while regular telephone uses low frequency on the same telephone line. The phone can be used independent of the Internet connection. This type of internet is typically fast and has a lot of bandwidth to spare. Video streaming is quite smooth and it uses a different frequency than the phone. The speed is usually 128 kbps to a few Mbps.

Cable

This type of internet connection uses the existing cable line used with your TV. It uses different frequencies than the TV signals so they are not interrupted. Cable requires a cable modem that is connected using the same kind of coaxial cable used to connect your TV. A fixed channel capacity is shared by a population of users. Therefore, Internet speeds can vary depending on how many people are using the service at the same time. This can be a disadvantage because Internet speeds are constantly changing depending upon who is connected. This type of Internet connection can be faster than DSL. Download speeds for a true Internet service via cable ranges from 2Mbps to 10Mbps.

Fiber

This type of internet is the future and also the fastest. Optical Fibres are used to transmit data at very high speeds. This type of internet has a maximum speed of 30 Mbps. This type of internet is available in limited areas.

Uploading vs. Downloading

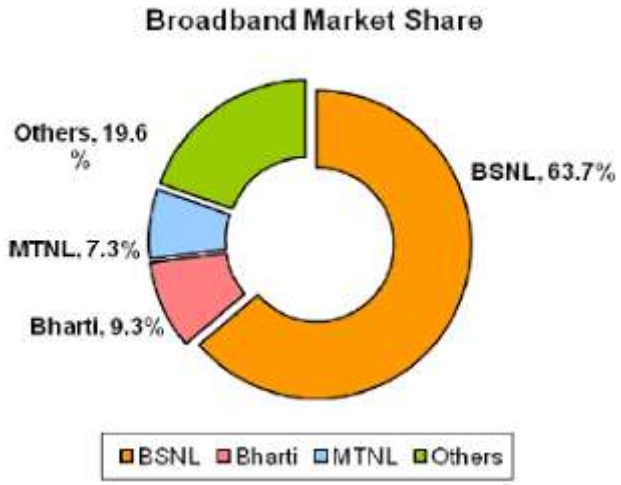
Uploading is the transfer of files from your computer to another computer or server. Downloading is the transfer of files from a website to your computer. Downloading is always faster than uploading.

ISPs always refer to Internet speeds as 128 Kbps, 2 Mbps, 8 Mbps etc. One distinction that has to be understood is the difference between speed and storage. When referring to Internet speeds, the “b” in Kbps or Mbps is lower case and it refers to Kilo bits per second or Mega bits per second.

When we talk about file sizes, we refer to files as being 4 KB or 4 MB in size. Here the “B” is in upper case and refers to Kilobytes and Megabytes. 1 byte = 8 bits.

The following table further illustrates the distinction between speed and storage units.

speed:	storage:
1 kilobit(kb)=1024 bits	1 kilobyte(kB)=1024 bytes
1 megabit(Mb)=1024 kb	1 megabyte(MB)=1024 kB
1 gigabit(Gb)=1024 Mb	1 gigabyte(GB)=1024 MB
1 terabit(Tb)=1024 Gb	1 terabyte(TB)=1024 GB
1 petabit(Pb)=1024 Tb	1 petabyte(PB)=1024 TB
1 exabit (Eb)=1024 Pb	1 exabyte (EB)=1024 PB



Figure**ERROR! NO SEQUENCE SPECIFIED.** - The above figure shows the market share of the various ISPs in India

Point-of-Presence (POP)

On the Internet, a point-of-presence (POP) is an access point from one place to the rest of the Internet. A POP necessarily has a unique Internet Protocol (IP) address. An ISP provider (ISP) has a point-of-presence on the Internet and probably more than one. The number of POPs that an ISP has is sometimes used as a measure of its size.

Additional Readings

1. ISP Market Share in India - http://cis-india.org/home-images/ISP.png/view
2. How ISPs block websites and why it doesn't help - http://cis-india.org/news/www-livemint-com-aug-24-2012-gopal-sathe-how-isps-block-websites-and-why-it-doesnt-help
3. India curbs on Bloggers and Internet - http://cis-india.org/news/india-curbs-bloggers-internet
4. ISP Email Basics - http://www.gs-cc.net/learning/ISP_Email%20Basics.pdf
5. 10 Things to look for in an ISP - http://www.techrepublic.com/blog/10things/10-things-to-look-for-in-an-isp/1766

Sources – Further Readings

1. ISP and its types - https://en.wikipedia.org/wiki/Internet_service_provider

Types of Internet Connections

When HTML was first developed, the ability to embed an image and view it was considered phenomenal. Now, YouTube videos, animations, online gaming, streaming HD video, database-driven websites, ecommerce and mobile applications are common on the Internet. As technology advances, so does our need for speed.

The types of Internet Connections available today and their average speeds are listed below.

Wired:
Dial-up: Dial-up is the slowest of the internet connections. A dial-up connection is made via existing phone lines using a dial-up modem. It is generally the cheapest option but requires phone service. One must "dial" to connect to the Internet and "disconnect" when done. One cannot use the internet and phone on the same line. This is available widely in India whereever phone services are available and the demands are catered mostly by BSNL. Typical Dial-up connection speeds range from 2400 bps to 56 Kbps. Kbps stands for kilo bits per second. Today, analog `narrowband' dialup has been widely replaced by broadband; all other technologies mentioned below can be called 'broadband' and are always-on.

DSL: DSL uses the existing 2-wire copper telephone line connected to the premise so internet service is delivered simultaneously with wired telephone service. The two main categories of DSL for home subscribers are called ADSL (Asymmetrical Digital Subscriber Line) and SDSL(Symmetrical Digital Subscriber Line). All types of DSL technologies are collectively referred to as xDSL. xDSL connection speeds range from 128 Kbps to 9 Mbps. Airtel and BSNL offer DSL in many metros in India.

Cable: Through the use of a cable modem one can have a broadband Internet connection over cable TV lines. Cable internet works by using TV channel bandwidth for data transmission, with certain channels used for downstream transmission, and other channels for upstream transmission. Because the coaxial cable used by cable TV provides much greater bandwidth than telephone lines, a cable modem can be used to achieve faster connections. Cable speeds range from 512 Kbps to 20 Mbps. HathwayBhawani Digital Cable in India is known to provide Cable Internet in major cities.

T-1 Lines – Leased Line: T-1 lines were a popular leased line option for businesses connecting to the Internet and for Internet Service Providers (ISPs) connecting to the Internet backbone. It is a dedicated phone connection supporting data rates of 1.544Mbps.

Bonded T-1: A bonded T-1is two or more T-1 lines that have been joined (bonded) together to increase bandwidth. A single T-1 provides approximately 1.5Mbps. Two bonded T1s provide 3Mbps or 46 channels for voice or data. Two bonded T-1s allow one to use the full bandwidth of 3Mbps where two individual T-1s can still only use a maximum of 1.5Mbps at one time.

T-3 Lines – Dedicated Leased Line: T-3 lines are dedicated phone connections supporting data rates of about 43 to 45 Mbps. A T-3 line actually consists of 672 individual channels, each of which supports 64 Kbps. T-3 lines were used mainly by Internet Service Providers (ISPs) connecting to the Internet backbone and for the backbone itself. Typical T-3 supports speeds ranging from 43 to 45 Mbps.

Fiber: This is the fastest medium of data transfer, used for backbone connections and quickly becoming the medium of choice for end users. It's become cost effective to bring it up to a neighbourhood/apartment complex, but the optical technology to convert the light into electricity for your computer's ethernet connection is still expensive, being around 2.5 lakh rupees. It is cost effective, however, for one such box to provide ethernet connection points for multiple users, a combination that's called "Fiber To The Kerb" or FTTK. Anything you find called "Fiber to the – x" or "FTTx" is a minor variation on this.

Wireless Internet Connections

Wireless Internet[308] is one of the newest Internet connection types. Instead of using telephone or cable networks for the Internet connection, radio frequency bands are used. Like DSL Wireless broadband also provides an always-on connection which can be accessed from anywhere — as long as you the computer is within a network coverage area. It is typically more expensive because wireless connections require licensed spectrum and is mainly available in metropolitan areas.

Satellite: Internet over Satellite(IoS) allows a user to access the Internet via a satellite that orbits the earth. A satellite is placed at a static point above the earth's surface, in a fixed position. This type of connection is slow because of the sheer distance involved between the satellite and the end user device. This type of connection is also easily affected by weather conditions. Speeds average around 492 up to 512 Kbps.

2G - GPRS: This is the oldest, slowest and most widely available of the digital standards still extant in India. Speeds are from 35Kbps to 171kbps.

3G - EDGE, UMTS, HSPA, WIMAX: These technologies can be classified as broadband and cover most of the major metros, and are being rolled out in rural India at a fast pace. Speeds: EDGE - 120Kbps to 384Kbps, UMTS – 384Kbps to 2Mbps, HSPA - 600Kbps to 10Mbps, average 2 Mbps

4G - LTE: This is the fastest commercially available wireless standard; service providers are just rolling out this technology in some metros as this is being written. Speeds: 3Mbps to 6Mbps average, 10Mbps+ peak

A note about 'G' and speed: in the points above, 'G' stands for 'Generation'. 2G, 3G and 4G roughly correspond to when the technology came to the market, and the terminology is vague and sometimes controversial. EDGE, for instance, is sometimes classified as 2.5G, because it's slower than UMTS and HSPA. Some current deployments of 4G technology are slower than mature 3G deployments. Also note that each technology can have multiple revisions, the later revisions being faster.

Internet Speeds in India:
According to the State of the Internet Report released by Akamai, average Internet speed stood at 1.2 Mbps in the fourth quarter of 2012. This is 48 per cent higher than the fourth quarter of 2011.
http://www.speedtest.net/ is a place where you can test the speed of your broadband connection.

The **National Telecom Policy of 2012**[309] aims to provide affordable and reliable "Broadband on Demand" by 2015 and to achieve 175 million broadband connections by the year 2017 and 600 million by the year 2020 at minimum 2 Mbps download speed and making available higher speeds of at least 100 Mbps on demand. It also aims revise the existing definition of minimum speed to qualify as broadband from 256 Kbps to 512 Kbps by end of 2012 and subsequently to 2 Mbps by 2015 and higher speeds of atleast 100 Mbps thereafter. It also aims to recognise

308. Speed data from http://www.speedguide.net
309. National Telecom Policy 2012 available at http://www.dot.gov.in/ntp/NTP-06.06.2012-final.pdf

telecom, including broadband connectivity as a basic necessity like education and health and work towards 'Right to Broadband'.

National Optical Fibre Network (NOFN) in India: NOFN is a Government of India Project to connect 2,50,000 Gram Panchayats (GPs) through OFC (Optical Fibre Cables). It was approved by GoI on 25.10.2011. NOFN will bridge connectivity gap between GPs and Blocks.

Information released by the government can be summarized as follows:

1. Project to be implemented by NOFN SPV namely Bharat Broadband Network Ltd (BBNL).
2. Envisaged as a Centre State joint effort.
3. Govt. of India to fund the project through the Universal Service Obligation Fund (USOF). Rs. 20,000 Cr. ($4B).
4. State Governments are expected to contribute by way of not levying any RoW (right of way) charges (including reinstatement charges)
5. Reinstatement to be done by BBNL
6. Suitable Tri partite MoU to be signed by GOI, State Govt & BBNL
7. NOFN will ensure that Broadband of at least 100Mbps is available at each GP
8. NOFN will provide non discriminatory access to all categories of service providers.
9. NOFN Project implementation time 24 months (by 31.10.2013)[310]

Additional Readings

Types of Internet Connections:

1. http://bit.ly/1hN3ZZ8
2. http://bit.ly/1hN3ZrU
3. CIS Research – Broadband user base still has a long way to go: http://bit.ly/1bjwici

Sources – Further Readings

1. Optical Fibre - http://bit.ly/JOFrlG
2. TRAI Recommendations on National Optical Fibre Plan - http://bit.ly/19P36Pt

Unit 12: Internet Protocol

Introduction to Internet Protocol (IP)

IP stands for Internet Protocol. It is the fundamental technology that makes it possible for us to connect our devices to the Internet. Whenever a device accesses the Internet it is assigned a unique, numerical IP address. To send data from one computer to another through the Internet, a data packet must be transferred across the network containing the IP addresses of both the sender and the receiver. Without IP addresses it is not possible for devices to communicate with each other. Therefore IP addressing is fundamental to the working as well as existence of the Internet.

IP Address[311]

Every machine on the Internet has a unique identifying number, called an **IP Address**. The IP stands for Internet Protocol. An IP address should be unique over a network. On the Internet,

310. Average Internet speed rises 19% in Q4 from http://bit.ly/1kZUL08.

311. Bradley Mitchell, IP - Internet Protocol, *About.com Wireless Networking*, http://abt.cm/1l0930S, last accessed on February 5, 2014.

you never get two machines with the same IP address. In case there are, then, packets won't know exactly where to go. This is called IP conflict.

The IP Address Structure

IP addresses are made up of four parts (octets) separated by dots, like: XXX.XXX.XXX.XXX where each XXX can be any number between 0 and 255. In binary format each of these numbers are stored in 8 bits (binary digits), and the number of possibilities you can have is 2 to the power 8, which is 256 (0-255).
Examples of IP addresses are:
192.168.66.5
127.0.0.1

The second example above is the default IP address assign to any standalone machine. So, if your machine is not connected to any network, its address is 127.0.0.1. This is also called the localhost address.

The Two Parts of an IP address

An IP address consists of two parts: the network part and the machine part. This is similar to our house's address. It is made up of the country part, the city part, then the street part. All people living in our colony will have the same country and city parts in their addresses. Only the house number and street parts will be different.

For IP, all machines on a same network will have the same left (network) part. The right side varies based on machines. For example, right now, I am writing this within a LAN. The LAN router's IP address is 122.167.231.239; my machine's IP address is 122.167.231.240 and my fellow LAN-mate's IP address is 122.167.231.241. In this LAN, the network part is 122.167.231 and the machine part is the last quadrant. We can have a maximum of 256 machines on our LAN. Bigger networks have smaller network parts and bigger machine part, so as to accommodate more machines on the network. What’s your IP Address? Check it out at http://www.whatismyip.com/.

IPsec Protocol

This protocol is designed to protect communication in a secure manner using TCP/IP. It is a set of security extensions developed by Internet Engineering Task Force (IETF), and it provides security and authentication at the IP layer by using cryptography. To protect the content, the data is encrypted.

Terminology

Protocol

1. Formal description of how different entities communicate
2. A language computer systems/ machines use to communicate information

Attribute

1. A variable used to support protocol operation
2. It is sometimes called a field

Value

1. Assigned to an attribute at a particular point in time
2. Convey protocol state

Tip: Protocols have attributes. Attributes have Values. The values define the state of the

protocol at any point in time.

IPv4 vs. IPv6

IPv4 stands for Internet Protocol version 4. It is the fundamental technology that makes it possible for us to connect our devices to the Internet. Whenever a device accesses the Internet it is assigned a unique, numerical IP address such as 128.255.244.221. To send data from one computer to another through the Internet, a data packet must be transferred across the network containing the IP addresses of both the sender and the receiver. Without IP addresses it is not possible for devices to communicate with each other. It is fundamental to the existence of the Internet.

The initial fundamental technology that was the basis for allocating addresses to computers on the Internet – the IPv4 (IP ver.4) standard has almost reached its limits and Internet has started running out of address space.

A new Version of this has started taking its place, though. IPv4's successor is IPv6, a system that will not only offer far more numerical addresses but also simplify how we address computers and offer enhanced security features.

IPv6 is an improvement and the next version to IPv4. The core functionality of IPv6 is similar to that of IPV4 in the sense that it is used to address computers on the Internet. It however uses a larger address space (128 bits instead of 32 bits) and can accommodate more devices. Exactly how this happens is explained in the latter half of this tutorial.

IPv4 uses 32 bits to address computers on the Internet. That means it can support 2^32 IP addresses in total -- around 4.29 billion. In the 1980's a 4 billion computers on the Internet seemed like impossibility. Surprisingly, almost all 4.29 billion IP addresses have now been assigned to various institutions, leading to the crisis we face today. We have not totally run out of these addresses but with the growing population and the ever increasing number of devices that connect to the Internet, the day when we shall completely exhaust these addresses is very near. Hence the need to shift to a system that offers a larger addresses space.

However, the migration from IPv4 to IPv6 is not going to be smooth. The underlying hardware and software have to be compatible with this new technology to make the transition.

This tutorial will start off with some terminology and FAQ's that will help clear some of the doubts straight up. We will then delve deep into the basics of what Internet Protocol is all about and how a message reaches from one computer to another on the Internet.

Why are we running out of IPv4 addresses?

As previously stated, IPv6 uses 128-bits for Internet addresses. Therefore, it can support 2^128 Internet addresses -- 340,282,366,920,938,000,000,000,000,000,000,000,000 of them to be exact.
2^32 = 4.4 x 10^9 addresses (IPv4)
2^128 = 3.4 x 10^38 addresses (IPV6) - That is 6.7x10^19 addresses. 15 billion IPV4 internets per sq.cm of Earth's surface!

To make the switch, software and hardware will have to be changed to support the more advanced addressing. This will need time and money. The first live test of the IPv6 network

was done on June 8, 2011, World IPv6 Day. Google, Facebook and other prominent web companies test drove the IPv6 network.

IPv4 vs IPv6

	Internet Protocol version 4 (IPv4)	Internet Protocol version 6 (IPv6)
Deployed	1981	1999
Address Size	32-bit number	128-bit number
Address Format	Dotted Decimal Notation: 192.149.252.76	Hexadecimal Notation: 3FFE:F200:0234:AB00: 0123:4567:8901:ABCD
Prefix Notation	192.149.0.0/24	3FFE:F200:0234::/48
Number of Addresses	2^{32}=4,294,967,296	2^{128}=340,282,366,920, 938,463,463,374,607, 431,768,211,456

Figure **Error! No sequence specified.** – The above figure provides a table comparing the fundamental features of IPv4 vs IPv6

How are IP Addresses Assigned

So as not to have any duplication in the allocation of IP addresses, there is an independent organisation that monitors the allocation of IP addresses. It is called the ICANN (International Company for the Assignment of Names and Numbers). The equivalent authority in India is The Indian Registry for Internet Names and Numbers (IRINN).

How to Map on to Domain Name: If we have a network with a server, we need to have one or more IP addresses for these. We need one for the server, which will be uses for identifying the server over the net, and one or more for the machines on the network. The network administrator will set the IP addresses to each machine. If you look at a web-site, it has to have a domain name, which, simply said, is what you type to access its main page, e.g. google.com, cis-india.org etc. Just like IP addresses, each of these domain names have to be unique. You cannot have two sites with the same name and address. Each name is attached to an IP address. The ICANN takes care to ensure that all names and IP addresses are unique.

When a user types the address of a site on a browser, the name is converted, or rather matched, to its IP address at a DNS (Domain Name Server), which is there for domain name translation to IP address.

Buying IP Addresses

If you want to get one or a set of IP addresses, you have to buy these from The Indian Registry for Internet Names and Numbers (IRINN). But you do not necessarily need to do so directly. If you want to create a web site and name it myownsite.com, you can go to any of the registrar or hosting companies, where they ask you to choose a name (and they check whether the myownsite.com is unique before assigning) and you pay for their hosting services. They also assign an IP address to your site. They register all this with the IRINN.

There are a number of factors which make the IPv6 protocol suite challenging from a security point of view.

IPv6 implementations are very new and less mature than their IPv4 counterparts making it likely that a number of bugs will be discovered and fixed before their stability matches that of the existing IPv4 implementations.

Security products such as firewalls and Network Intrusion Detection Systems have less support for the IPv6 protocols than for their IPv4 counterparts.

A number of transition technologies have been developed to aid in the deployment of IPv6 and the co-existence of IPv6 with the IPv4 protocol. These technologies will increase complexity which may introduce new security weak zones in existing networks.

Technical staff will have less confidence with the IPv6 protocols than with their IPv4 counterparts. This creates an increased likelihood that security implications are overlooked when the protocols are deployed.

IPv6 in India

The Indian Registry for Internet Names and Numbers (IRINN) has begun issuing the latest version of Internet Protocol version 6 (IPv6) addresses in India.

The initial sets of IPv6 have been sold for a starting price of Rs. 21,999 which is 60 percent lesser than the prevailing rates in the APAC region.

The new version of Internet addresses will aid the security agencies to prevent cyber crime on a real-time basis as the IPv6 version provides a database of registered Internet addresses, which was not available previously with IPv4.

Security and Privacy Concerns

What Can an IP Address Reveal about You?

We carried out a straightforward task to understand what information can be found when starting with an IP address.

1. used the IP address of a contributor to Wikipedia;
2. looked-up the owner of the IP address, including any registration entries, using tools such as WHOIS (an online service used for activities including querying databases that store the registered users or assignees of domain names or IP address blocks);
3. Geo-location searches using the IP address.
4. Searched for the IP address on various search engines (e.g., Google, Bing) and examined the web pages returned in the search results looking for user behaviour, interests,etc.

Case Study: WHOIS

90.218.199.164 is an IP address that was obtained from the Revision History of the Wikipedia page on iOS Version History.[312]

Step 1:

A WHOIS lookup of the IP address 90.218.199.164 reveals that the user uses BSkyB Broadband as his/her ISP in London.[313]

Step 2:

A geo-location search using ipligence.com reveals the following details.
IP address is 90.218.199.164

City: Peterborough

Country: United Kingdom

Continent: Europe

Time Zone: GMT

Step 3:

A trace route command reveals the following router hops that data sent from an IP address in Bangalore, Karnataka using Airtel as the ISP would take to reach **90.218.199.164**.

```
C:\Windows\system32>tracert 90.218.199.164
Tracing route to 90.218.199.164 over a maximum of 30 hops
  1    2 ms     1 ms     1 ms  192.168.1.1
  2   19 ms     *       56 ms  ABTS-KK-Static-001.228.178.122.airtelbro
n [122.178.228.1]
  3    8 ms     7 ms    18 ms  ABTS-KK-Static-221.32.166.122.airtelbroa
 [122.166.32.221]
  4    8 ms     8 ms    20 ms  AES-Static-025.102.22.125.airtel.in [125
25]
  5  155 ms   158 ms   161 ms  125.62.187.226
  6  157 ms   157 ms   163 ms  pc3.gr10.telon.uk.easynet.net [195.66.22
  7  171 ms   170 ms   182 ms  bu4.er10.thlon.ov.easynet.net [89.200.13
  8    *        *        *
  9  222 ms   228 ms   206 ms  5adac7a4.bb.sky.com [90.218.199.164]
```

Step 4:

Using the IP address 90.218.199.164 as a search term in the major search engines did not reveal much information except for a couple of Wikipedia edits.

Conclusion

By combining the results the above steps, it was possible to get a rough but not a complete idea of the user.IP addresses are almost always the first step in cyber-crime investigations. However, IP Tracking must be done with great caution and with good intent. A casual approach to the same not only yields wrong results but may also result in wrongful implication of an innocent person. An innocent software professional was kept in jail for 50 days because the Internet Service Provider (ISP) gave wrong details about the IP address.[314]

CIS has done extensive research on the same and an article on IP addresses and Expeditious Disclosure of Identity.[315]

Just like a street address determines the recipient of a letter, an IP address (short for

Internet Protocol address) is used to identify computers on the Internet. When your computer sends a request, such as a Google query, it tags the request with its IP address in order for the response to be sent back to your computer — just like a return address on a letter.

IP addresses are a unique set of numbers that identify a given computer at a given time in the Internet world. However, ISPs often use dynamic IP addresses for various users. This means the same address can be applied to different users. Further, there are methods available to spoof IP addresses.

What are the Key Security Concerns?

Security Challenges

	IPv4	IPv6
Implementation	Mature	Less Mature
Security products	Fully supported	Less supported
	Better security features	Less security features
	⚠ **Difficult to enforce exactly the same policies**	
Transition technologies	Does not apply	Increase complexity
Technical personnel	Confident	Less confident

312. See more on iOS Version History at http://en.wikipedia.org/wiki/IOS_version_history, last accessed on February 4, 2014.
313. See Overview for 90.218.199.164 at http://who.is/whois-ip/ip-address/90.218.199.164 , last accessed on February 4, 2014.
314. Ketan Tanna, "Wrong man in jail for 50 days on cyber charge", *The Times of India*, November 3, 2007,http://articles.timesofindia.indiatimes.com/2007-11-03/india/27986914_1_pune-wrong-man-chhatrapati-shivaji, last accessed on February 5, 2014.
315. Prashant Iyengar, "IP Addresses and Expeditious Disclosure of Identity in India", *Centre for Internet and Society*, August 22, 2011, available at http://cis-india.org/internet-governance/ip-addresses-and-identity-disclosures, last accessed on February 5, 2014.

Case Study: Protocol and Packets

We have all sat down and sent email messages but do we know how the message gets from one place to another?[316]

Our language is very different from the language a computer uses. So, our alphabetic text needs to be converted into a machine-understandable form of 1's and 0's before it can be sent.

Figure **ERROR! NO SEQUENCE SPECIFIED.** – The above picture demonstrates a man wondering how messages are sent and the differences between human language and computer binary.

This translation is handled by the computer by the different modules in the communication protocol.

Figure **ERROR! NO SEQUENCE SPECIFIED.** – The picture above shows modules in communication protocol.

These modules or rules of conduct communicate with each other. They are best described as layers in a stack of protocols. These layers are Application Layer, Transport Layer, Internet Layer, Link Layer and Physical Layer.

[316] . From Internet Protocol Explained https://www.youtube.com/watch?v=zyL1Fud1Z1c

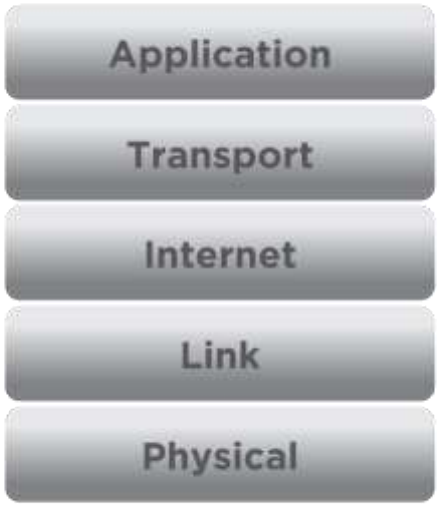


Figure **ERROR! NO SEQUENCE SPECIFIED.** – The picture above shows different layers in a stack of protocols.

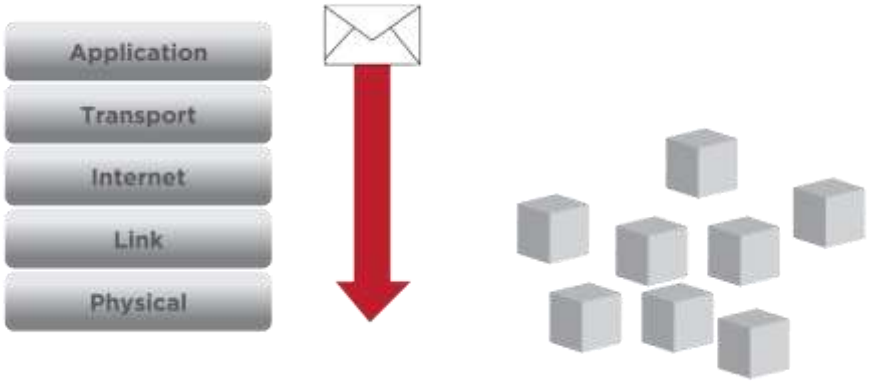
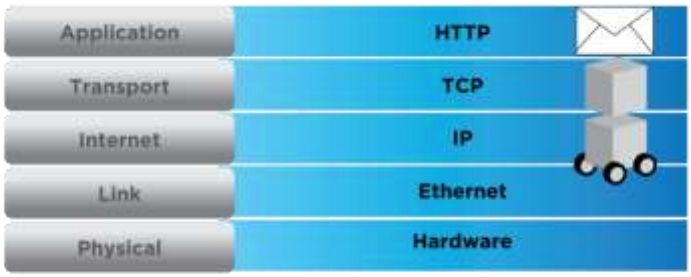


Figure **ERROR! NO SEQUENCE SPECIFIED.** – The picture above shows how messages are broken down into chunks of data and their progression through the layers.

The messages that we send are filtered through these layers and broken down into small chunks of data called ‘packets’.

We start with the Application Layer to create our message. One protocol from the Application Layer that you may be familiar with is the Hyper Text Transfer Protocol (HTTP). The Transport Layer uses Transmission Control Protocol or TCP to encapsulate the information from the Application Layer. It then moves to the Internet Layer where Internet Protocol or IP is used to deliver the ‘packets’. These packets are delivered through the Link Layer which is an Ethernet cable to the Physical Layer which is the basic hardware of our computer network.



7 layers of network stack, link and physical are not explained. Begin the chapter with this diagram. 1st two pages should cover link and physical. Cut down on IP: network layer diagrams should be removed

Figure **ERROR! NO SEQUENCE SPECIFIED.** – The picture above explains the workflow as the message moves through the different layers along with the protocols involved.

The computer that receives these data packets moves them through the protocol stack in the reverse order so that the message can be reconstructed and understood.

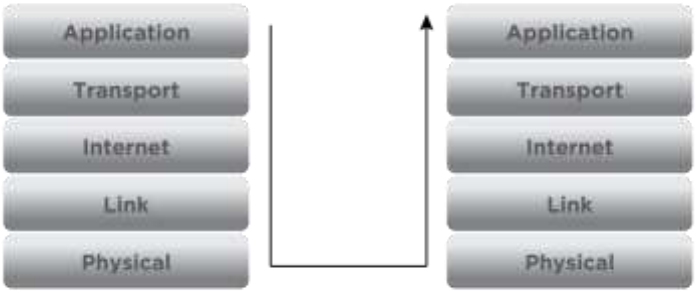


Figure **ERROR! NO SEQUENCE SPECIFIED.** – The picture above shows the reverse workflow when the message has to be reconstructed and delivered.

Additional Readings

1. The First Step - http://cis-india.org/internet-governance/ip-v-6
2. IPv6 – The Transition Challenge - http://cis-india.org/about/internet-governance/ip-v-6-the-transition-challenge
3. IPv4 and IPv6 – A short guide by Ben Parr http://mashable.com/2011/02/03/ipv4-ipv6-guide/
4. IIT Kanpur Case Study at http://academy.itu.int/moodle/pluginfile.php/38184/mod_resource/content/1/IITK_IPv6_Case_Study_1.pdf
5. An Introduction to IPv6 by James P. Early, Ph.D at https://www.youtube.com/watch?v=uNb7wd0-jpI
6. Security Implications of IPv6 by CPNI K at https://www.youtube.com/watch?v=_glagaW7wKo

Sources – Further Readings

1. Internet Protocol - http://en.wikipedia.org/wiki/Internet_Protocol
2. IP - Internet Protocol (Bradley Mitchell)
3. http://compnetworking.about.com/od/networkprotocolsip/g/ip_protocol.htm

Unit 13: The World Wide Web

Web Search Engines

The Internet contains an unbelievable amount of information, which is really not all that useful unless you can find what you're looking for. Search engines are all about finding the needle in the haystack. Searching or "Googling" as it is widely known these days due the popularity of Google is one of the easiest and useful ways to use the Internet. People use common search engines (such as Google, Bing and Yahoo) to find web pages, images, books, currency conversions, definitions, file types, news, local information, movies, and many more.

Query

A query consists of one or more words, numbers, or phrases that you want to find in the search results listings.

To enter a query, type keywords into Google's search box. You can use either the search box on Google's home page (shown above) or the search box that always appears at the top of a Google results page (shown below).

Results

The results page is full of information and links, most of which relate to your query. Results Google considers to be most relevant to your query are shown first. To the right of Google's search results appear sponsored links, which are paid advertisements.

The first line in each result is the page title. The title will be a link to the web page. Under the title are often excerpts which include one or more of your query words shown in boldface. The URL of the page is shown in green at the start of the last line under the result.

Cached Pages

To the right of the URL there is a link named "Cached". The CACHED link will take you to a screen shot of the page that Google took when it first crawled it. A lot of the content and images under the cached page may have been changed since websites are constantly updated.

Similar Pages

The similar pages*(to the right of the *cached page) link will take you to a results page similar to the normal results page, but will have results similar to the result you linked from.

Keywords

What keywords should one enter into the search bar? Not only does it matter what words you enter, but the order you enter them will vary your results. A good rule for the order of words to have in your search is that the first word should be a word that if you only included that word, the results would be closest to what you wanted. Then the second word would be the word that if you included after the first word, the results would be the closest to what you were looking for. And so on and so on with the rest of the words you want to enter.

Quotes
To search for a phrase, a proper name, or a set of words in a specific order, put them in double quotes. For example, say you wanted to search for the quoted phrase “to be or not to be” you would enter into Google [“to be or not to be”] (without the brackets).

Boolean
One can force Google to include a term by prefixing the term with a “+” sign. For example, if you wanted to search for Star Wars Episode 1. “I” is a stop word and is not included in a search unless you precede it with a + sign. So you would input into Google [Star Wars Episode +I] or [Star Wars +I]. Precede each term you do not want to appear in any result with a “-” sign.

Searching for Images
A really handy feature of Google search is search for images at http://images.google.com. Searching for images is the second most used Google feature behind searching for web pages. There are multiple ways that Google allows you to search for images.

Image search results can be filtered by size, color, type (face, photo, clip-art etc) and time of upload of the picture.

Key Terminology
The "**Web**", short for "*World Wide Web*" or www, is the name for one of the means by which people can browse the interconnected documents on the Internet.

The concept of the Web evolved at CERN (The European Organization for Nuclear Research) in 1991 by a group of researchers which included Tim-Berners Lee, the creator of the hyperlink, who is today considered the father of the Web.

The Web is based on the principle of using hyperlinks to browse through and traverse between documents that are also called web pages with a program called a browser. A web page is a simple text file written in a mark-up language called HTML that lays out the structure of the document, links to graphical elements, and links to other documents, all with the help of tags.

Besides the links which connect marked-up documents to one another, the web uses the HTTP protocol to link documents hosted on distant computers (or servers). On the Internet, documents are identified with a unique address, called URL, which can be used to locate any resource on the Internet, no matter which computer may be having that information.

Website
A website is a group of HTML files that are stored on a hosting computer that is permanently connected to the Internet.

A website is normally built around a central page, called a home page, which offers links to a group of other pages hosted on the same server, and sometimes "external" links, which lead to pages hosted by another server.

Secure Websites

Ensure that the websites are secure while shopping or banking online. There are many easy ways to tell if a site is secure and encrypted. First thing to notice is if the site URL has “https” at the beginning of the URL. The website should have an additional “s” to http which means that any information that flows from and to the browser is governed by HTTP Secure protocol. Most browsers also include a padlock icon in the browser to show that it has encryption.

Hackers can alter browser code to mislead the user. This type of phishing can be very tricky to detect because everything looks normal. Usually JavaScript code is written to change the way the address bar works. A picture can be placed over a real site to make it look like it is a secure site. Malicious URL details can be hidden by encoding techniques.

Digital Certificate

A digital certificate is akin to an electronic "credit card" that establishes your credentials when doing transactions on the Web. It is issued by a certification authority (CA). It contains the holder’s name, a serial number, expiration dates, a copy of the certificate holder's public key (used for encrypting messages and digital signatures), and the digital signature of the certificate-issuing authority so that a recipient can verify that the certificate is real. Some digital certificates conform to a standard, X.509.

What is HTTPS?

Hyper Text Transfer Protocol Secure (HTTPS) is a secure version of the Hyper Text Transfer Protocol (http). HTTPS allows secure ecommerce transactions, such as online purchases and banking.

Web browsers such as Firefox display a padlock icon to indicate that the website is secure, as it also displays https:// in the address bar.

When a user connects to a website via HTTPS, the website encrypts the session with a digital certificate. A user can tell if they are connected to a secure website if the website URL begins with https:// instead of http://.

How Does SSL Work?

Secure Sockets Layer uses a cryptographic system that encrypts data with two keys. When a SSL Digital Certificate is installed on a web site, users can see a padlock icon at the bottom area of the browser.

Users on sites with SSL Certificates will also see https:// in the address bar during a secure transaction.

Web Browsers

A web browser is a software program which enables a user to display and interact with text, images, videos, music, and other information that could be on a website. Text and images on a web page can contain hyperlinks to other web pages at the same or different website. Web browsers allow users to access information provided on many web pages at many websites by following these links.

Web browsers translate the HTML and display the content on the browsers. Since different browsers have their own parsing mechanisms (the way in which the HTML is translated for display) the same webpage can appear differently on different browsers.

Web Protocols and Standards

Web browsers interact with web servers primarily using HTTP (hypertext transfer protocol) to fetch web pages. HTTP allows web browsers to submit information to web servers as well as fetch web pages from them. WebPages are identified by means of a URL (uniform resource locater), which is treated as an address, beginning with "http://" that signifies http protocol.
The file format for a web page is usually HTML (hyper-text mark-up language) and is identified in the HTTP protocol. Most web browsers also support a variety of additional formats, such as JPEG, PNG, and GIF image formats, and can be extended to support more through the use of plug-ins. The combination of HTTP content type and URL protocol specification allows web page designers to embed images, animations, video, sound, and streaming media into a web page, or to make them accessible through the web page.

Uniform Resource Locator

A URL (Uniform Resource Locator, previously known as Universal Resource Locator) - usually pronounced by sounding out each letter is the unique address for a file that is accessible on the Internet. A common way to get to a Web site is to enter the URL of its home page file in your Web browser's address line. However, any file within that website can also be specified with a URL. Such a file might be any Web (HTML) page other than the home page, an image file, or a program such as a common gateway interface application or another program. The URL contains the name of the protocol to be used to access the file resource, a domain name that identifies a specific computer on the Internet, and a pathname, a hierarchical description that specifies the location of a file in that computer.

On the Web (which uses the Hypertext Transfer Protocol, or HTTP), an example of a URL is: http://www.cis-india.org/accessibility/blog.

The above URL specifies the use of a HTTP (Web browser) application, a unique computer named www.cis-india.org, and the location of a blog file or page to be accessed on that computer whose pathname is /accessibility/blog.

A URL for a particular image on a Web site might look like this:http://www.cis-india.org/accessibility/logo.png

A URL for a file meant to be downloaded using the File Transfer Protocol (FTP) would require that the "ftp" protocol be specified like this hypothetical URL: ftp://www.cis-india.org/accessibility/rules.txt

Analogy

Ravi goes to a restaurant in Chennai where there are 3 types of people: Dish cleaner, food server and financial transactors

The protocol is as follows:

a) Putting the tumbler upside down means you are calling the dish cleaner.
b) Writing on the palm conveys to the financial transactor that you are ready to pay the bill.
c) Stopping your local dialect conversation and talking in English conveys your calling the food server.

Now if applied to hyperlinks and urls, we see that different users understand different language (web browser etc). When you use the internet, your language and other signs signifies the different users.

Web Browser

Firefox (http://www.mozilla.org/en-US/firefox/all/)

Firefox is a very popular web browser. It is supported on a variety of operating systems. It is also open source which makes its support group a very large community of open source developers. It is also known for its vast range of plug-ins/add-ons that let the user customize in a variety of ways. Firefox is a product of the Mozilla Foundation. The latest version is Firefox 19.0

Some of Firefox's most popular features include: tabbed browsing, a spell checker, incremental find, live bookmarking, a download manager, and an integrated search system that uses the user's favourite search engines like Google, Bing, Amazon etc.

Chrome
Google Chrome is a freeware web browser developed by Google. Google has released the most of Chrome's source code as part of an Open Source project called Chromium.

Internet Explorer (http://windows.microsoft.com/en-IN/internet-explorer/download-ie)

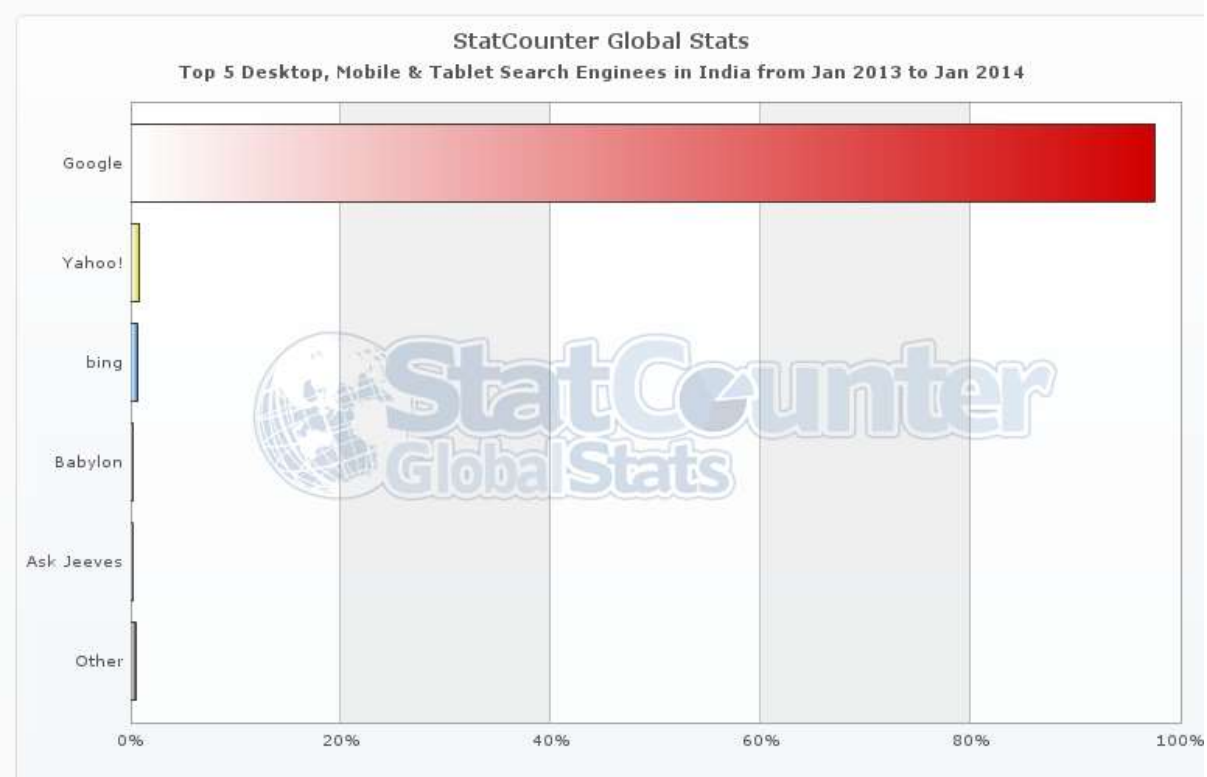
Internet Explorer (IE - created by Microsoft) is a very popular web browser for the Windows OS platform. It comes bundled on all Windows computers. The latest version of IE is IE9.

IE suffers from inherent security loopholes. Much of the spyware, adware, and viruses across the Internet are made possible by exploitable bugs and flaws in the security architecture of IE.

Others
Safari (created by Apple - http://www.apple.com/in/safari/) is a very popular web browser among Apple computers. Safari is also the native browser on the iPhone, iPad and iPod touch.

Opera (created by Opera Software - http://www.opera.com/) is another fairly popular web browser. It handles common Internet-related tasks. Opera also includes features such as tabbed browsing, page zooming, mouse gestures, and an integrated download manager. Its security features include phishing and malware protection, strong encryption when browsing secure web sites, and the ability to easily delete private data such as cookies and browsing history. Opera runs on Windows, OS X, and Linux.

Advance Search Capabilities	**Google**	**Yahoo**	**Bing**
all these words	Y	Y	Y
the exact phrase	Y	Y	Y
any of these words	Y	Y	Y
none of these words	Y	Y	Y
numbers within a range	Y	N	N
language	Y	Y	Y
Region	Y	Y	Y
last updated	Y	N	N
site or domain	Y	Y	Y
SafeSearch	Y	Y	Y
Images	Y	Y	Y
Videos	Y	Y	Y
News	Y	Y	Y



Top 5 Mobile search engines

Cookies

Cookies are a very important mechanism by which “state” can be maintained on the web. "State" refers to an application's ability to work interactively with a user, remembering all data since the application started, and differentiating between users and their individual data sets.

An often used analogy to explain cookies is this: You drop something at a laundry shop and you get a slip. When you return with the slip, you get your clothes back. If you don't have the slip, then the laundry man doesn't know which clothes are yours. In fact, he won't be able to tell whether you are there to pick up clothes, or a brand new customer. As such, the slip is critical to maintaining a state between you and the laundry man.

HTTP is a "stateless" protocol. This means that each visit to a site is seen by the server as the first visit by the user. In essence, the server "forgets" everything after each request, unless it can somehow mark a visitor (that is, hand him a "laundry slip") to help it remember. Cookies can help us with this.

What is a Cookie?

A cookie is a simple text file that gets stored on your computer’s hard disk as part of the browser’s memory. It contains variables whose values are set by the website that a user browses.

Where did the Term Cookies come From?

According to an article written by Paul Bonner for Builder.Com on 11/18/1997:

"Lou Montulli, currently the protocols manager in Netscape's client product division, wrote the cookies specification for Navigator 1.0, the first browser to use the technology. Montullisays there's nothing particularly amusing about the origin of the name: 'A cookie is a well-known computer science term that is used when describing an opaque piece of data held by an intermediary. The term fits the usage precisely; it's just not a well-known term outside of computer science circles."

Why use Cookies?

There are many reasons a given site would wish to use cookies. These range from the ability to personalize information (like on Yahoo or Google), or to help with on-line sales/services (like on Amazon Books or eBay), or simply for the purposes of collecting demographic information. Cookies also provide programmers with a quick and convenient means of presenting content that match user's interests.

How Does a Cookie Work?

Understanding how cookies work requires an understanding of how HTTP works. Cookies move from server to client as an HTTP header.

When a cookie is sent from the server to the browser, an additional line is added to the HTTP headers (example):

Content-type: text/html

Set-Cookie: foo=bar; path=/; expires Mon, 09-Dec-2013 22:00 GMT

This header entry would result in a cookie named **foo**. The value of **foo** is **bar**. In addition, this cookie has a path of **/**, meaning that it is valid for the entire site, and it has an expiration

date of **Dec 9, 2013 at 10:00 PM Greenwich Mean Time (or Universal Time)**. If the browser has cookie handling capabilities (and most well known browsers have this feature), the cookie will be created.

When a cookie is sent from the browser to the server, the cookie header is changed slightly:
Content-type: text/html
Cookie: foo=bar
Here, the server is made aware of a cookie called **foo**, whose value is **bar**.

Cookie Parameters
As we have just seen, a cookie contains more than simply a name and a value. In fact, a cookie has 6 parameters that can be passed to it:

1. The **name** of the cookie,
2. The **value** of the cookie,
3. The **expiration date** of the cookie,
4. The **path** the cookie is valid for,
5. The **domain** the cookie is valid for,
6. The need for a **secure** connection to exist to use the cookie.

Two of these are mandatory (its name and its value). The other four can be set manually or automatically. Each parameter is separated by a semicolon when set explicitly.

Where do Cookies Get Stored?
When a cookie is sent as part of an HTTP header, it is stored in the memory of your browser. This way the information is quickly and readily available without the need to fetch it from the server every time. As we have seen, however, it is possible for the lifetime of a cookie to greatly exceed the amount of time the browser session will be open.

Mozilla Firefox keeps its cookies in different locations depending on the OS version that you are using. The best way to find it is to use the "Search" feature and look for the "Cookies" folder.

Although the location may be different, the format is the same. Every domain's cookies are stored in their own file, along with the username that accessed the site. For example, if Joe visits MSN.com, his cookie file would be joe@msn.txt.

Case Study: Lightbeam

Surfing comes with an element of risk in it. Websites you visit can ask your browser for information for their proper functioning. However, this information can also be passed on to third parties without your knowledge as many websites are tracking you.

Cookies stored in your browser notify the server of the website of your movements allowing third parties to get access to your browsing history.

The Mozilla Corporation has come up with a tool to allow you to find out who is tracking you online.

Ligthbeam shows a bigger picture view by throwing light on the entire chain of events. It shows you a visual representation of all the cookies stored in your computer (by sites which you visit intentionally as well as third party websites). You can choose to look at this as a graph, as a clock and as a list.

Once it is activated Lightbeam shows not only the first party (the website you visit) but also all the third parties active on that particular webpage.

If you navigate on another site Lightbeam will record whether the same third party is also on the second site thus Lightbeam can tell you whether that third party is tracking you across sites.

Case Study: Panopticlick

You are at risk even after you disable cookies from your browser and start private browsing. Websites you visit are notified of your configuration through your browser. This information could be used to identify you and your computers, i.e., fingerprint you exclusively.

Electronic Frontier Foundation (EFF) has developed a webapp which will tell you how identifiable you are.

Panopticlick will anonymously create a log of your system fonts, user agents, browser plugins, and a few more variables that your browser normally gives to any site, and compare it with an existing database of 5 million configurations maintained by EFF, and using that will tell you whether you are uniquely identifiable. This is similar to what is done by companies that actively track you on the web and gives you evidence of how easy that is.

Analogy

Rajiv calls Prerna an idiot. Prerna gets angry and slaps Rajiv. The next day, Rajiv calls Prerna an idiot again. Prerna gets angry again and slaps Rajiv again. This repeats every day. They each have no memory of the previous day's transaction and hence, don't learn from them. This is how the internet would be were it not for cookies. Cookies record that information through imprints. Usually the user records the information. If we go back to Rajiv and Prerna, Prerna would have a sign hanging around her neck saying that Rajiv had called her an idiot and she had slapped him.

Browser Cache

Browsing almost always follows a set routine: you point your browser to a URL. The page you are asking the browser to load could be long. It could contain embedded pictures and music.

You may want to load the same page again. So, the programmers who designed the browser decided to have a storage mechanism to prevent the back and forth of data between the browser and the server where the website is stored. The storage mechanism is called browser caching. Now all browsers have the ability to cache data. Browser caching can be disabled but very few do it.

The ability or the convenience to store data comes at a price. By storing data, in whatever form, browsers infringe on security and privacy and introduce a fair number of new implications.

Browser caching is a wonderful feature in terms of user experience. It improves browser performance and speed at which websites are loaded.

A typical browsing session may include the user logging into a website. Depending on the user authorizations, they may be able to see parts of the website that are inaccessible to other users. A typical browsing session also includes moving through at least a few pages. Some users can see some content in a website while others may have access to different ones. The majority of web applications today are not only user-centric, but provide for some form of customization.

Problems Arising from Browser Caching

Once the user finishes using the application, one of the following things will likely happen: the session may time out, the user may log out or they will simply close the browser window. If the browser was left as is, it may be possible for a user with a different level of system privileges to access and redisplay pages from the browser session of the first user by simply using the *Back* button in the browser toolbar. If user credentials were stored in a cookie, it may be even possible for the second user to start a new browser session and regain access to the system using the credentials stored in the browser cookie.

The risk of displaying information and/or application functionality exists and has significant implications from security and privacy perspective. To expect that every user shall log out of a web application diligently is a very loose security approach, as even when users do log out, it is not possible to prevent the display of cached pages within the same browser instance. Newer browsers have the concept of tabbed browsing. Different browsers exhibit different behaviour when it comes to cookie sharing between existing tabs of the same browser instance/window. So we need to tell the browser not to store select pages with sensitive information and this would help in addressing privacy and security concerns to a large extent. Below is the complete set of headers that will allow you to control whether a browser ends up caching content:

Cache-Control: no-cache

Cache-Control: no-store

Cache-Control: must-revalidate

Expires: 0

Anonymization Techniques

There are many levels of anonymity when using the internet and each has a few best practises associated with it.

To hide your surfing habits from someone else with physical access to your browser, you'll have to wipe all traces from wherever your browser stores incriminating data after you're done.

The easiest way to do that is by browsing with your browser's Incognito mode (or similarly named browsing mode) on, which effectively instructs the browser to do the job for you.

The next level is cloaking your behaviour from websites you visit. As has been discussed elsewhere in this Report, websites can store cookies that can legally track your return times and behavior on the website that stores the cookie. Third parties can go a step further by arriving at cookie-sharing agreements with multiple websites; if all the websites you visit have cookies by the same third party, it can track your entire browsing behaviour. It's easy, however, to delete all cookies, though this may impair the functionality of some sites, and thereby escape that trap. One particular type of cookie - that stored in your Adobe Flash plugin, something your browser doesn't normally interfere with - is not deleted by this action, but can be deleted by *other* browser plugins made specifically for that purpose.

It is almost impossible to get away from browser fingerprinting which is a method to correlate every bit of information a website can get from your browser - which plugins it contains, what fonts it has, even your screen resolution - to attempt to identify you uniquely. A quick visit to the EFF's https://panopticlick.eff.org will give you an idea of how well you can be identified. Just like with cookies, third parties that compare this information across websites can trace your browsing history, and possibly your identity. They do suggest methods to protect yourself, even incompletely[317]: block javascript with NoScript[318], or do that plus other things including standardize certain browser characteristics using TorButton (some of these other things also slow down your browsing). The best present weapon in your arsenal would be the Tor Browser Bundle, of which the Tor Project has this to say[319]:

"The **Tor** software protects you by bouncing your communications around a distributed network of relays run by volunteers all around the world: it prevents somebody watching your Internet connection from learning what sites you visit, it prevents the sites you visit from learning your physical location, and it lets you access sites which are blocked."

Additional Readings

1. Sahana Sarkar, "Consumer Privacy in e-Commerce", *Centre for Internet and Society*, http://cis-india.org/internet-governance/blog/privacy/consumer-privacy-e-commerce.
2. Caspar Bowden, "Talk on Internet Privacy and Surveillance",http://cis-india.org/internet-governance/internet-privacy-surveillance.pdf/view
3. Pallavi Polanki "How private censorship is making online content disappear", *FirstPost*,http://www.firstpost.com/india/how-private-censorship-is-making-online-content-disappear-quietly-156545.html
4. Sunil Abraham, "Sense and Censorship",*Indian Express*, March 27, 2010, http://archive.indianexpress.com/news/senseandcensorship/596260/

Unit 14: Email Protocols

History

317. Read more at https://panopticlick.eff.org/self-defense.php
318. Read more at http://noscript.net/
319. Read more at https://www.torproject.org/projects/torbrowser.html.en

Today email has become the de-facto standard of communication. We all send dozens of emails without thinking about the details about what happens when we click the “Send” button.

Earlier one could send email messages to users on any given computer only. In 1971, Ray Tomlinson made the breakthrough with the ability to send messages to other machines on the Internet. He introduced the “@” sign to refer to the receiving machine.

Ray Tomlinson working at ARPANET did not know at that time that E-Mail could have a profound influence on the way deaf/hard-of-hearing people communicate. The most direct beneficiaries of the invention of E-Mail were Vinton Cerf (yes, you heard it right! Vint Cerf - the Internet Man) and his wife Sigrid Cerf.Vint Cerf was hard-of-hearing due to his premature birth. His wife Sigrid had a total loss of hearing from the age of 3 due to spinal meningitis. They both met at a hearing aid clinic and eventually married each other. Sigrid hated telephone calls and dreaded communicating with neighbours. She had to totally rely on sign-language to communicate. Email presented her with a new way to communicate.

Years later in May 1996, Sigrid had her cochlear implant activated at Johns Hopkins Hospital. Within 20 minutes of turning the implanted devices on, Sigrid called up Vint and they spoke over the phone for the first time in 33 years of marriage.

And guess what Vint Cerf did when he got off the phone? He wrote an **E-mail**to all his friends saying “Sigrid can hear”.

Yes, E-Mails have changed lives!

Email is an incredibly simple system at its core and this article explains the basics of email and how it works.

Email Terminology

1. Hackathon username and password.

Email Client

An email is essentially a piece of text and nothing more. You probably have a dozen unread emails in your inbox by now. The program that you use to look at your email is referred to as the **email client**. Popular open source email clients are Thunderbird, Claws Mail, Spicebird etc. Free email services like Gmail, Yahoo!, and Hotmail etc are accessed by a client on the webpage. Irrespective of the email client used, the client does four things:

1. It lists all the emails you have received by showing the message headers. Message headers contain the sender, the subject of the email, date and time and size of the message.
2. It allows you to select a message by clicking on it and reading the message.
3. Ability to create new messages and send them.
4. Ability to add attachments to messages and save the attachments that one receives on the computer.

Simple E-Mail Server

Once you have an email client you are ready to send and receive email. All that is needed is an email server that the client can connect to. Let's look at what the simplest email server would function like.

1. It would have a list of email accounts, with one email account for each person who can receive email on that server. Let's say two people A and B.
2. It would have a text file for each account. In our case, A.txt and B.txt
3. If someone wanted to send a message to 'A', he/she would compose the message on the email client, and indicate that the message should go to 'A'. When he/she presses the 'Send' button, the email client would connect to the email server and pass on to the server the name of the recipient, the name of the sender and the body of the message.
4. The email server would format this information and add it to the A.txt file. The entry appended in A.txt would look something like:
   From: B
   To: A
   How are you doing today?
   To:B

There are several pieces of information that would get appended in the A.txt file in addition to what is shown above. These include the time and date of receipt of message, the subject line, etc., but what is shown above indicates that this is indeed an extremely simple process.

As more and more people send emails to 'A', the pieces of information would get appended to A.txt. When 'A' logs on to his email client, the server presents these messages to him. The email client connects to the email server and

1. Asks the server to send a copy of A.txt file.
2. Asks the server to erase and reset A.txt file.
3. Save a copy of A.txt on 'A's local machine.
4. Parse the file and separate the messages and list them using the message headers.

When 'A' double clicks on a message header (sender's name, subject etc), the client would find the message in the text file and show its body. This is a VERY simple system. The real world email server and client are very similar to this and not more complicated.

Real World Email System & Email Protocols

The real world email system consists of two email servers – one for handling incoming email and the other for outgoing email. One is called the SMTP server. SMTP stands for Simple Mail Transfer Protocol and handles outgoing email. The other is called POP3 or IMAP server. These handle incoming email. POP stands for Post Office Protocol. IMAP stands for Internet Mail Access Protocol. The SMTP uses port number 25 of the given server machine while POP uses port 110 and IMAP listens on port 143.

A typical real world email system is depicted in the picture shown below.

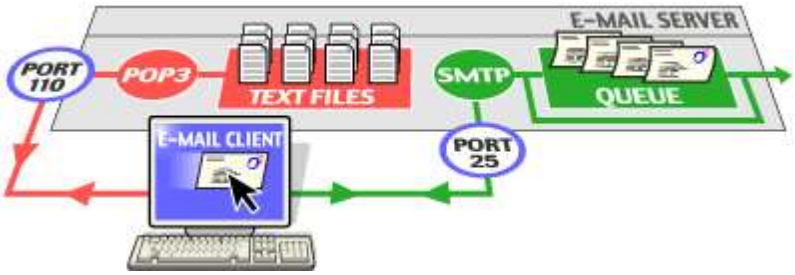


Figure **ERROR! NO SEQUENCE SPECIFIED.** – The above picture shows the working of a real world email system. it represents the workflow of an email.

SMTP Server

Whenever we send an email, the email client interacts with the SMTP server to take care of the sending.

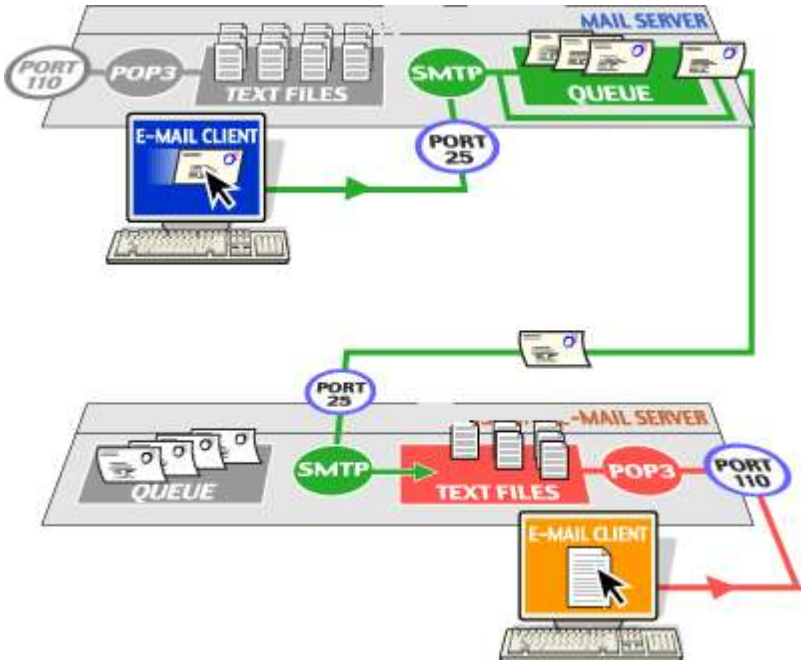


Figure **ERROR! NO SEQUENCE SPECIFIED.** – The above picture shows the working of an smtp server and the workflow when we send an email

What Happens when You Send an Email

Let's assume that I want to send an email. My email id is srividya and I have an account on cis-india.org. So, my email address is srividya@cis-india.org. I want to send an email to joe@marthastewart.com . I use Mozilla Thunderbird as my email client. When I setup my Thunderbird email client, I have specified the name of the mail server as mail.cis-india.org. When I write an email and hit Send the following happens:

1. Thunderbird (email client) communicates with the SMTP server at mail.cis-india.org on port 25.
2. Thunderbird informs the SMTP Server the address of the sender, the address of the recipient, as well as the body of the message.
3. The SMTP Server breaks the recipient email address i.e. joe@marthastewart.com into 2 parts – joe (recipient) and marthastewart.com (domain)
4. The SMTP Server communicates with the DNS Server (Domain Name Server) and

requests the IP address of the SMTP Server for marthastewart.com. The DNS Server responds by providing the IP address of the SMTP Server.

5. The SMTP Server of cis-india.org connects with the SMTP Server of marthastewart.com using port 25. It has the simple text message that Thunderbird gave to the SMTP server of cis-india.org. This message is transferred to the server at marthastewart.com. This server recognizes that joe is indeed a valid username on marthastewart.com and hands over the message to the POP3 server on marthastewart.com. The POP3 server puts the message in joe's mailbox.

If, for some reason, the SMTP server at cis-india.org cannot connect with the SMTP server at marthastewart.com, then the message goes into a queue. The SMTP server on most machines uses aprogram called **sendmail** to do the actual sending, so this queue is called the **sendmail queue**. Sendmail will periodically try to resend the messages in its queue. For example, it might retry every 15 minutes. After four hours, it will usually send you a piece of mail that tells you there is some sort of problem. After five days, most sendmail configurations give up and return the mail to you undelivered.

Other Forms of e-Communication

Mailing Lists

Mailing lists send information to an e-mail subscription list. Many companies and groups rely on mailing lists to distribute their information. Postings, in the form of e-mail messages, are automatically delivered to one's e-mail. One can read the contents of the messages, or can ask a question, give opinions or participate in discussions. Mailing lists can involve just a few people or tens of thousands. There are mailing lists that cover almost any conceivable topic.

Case Study: Mailing List

To find mailing lists, try http://lists.topica.com, a site that provides listings of mailing lists and newsletters on a wide range of topics.

Instant Messaging (IM)

An instant message is the process of sending messages in real time. Pidgin is an example of an open and extensible instant messaging client that has a huge fan following on both the Windows and Linux platforms. Examples of instant message services include AOL Instant Messenger, Yahoo! Messenger, and Google Talk.

Case Study: Cyber Raiders

There is a community of hackers called Cyber Raiders. They have terrible fights and during their fights, they like to bring up old fights that they've had as references and reasons for their accusations. Should they use IM or Mailing lists?

Chat Room

A chat room is an area on the Internet where a group of people come together to communicate in a "room". A user types a message that is seen by all other users currently online in the same "room." Users can see a list of all other users online. If a user right-clicks another user name, they are able to view his profile and send a private message.

Social Networking

Social networking allows members to connect with friends, make new friends and come together with members of similar interests. A user creates a profile and is granted access to the site where he can view other user profiles and connect with them. Popular social networking sites include Facebook, YouTube and Twitter.

Facebook was originally designed for college and university students, as a Harvard project but it is now open to anyone with an email address. It allows users to post profiles and pictures, upload videos and create networks of friends. Companies also widely use Facebook to promote their products and services via Facebook pages.

Case Study: Social Media

MySpace is similar to Facebook but it is slowly losing its customer base to Facebook.

Orkut from Google initially found a lot of fan following in India but like MySpace is losing its customers to Facebook.

YouTube has quickly become the de facto video-sharing site on the Internet, though its success has created competitors. Increasingly political parties in India have also used YouTube to get their messages out. YouTube helped create the concept of viral video, in which video messages may be easily shared with millions of people.

Online Forums

A forum is either a part of a website or a website itself where people come to discuss or get their queries answered. Users usually start a thread to start their discussion and reply to threads started by others. Yahoo Groups, Google Groups, Team-Bhp.com are good examples of online forums.

Blog

This is short for weblog and is an online journal of an individual or an organization. http://www.invesp.com/blog-rank/india lists India's famous blogs based on 20 different factors such as incoming links, RSS feed memberships etc.

Audio Conferencing

Audio conferencing is a connection between two computers that requires participants to have a microphone and speakers. Using audio conferencing software, such as Skype, users speak into the microphone and the dialogue is heard through the speakers of the other users.

Video Conferencing

Video conferencing works much like audio conferencing. The differences are that the users are able to see each other -- and for this a webcam is needed by all parties -- and that depending upon the service used, multiple people can see and be seen at the same time.

VoIP

Voice over Internet protocol, or VoIP, is phone service through an Internet connection. Users are given an adapter and a unique phone number. The user can then send and receive phone calls using a computer, a VoIP phone or a traditional phone, to and from other people, whether or not they use VoIP themselves.

Podcasting

Podcasting expands the concept of RSS feeds into multimedia formats, such as audio programs or music videos. The term podcast was created in 2004, a combination of the words iPod and broadcasting. Podcast files may be downloaded via an RSS feed to an iPod or to any computer. Directories of Podcasts include Digital Podcast, Podcast Alley, and Podcast Bunker.

IMAP, POP3, Webmail and VPN

POP3 Server

In its simplest form, the POP3 server maintains a list of text files for each of the email accounts. When a new email arrives, the POP3 server appends it to the bottom of the text file for that particular recipient.

When we open our mailbox, the email client (say, Mozilla Thunderbird) connects to the POP3 Server using port 110. The POP3 server requires an account name and password. Once the login is successful, the POP3 server accesses the text file corresponding to the user name and allows you to see the emails received. The POP3 server understands very simple commands such as:

1. USER- enter your user ID
2. PASS - enter your password
3. QUIT - quit the POP3 server
4. LIST - list the messages and their size
5. RETR - retrieve a message, pass it a message number
6. DELE - delete a message, pass it a message number
7. TOP - show the top x lines of a message, pass it a message number and the number of lines

IMAP Server

As we saw above, the POP3 protocol is rather simple. It allows one to have a list of messages stored in a text file on the server. The e-mail client (e.g. Thunderbird) can connect to the POP3 e-mail server and download the messages from the POP3 text file onto your machine. Unfortunately, that is all that one can do with a POP3 server.

Many users want to do far more than that with their e-mail, and they want their e-mail toremain on the server. The main reason for keeping your e-mail on the server is to allow them toconnect from a variety of machines. With POP3, once the emails are downloaded they are confined to the machine on which they were downloaded. If you want to read your e-mail both on your desktopmachine and your laptop (depending on whether you are working in the office or on the road),POP3 isn't sufficient.

IMAP (Internet Mail Access Protocol) is a more advanced protocol that solves these problems.

With IMAP, the emails stay on the e-mail server. One can organize e-mail into folders, andall the folders reside on the server as well. When a user searches through emails, the search occurs on theserver machine, rather than on your machine. This approach makes it extremely easy for you toaccess your e-mail from any machine, and regardless the machine used, one haveaccess to all the emails.

The e-mail client connects to the IMAP server using **port 143**. The e-mail client then issuesa set of text commands that allow it to do things like list all the folders on the server, list all themessage headers in a folder, get a specific e-mail message from the server, delete messageson the server or search through all of the e-mails on the server.

One problem that can arise with IMAP involves this simple question: “If all of my e-mail isstored on the server, then how can I read my mail if I am not connected to the Internet?”

Email clients have some way to cache e-mail on the local machine to solve this issue.For example, the email client can download all the messages and store their complete contents on thelocal machine in a PST file for example (just like it would if it were talking to a POP3 server). The messages still exist onthe IMAP server, but you now have copies on your machine. This allows you to read and reply toe-mail even if you have no connection to the Internet. The next time you establish aconnection, you download all the new messages you received while disconnected and send allthe mail that you wrote while disconnected.

What to Choose – POP3 or IMAP

POP3 is very good if all you want to do is pull down mail from the mail server to a single trusted client. This could be a single desktop computer (perhaps using Thunderbird as the client). This is ideal if this particular computer is the only place from where you access your email always. This is also ideal when you do not want to leave messages on the mail-server open to prying eyes.

But, if you have a smart-phone or several computers and you are on the go and want to be able to read the same messages from each e-mail client, then IMAP is the solution for you.

In addition to having multiple clients, IMAP allows you to organize a hierarchy of message folders. Once a message has been moved from one folder, that message reflects across the board to every e-mail client.

If you have a large inbox and are prone to receiving messages of large size, then IMAP allows you to only retrieve the headers (rather than the entire message) from the e-mail server. So if you have several hundred new messages, retrieving only the headers allows you to sort through them very quickly – and open only those that call for your attention.

With IMAP once a message is marked as read on one client, that message gets marked as read with all of the clients.

For example, let’s say you are out of the office and read a message on your smart-phone then on your computer at your desk, that same message will be marked as read when you get back. With POP3, you would have to read the message in both locations to mark the email as "read".

How to Access your Email Remotely

Webmail:

In most cases, companies have a webmail client set up so that employees can remotely check their email using a URL and their email user-name and password. For example, mail.cis-india.org is the URL for accessing CIS' webmail.

VPN (Virtual Private Network)

A virtual private network (VPN) extends a private network across the Internet. It enables a user to send and receive data to and from the private network using the Internet path, while still retaining from the functionality, security and management policies of the private network.

Some companies who have such a system set up may provide you with VPN access or assign you a username or password that can be used to access your email through the company's web mail or intranet.

If VPN is set-up then a VPN client has to be installed on your computer.
Email SPAM
SPAM accounts for 77.2% of email traffic.[320]

Email spam, also known as **junk email** or **unsolicited bulk email** (**UBE**), is a subset of electronic spam involving nearly identical messages sent to numerous recipients by email. Clicking on links in spam email may send users to phishing web sites or sites that are hosting harmful software. Spam email may also include software such as scripts or other executable file attachments. Definitions of spam usually include the aspects that email is unsolicited and sent in bulk.[321]

Spammers collect email addresses from websites, customer lists, newsgroups, and viruses which harvest users' address books, and are sold to other spammers. They also use a practice known as "email appending" or "epending" in which they use known information about their target (such as a postal address) to search for the target's email address. Much of spam is sent to invalid email addresses.

Exercise: POP3 or IMAP
There are two internet users. Divya has very little space on her mail servers (20mb) and lots of mails (10mb). If she wants to access her mails with ease, should she use POP3 or IMAP?
Jerry is going into another country and can't carry his laptop but wants to access his mails abroad. Which one would he use? POP3 or IMAP?
3)
a) Alice doesn't have a computer. Should she use webmail or offline mail?
b) Ravi doesn't trust Google and wants to delete his mails after seeing them but wants to be able to access them later. Should he use webmail or offline mail?

Email Scams
Most ofus remember the Nigerian email scam in which targeted users received emails asking them to send a small amount to receive the bigger bounty that they have received. This is a classic example of email fraud or phishing.

320. See Spam Report April 2012 athttp://www.securelist.com/en/analysis/204792230/Spam_Report_April_2012 , last accessed on February 5, 2014.
321. From Email SPAM at http://en.wikipedia.org/wiki/Email_spam

Unlike the Nigerian scam which involved receiving doctored emails from an unknown email address, the "lost my wallet" email scam comes in the form of an email from one of your email contacts. A typical "lost my wallet" scam email looks like the one below. It comes from your contact's email address.

Example: Spam Message

A mail from lloyds bank at 6:58 p.m. with a list of documents and details that the receiver was supposed to send them to claim a prize money. lloyds bank had also attached a deposit certificate to ‘prove’ that shell petroleum development company had deposited the prize money in the bank. below is an extraction of the e-mail received from lloyds bank.

"from the desk of dr. mohamed malik
regional claims agent,
shell petroleum international lottery program.
regional office:
st james court, great park road,
almondsbury park, bradley stoke,
bristol bs32 4qj, england
contact: +447035974608
“lloyds bank plc
administrative headquarters.
london, england, united kingdom.
ref...filenos2345/ltb
attention: sarkar shaiza
regarding your prize from shell petroleum development company
please send us the documents below;
1. a certificate of award from shell petroleum contact dr mohamed malik
2. a scanned copy of either your drivers license or your international passport or work i.d card.
3. a sworn affidavit of claim from the crown court here in london,you are required to contact [dr mohamed malik]your agent for all this.
sir paul wisconfield.
head of operations.
lloyds tsb bank plc

Lloyds Bank

INTERNATIONAL REMITTANCE DEPARTMENT

DEPOSIT CERTIFICATE

THIS CERTIFICATE IS THE ORIGINAL SPECIMEN AND VALID DOCUMENT FROM THE TREASURY AND SECURITY DEPARTMENT OF LLOYDS BANK TSB PLC LONDON. THE AGREEMENT THEREIN CONTAINED ARE THOROUGH, CORRECT AND BINDING ON THE PARTIES. ALTERATION MADE ON THIS SPECIMEN AFTER IT HAS BEEN LEGALLY ISSUED AND ACCEPTED RENDERS THIS DOCUMENT, NULL AND VOID.

This is to Certify that :

DEPOSITOR'S NAME: SHELL PETROLEUM DEVELOPMENT COMPANY

NATIONALITY: UNITED KINGDOM

AMOUNT DEPOSITED WITH THIS BANK

$550,000.00

For a detailed explanation of phishing visit http://cis-india.org/internet-governance/blog/privacy/scam-baiting

ICICI bank was at the receiving end of a phishing attempt. A few customers of ICICI Bank received an e-mail asking for their Internet login name and password to their account. The e-mail seemed so genuine that some users even clicked on the URL given in the mail to reach a Web page that very closely resembled the official site. The scam was finally discovered when an assistant manager of ICICI Bank's information security cell received e-mails forwarded by the bank's customers seeking to crosscheck the validity of the e-mails with the bank.

Phishing

It is the act of attempting to acquire information such as usernames, passwords, and credit card details (and sometimes, indirectly, money) by masquerading as a trustworthy entity in an electronic communication. Communications purporting to be from popular social web sites, auction sites, online payment processors or IT administrators are commonly used to lure the unsuspecting public. Phishing emails may contain links to websites that are infected with malware. Phishing is typically carried out by e-mail spoofing or instant messaging and it often directs users to enter details at a fake website whose look and feel are almost identical to the legitimate one. Phishing is an example of social engineering techniques used to deceive users and exploits the weak links in security systems. Attempts to deal with the growing number of reported phishing incidents include legislation, user training, public awareness, and technical security measures.[322]

322. From Phishing at http://en.wikipedia.org/wiki/Phishing

Examples: Tax Refund Phishing
Tax Rebate: Tax rebates will never be sent over email and you will never be asked to disclose personal or payment information via email.

To:
From: info171581@inbox.net
Subject: Tax Refund Notice !

Tax Refund Confirmation

After the last annual calculations of your fiscal activity, we have determined that you are eligible to receive a tax refund of 468.50 GBP. Please submit the tax refund request and click here by having your tax refund sent to your bank account in due time

Please Click "Get Started" to have your tax refund sent to your bank account, your tax refund will be sent to your bank account in due time take your time to go through the bank we have on our list

Get Started

Note: A refund can be delayed a variety of reasons, for example submitting invalid records or applying after deadline.

Best Regards

HM Revenue & Customs

The link above is a fake and will take you to this website:

Netiquette

Netiquette refers to rules of behaviour governing the use of all Internet services, including communicating with discussion groups, creation of web pages, and blogging.

Some of the basic rules of e-mail netiquette include the following:

1. Never say anything in the online world without proper thought and consideration. Forum threads and email messages may be archived and what you say could be held against you.
2. As a rule of thumb, do not send emails when you are angry. Use informative, carefully phrased subject headings. Many people get a hundred or so pieces of e-mail a day. If you want your message to be read, give your message proper subject lines.
3. Using all upper case letters equates to shouting in the online world. Don't use all lower case either. It's much easier to read English the way it is written.
4. The Internet is an international network made up of people from all nationalities, races, and sexes. They have their own sensitivities. So, be careful with use of slangs and abbreviations.
5. Don't redistribute private e-mail.
6. Avoid sending messages to large numbers of users unless you have a valid reason to do so. E-mail sent to many recipients may be considered spam. Countries like the USA have strict laws against SPAM.

Case Study: RFC1855 Rules

"A good rule of thumb: Be conservative in what you send and liberal in what you receive. You should not send heated messages (we call these "flames") even if you are provoked. On the other hand, you shouldn't be surprised if you get flamed and it's prudent not to respond to flames.

- Remember that the recipient is a human being whose culture, language, and humor have different points of reference from your own. Remember that date formats, measurements, and idioms may not travel well. Be especially careful with sarcasm.

- Wait overnight to send emotional responses to messages. If you have really strong feelings about a subject, indicate it via FLAME ON/OFF enclosures. For example: FLAME ON: This type of argument is not worth the bandwidth it takes to send it. It's illogical and poorly reasoned. The rest of the world agrees with me. FLAME OFF"[323]

This is taken from the 1995 guidelines to internet etiquette by RFC. It is useful to ponder on the relevance of these guidelines in our society today and whether guidelines itself are relevant in the world today when the value heated messages, REM cycles and multi-culturalism has completely changed.

Conclusion

Emails have changed the way we communicate. Email systemhowever is very simple at its core.The next time you see a new email, you know exactly what happened in the background

323. Network Working Group S. Hambridge Request For Comments: 1855, http://www.ietf.org/rfc/rfc1855.txt , last accessed on February 6, 2014.

to get the email to your mailbox.

Additional Readings

1. Email SPAM at http://en.wikipedia.org/wiki/Email_spam
2. Phishing at http://en.wikipedia.org/wiki/Phishing
3. Simple Mail Transfer Protocol - http://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol
4. Post Office Protocol - http://en.wikipedia.org/wiki/Post_Office_Protocol
5. CIS Research – Bye Bye Email - http://cis-india.org/internet-governance/bye-bye-email
6. Cybercrime Case Studies - http://satheeshgnair.blogspot.nl/2009/06/selected-case-studies-on-cyber-crime.html
7. Computer Ports – http://compnetworking.about.com/od/basiccomputerarchitecture/g/computer-ports.htm
8. Are chat rooms accessible to people with difficulties http://www.washington.edu/accessit/articles?64
9. CIS Research on Accessibility of Government Websites in India - http://cis-india.org/accessibility/accessibility-of-government-websites-in-india
10. Accessibility of Online Chat Programshttp://webaim.org/articles/archives/chats/

Unit 15: Internet Security

Internet Security broadly refers to browser security and network security and involves putting measures in place to prevent attacks. The Internet has made possible the availability of a large amount of data at one's disposal. From being an advantage, the Internet has become an essential utility. Connecting one's private computer or network to the Internet brings with itself the inherent risk of exposing one's sensitive information. Users who connect their computers to the Internet must be aware of these dangers, their implications and how to protect their data and their critical systems.

The Internet has grown and so have the capabilities of the unethical hacker. Software programs have become more and more complicated making it harder to find a small hole or virus. Even with proper security software, hackers can develop new methods of getting into a computer, which makes it very essential to constantly update one's security software and operating system.

Passwords

Passwords are keys you use to access safeguarded information, such as personal information, online accounts, banking information, etc. In the online world, passwords are the main way of keeping hackers away from your information. It is important to make sure that your password is something that nobody else will be able to figure out easily.

Strong Passwords

What makes a strong password? There is a lot of criteria to include when making a strong password.

1. Length – All passwords should be long. Most places where you input a password will

give you a number range of characters to include in the password. It always best to include the MAXIMUM number of characters. The longer the password the more possibilities a hacker will have to go through before he/she gets to your password.

2. Characters – Make sure to use all types of characters. The more different types of symbols used, the harder it will be for a hacker to determine your password.

Passwords to Avoid

There are certain types of passwords that you want to make sure NOT to use.

1. Avoid using passwords that have repeating characters such as "222222", "123456" or adjacent letters on your keyboard such as "qwerty"
2. Purposely mistaking look-alike symbols such as "l"(L) for "1"(one). Or words like "P@ssw0rd" that just look like the same word. Hackers are smart enough not to be fooled by these.
3. Do not use words that exist in dictionaries of any language. Hackers have very good software that can quickly go through dictionaries of any language as well as backwards words, common misspellings, and substitutions.
4. Do not use parts of your login name, real name, birthday, credit card number, or other important information that you are already trying to protect with that password.
5. Do not use the same password for anything more than once. If a hacker gets access to one of your passwords he/she will keep note of that password and try to use it later again.

Alternatives

For passwords, bigger is better. The first thing to do to make a password secure is to pick from the *largest* set of symbols available (lower and upper case, special symbols and numbers) and make it *long*. The second thing to do is to have *lots* - each site you have an account on should ideally have an entirely different, unrelated password. The easiest way to remember them is to let something else do it for you - let Firefox or Keepass[324] store all your site-specific passwords and have them accessible using a master password, for which a compromise may need to be made between security and memorability. Unless you're in an unsecure environment, though, writing it down will usually suffice.

One time passwords are what you use when a site asks you to verify your identity using a link sent to your email id. The link is only active for a specific period of time (usually less than 24 hours) and works only once, after which it has fulfilled its purpose and expires.

Dual factor identification has become commonly known after Google implemented its 'two step authentication', in which Gmail sends a onetime password in the form of a six digit code to your phone which you have to enter in addition to your password to access Gmail. Fingerprint readers are becoming more common on smart phones and laptops, and, when used in addition to passwords, provide an additional layer of security.

Types of Security

Encryption

324. Read more at http://sourceforge.net/projects/keepass/

Encryption is the conversion of data into a form, called a cipher-text that cannot be easily understood by unauthorized people. Decryption is the process of converting encrypted data back into its original form, so it can be understood. Simple ciphers may involve substitution of letters for numbers, the rotation of letters in the alphabet, etc. To decrypt the contents of an encrypted message, the correct decryption key is required. The key is an algorithm that undoes the work of the encryption algorithm.

PGP (Pretty Good Privacy)

PGP provides confidentiality by encrypting emails to be transmitted or data files to be stored using encryption. Emails can be protected by using cryptography in various ways, such as the following:

1. Signing an email message to ensure its integrity and confirm the identity of its sender.
2. Encrypting the body of an email message to ensure its confidentiality.
3. Encrypting the communications between mail servers to protect the confidentiality of both the message body and message header.

Firewalls

Firewalls protect individual computers and private networks from malicious attacks by other computers connected to the Internet. A firewall protects networked computers from intrusion that could compromise confidentiality or result in data corruption or denial of service.

Types of Firewalls

The firewall may be a hardware device (see Figure 1) or a software program (see Figure 2) running on a secure host computer. In any case it will have two network interfaces, one for the network it wishes to protect and one for the network that it is exposed to.

A firewall sits at the gateway between the two networks, usually a private network and a public network such as the Internet. The earliest firewalls were simply routers. The term firewall comes from the fact that by segmenting a network into different physical sub-networks, they limit the damage that could spread from one subnet (remember subnet when you read about the various parts of an IP Address?) to another just like fire-doors or firewalls.

Figure 1: Hardware Firewall.
Hardware firewall providing protection to a Local Network.

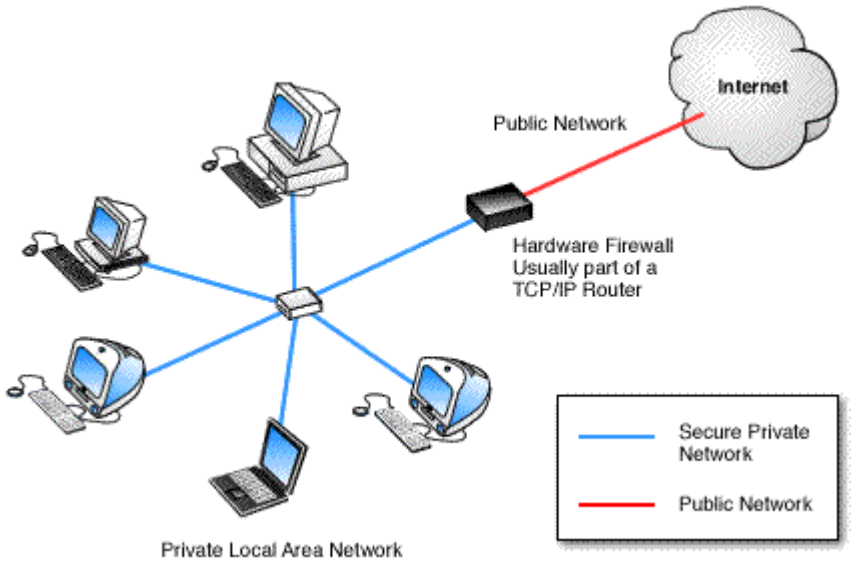
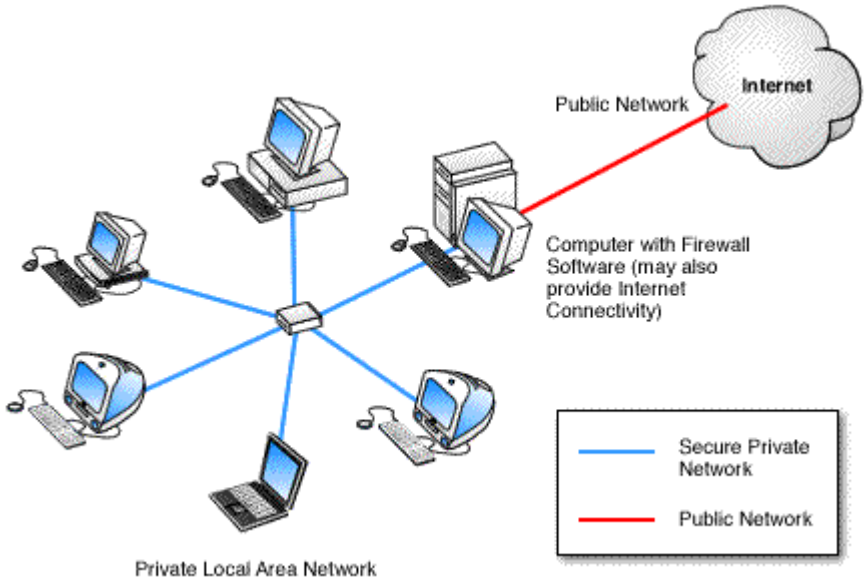


Figure 2: Computer with Firewall Software.

Computer running firewall software to provide protection



A firewall examines all traffic routed between the two networks to see if it meets some conditions. If it satisfies the conditions, it is routed between the networks, otherwise it is stopped. A firewall filters both inbound and outbound traffic. It can also manage public access to private networked resources such as host applications. It can be used to log all attempts to enter the private network and trigger alarms when hostile or unauthorized entry is attempted. Firewalls can filter packets based on their source and destination addresses and port numbers. This is known as address filtering. Firewalls can also filter specific types of network traffic. This is also known as protocol filtering because the decision to forward or reject traffic is based on the type of protocol used to access, for example HTTP, ftp or telnet. Firewalls can also filter

traffic by packet attribute or state.

However, a firewall cannot prevent individual users with modems from dialling into or out of the network, avoiding the firewall altogether.

Any private network that is connected to the Internet needs firewall protection. Even individuals who connect a single computer to the Internet via modem should have personal firewall software.

Different Types of Malicious Software

Viruses, Worms and Trojan horses are different types of malware (malicious software) and all of these basically refer to any software that gets installed on your machine and performs unwanted tasks, often for some third party's benefit. Malware programs can range from being simple annoyances (pop-up advertising) to causing serious computer invasion and damage (e.g., stealing passwords and data or infecting other machines on the network). Additionally, some malware programs are designed to transmit information about your Web-browsing habits to advertisers or other third party interests.[325]

Denial-of-service Attack (DOS)

A **denial-of-service attack (DoS attack)** or distributed **denial-of-service attack (DDoS attack)** is an attempt to make a computer resource unavailable to its intended users. Although the means to carry out, motives for, and targets of a DoS attack may vary, it generally consists of the concerted efforts of person or persons to prevent an Internet site or service from functioning efficiently or at all, temporarily or indefinitely.

http://www.digitalattackmap.com/#anim=1&color=0&country=ALL&time=16106&view=map

IP Spoofing?

As mentioned earlier, firewalls analyse the source IP addresses of packets to determine if they are legitimate. A firewall may be designed to permit traffic if it comes from a specific trusted host. A malicious entity can try to gain entry by "spoofing" the source IP address of packets sent to the firewall. If the firewall thought that the packets originated from a trusted host, it may let them through. Of course the hacker should have a fair idea of the firewall's rule base to exploit this kind of weakness.

An effective measure against IP spoofing is the use of a Virtual Private Network (VPN) protocol such as IPSec. This methodology involves encryption of the data in the packet as well as the source address. The VPN software decrypts the packet and the source address and performs a checksum. If either the data or the source address has been tampered with, the packet will be dropped. Without access to the encryption keys, a potential hacker would not be able to get past the firewall.

Additional Reading

1. Internet Security,http://en.wikipedia.org/wiki/Internet_security

325. For more see Viruses Spyware and Malware, available at http://ist.mit.edu/security/malware, last accessed on February 1, 2014.

2. Elonnai Hickok, Encryption Standards and Practices, Centre for Internet and Society,*Centre for Internet and Society*, April 5, 2011, http://cis-india.org/internet-governance/blog/privacy/privacy_encryption
3. Antivirus software, http://en.wikipedia.org/wiki/Antivirus_software
4. Browser security, http://en.wikipedia.org/wiki/Browser_security
5. Internet safety, http://en.wikipedia.org/wiki/Internet_safety

Module 4: Government Bodies, International Institutions and Other Mechanisms

Abstract

This is the fourth module on internet governance. This module deals with the international internet governance structure, the different multi-stakeholder mechanisms and the internet governance structure in India. The main questions dealt with are how the preservation of rights and values is possible within the current frameworks of governance. To answer this, we will explore many case studies and interview experts on the way.

How Does Internet Governance Affect Me?

Internet governance should not be confused with E-governance which refers to governance that is driven by the use of technology. Internet governance, according to the United Nations World Summit on the Information Society (WSIS) is "the development and application by Governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the internet".[326]This definition, when deconstructed, renders a rather benign image of the potentates of Internet Governance as multi-stakeholder groups that include the state as just one of the actors. It would seem, based on this definition, that Governments, the private sector and civil society are just involved in a shared goal and process to discover the values or guidelines which should inform conduct involving the internet. According to the Harvard Law Professor Yochai Benkler, Internet Governance exists in three "layers". The first layer is the "physical infrastructure" through which the information travels, the infrastructure is controlled by the "logical" layer or is sometimes called the "code" layer and the information that actually signals through the networks is known as the "content" layer. [327]

In the past, we have seen that to the layperson, the third layer has been the most visible and active space which has led to the most concerns over the content and freedoms that are entailed within it. Values that we have discussed such as the freedom of expression and privacy inform the nature of the third layer but the other two layers largely determine the ways and means in which the third layer attains its morphology. No single person, company, organization or government actively monopolizes and runs the internet. To a large extent, the network is distributed globally with an interconnection of copious autonomously acting networks. Since each constituent networks set their own policies, the main aim of most bodies bidding for governance is to form cooperation among the many stakeholders and maintain the internet's global interoperability for the public good.

Control of the physical infrastructure and the logical layer has sometimes given bodies like governments an asymmetrical stock in decision making and governments' acting in their self-interest has led to a compromise on individual freedoms on the internet. This has led to many individuals feeling a sense of insecurity about their individual freedoms and a general push against having a centralized governance of the internet. One of the lingering fears that people around the world have is that of a United States' hegemony over the internet.

326. For more see Chateau de Bossey, "Report of the Working Group on Internet Governance", *WGIG*, June 2005, available at http://www.wgig.org/docs/WGIGREPORT.pdf, last accessed on January 28, 2014.
327. See more at http://www.law.indiana.edu/fclj/pubs/v52/no3/benkler1.pdf, last accessed on January 28, 2014.

Now that we have Servers in India, is it still Legitimate to Claim the US Hegemony of the Internet?

In order that interoperability is ensured, the Internet Corporation for Assigned Names and Numbers (ICANN) presides over assigning globally unique identifiers on the internet. This includes the assignment of domain names, Internet Protocol (IP) addresses, application port numbers in the transport protocols and various other such parameters. Creating a globally unified namespace can ensure, and enhance the global reach of the internet which is its main purport. The National Telecommunications and information Administration, an agency of the US Department of Commerce, however, exercises the ultimate authority over the DNS root zone of the internet. It is managed by the Internet Assigned Numbers Authority (IANA) whose operator is ICANN while the root zone is maintained by Verisign, Inc. As we have discussed, the internet has diluted, distributed and spread authority but the control over the root zone file makes ICANN one of the rare bodies with centralized influence over the first and second layers of the internet. [328]This is separate from whether the US, through ICANN exerts too much influence in other aspects of Internet Governance by virtue of its control of the DNS root zone. Also, now that India has a server, an individual in India's general fear that the U.S controls the internet is also coming into question.

Internet Governance still hasn't taken a clear form yet and maybe that is the virtue that ought to be revered as we move forward. This module will discuss the different bodies that have a stake in Internet Governance and what their roles are in the debates that rage on the nature of Internet Governance in the context of public good.

Unit 16: International Institutions

International Telecommunication Union

Introduction

The International Telecommunication Union (ITU) is a specialized agency of the United Nations. It is an intergovernmental organization which coordinates between governments and private sector bodies with respect to global telecommunication and information communication technology (ICT) services. The ITU is headquartered at Geneva, Switzerland, having been established as a successor to International Telegraph Union which was set up in 1865. Subsequently in 1947 the ITU became as specialized agency of the United Nations.

This unit will deal with the ITU's main areas of work and with special focus on review of the International Telecommunication Regulations (ITRs) during the World Conference on International Telecommunications 2012 (WCIT '12) and its impact on the internet. It will also briefly touch upon the various functions of the ITU.

Amongst other functions[329], the ITU is mainly responsible for management of radio spectrum globally and coordination and setting of technical standards related telecommunication/ICT.

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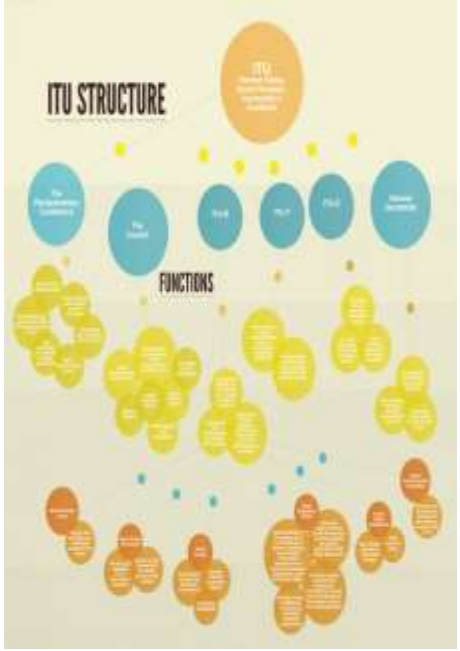
328. Jerry Brito, "ICANN vs. The World", *TIME Tech*, available at http://techland.time.com/2011/03/05/icann-vs-the-world/

329. Article 1(2), Constitution of the ITU, "...effect allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies and the registration of radiofrequency assignments and, for space services, of any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to avoid harmful interference between radio stations of different countries;
a) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio-frequency spectrum for radiocommunication services and of the geostationary-satellite and other satellite orbits;
b) facilitate the worldwide standardization of telecommunications, with a satisfactory quality of service;

The ITU also has active involvement in the sectors of broadband internet, next generation wireless technologies, data, access, television broadcasting and convergence in mobile devices.

Composition of the International Telecommunication Union



The ITU comprises of Member States, Sector Members and Associates.

Member States

Member states have the right to vote in the ITU proceedings. Each member state nominates one member to represent the State in ITU proceedings. Currently, 193 member states participate in the ITU proceedings. For example, India, the United States of America, Sudan, etc.

Sector Members

Any interested organization can become a member of any of the sectors or all the sectors (ITU-T, ITU-R and ITU-D) for a payment of a fee. Sector members can be from industry, international or regional organizations. The rights and obligations of the Sector Members are

c) foster international cooperation and solidarity in the delivery of technical assistance to the developing countries and the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, including through its participation in the relevant programmes of the United Nations and the use of its own resources, as appropriate;
d) coordinate efforts to harmonize the development of telecommunication facilities, notably those using space techniques, with a view to full advantage being taken of their possibilities;
e) foster collaboration among Member States and Sector Members with a view to the establishment of rates at levels as low as possible consistent with an efficient service and taking into account the necessity for maintaining independent financial administration of telecommunications on a sound basis;
f) promote the adoption of measures for ensuring the safety of life through the cooperation of telecommunication services;
g) undertake studies, make regulations, adopt resolutions, formulate recommendations and opinions, and collect and publish information concerning telecommunication matters;
h) promote, with international financial and development organizations, the establishment of preferential and favourable lines of credit to be used for the development of social projects aimed, *inter alia*, at extending telecommunication services to the most isolated areas in countries."

laid down in Article 3 of the Constitution of the ITU.[330] The Internet Society is an ITU-D and ITU-T sector member.

Associates and Academia

Any interested industry, international or regional organization can become Associates on a payment of a fee. University and research organizations can also become members from academia. HMR Institute of Technology Management, New Delhi and Sinhgad Technical Education Society, Pune are academia members at ITU from India. The Associates can participate in Study Groups which will be explained below. Each sector convenes study groups in order to support and carry out research and study related to the three sectors of the ITU. They are also responsible for the formulation of the draft recommendations. Companies such as Ericsson and Samsung are associate members of the ITU.

Structure of the International Telecommunication Union

The ITU has certain bodies which are convened as per the Constitution. The Plenipotentiary Conference is convened every four years which decides upon the future mandates of the ITU. Similarly the world conferences on international telecommunication are convened as decided upon in the Plenipotentiary Conference. Although these bodies are not permanent, they play a major role in functioning of the ITU.

The structure of the International Telecommunication Union is laid down under Article 7 of the Constitution of the ITU. According to Article 7, the ITU comprises of the following mechanisms/bodies:

Other Bodies

ITU Telecom: This acts as the platform for high level debate, networking and knowledge sharing for the global ICT community. It basically tries to drive industrial success and tackle socio-economic problems. The ITU telecom also hosts many annual events where these debates occur.

World Conference on International Telecommunications 2012 **[331]**

The WCIT '12 was held in Dubai. The main agenda for the treaty- level conference was to review and propose changes to the International Telecommunication Regulations (ITRs). One of the key reasons for convening WCIT '12 was to update the treaty as telecommunication has undergone major changes since 1988. Prior to WCIT '12 the ITRs were last negotiated at the World Administrative Telegraph and Telephone Conference (WATTC-88) in Melbourne, Australia.

330. Art. 3, Constitution of the ITU, "In respect of their participation in activities of the Union, Sector Members shall be entitled to participate fully in the activities of the sector of which they are members, subject to relevant provisions of this Constitution and the Convention:
a) they may provide chairmen and vice-chairmen of Sector assemblies and meetings and world telecommunication development conferences;
b) they shall be entitled, subject to the relevant provisions of the Convention and relevant decisions adopted in this regard by the Plenipotentiary Conference, to take part in the adoption of Questions and Recommendations and in decisions relating to the working methods and procedures of the Sector concerned."
331. For more see WCIT-12: Conference Overview, International Telecommunication Union, available at http://www.itu.int/en/wcit-12/Pages/overview.aspx, last accessed on January 28, 2014.

The main purpose of the ITRs is to lay down treaty-level provisions with respect to the coordination and cooperation with international telecommunication networks and services and accounting standards for the international telecommunication services.

Concerns over ITU's takeover of the Internet

One of the major concerns raised during the WCIT '12 was that there was a chance that the language of the updated ITRs would bring the internet within its ambit. There are still differences among the various stakeholder present at WCIT '12 viz. member states, internet and telecom companies, civil society, academicians and other scholars on this issue.

Prof. Milton L. Mueller (see interview below) of the Syracuse University School of Information Studies in his post states that the current draft of the ITRs does not even mention 'Internet' once and should be considered as a victory for internet defenders. Furthermore, there is no language in the treaty which refers to cyber security. Professor Mueller believes that, "there may have been a few subtleties here or there that were not perfect, but on the whole this was a set of ITRs that could have been passed."[332] However, it has also been pointed out there was no consensus at this treaty-level conference as 55 member countries including United States, several European Union Countries and India refused to sign the treaty.

The main reasons for the lack of consensus:

1. *Article 5A and 5B:* Article 5A of the ITRs (as updated at WCIT '12) deals with security and robustness of networks and Article 5-B deals with unsolicited bulk messages or spam. This may be considered as a clause which can be potentially used by Governments to increase censorship and surveillance in the name of 'network security'. India in its submission at the treaty level conference WCIT '12 states that use of the term ICT in the ITRs should be further qualified and should be limited to the physical layer of the Internet.

2. *Resolution 3: To foster an enabling environment for the greater growth of the Internet:* This was considered to be the main reason as to why countries such as US walked out of the WCIT '12 negotiations. The Secretary-General of the ITU had previously assured that there would not be any text in the updated treaty that would have references to internet related public policy.
   Resolution 3 of the finalized ITRs is not legally binding on the member states but it is perceived as a step which would undermine the multi-stakeholder process which has been adopted for internet governance and would allow a greater role of the State with respect to internet related issues.
   However, Professor Mueller disagrees with the above position and states that, "its (Resolution 3) ability to shape the future of Internet governance is minimal. All it means is that a bare majority of states in the ITU want to continue to discuss internet governance in the ITU."[333]

3. *Right of access to international telecommunication services:* The Resolution 3 of the WCIT states that the member countries cannot discriminate among countries insofar as

332. "What really happened in Dubai", *Internet Governance Project*, available at http://www.internetgovernance.org/2012/12/13/what-really-happened-in-dubai/ , last accessed on January 28, 2014.
333. Milton L. Mueller, "ITU Phobia: Why WCIT was Derailed", *Internet Governance Project*, available at http://www.internetgovernance.org/2012/12/18/itu-phobia-why-wcit-was-derailed/, last accessed on January 28, 2014.

access to the international telecommunication services is concerned. This has been considered to be one of the main reason for the United States to back out of the treaty as it puts the position of ICANN in jeopardy. Professor Mueller explains it in the following terms, "Suppose that the US decided to deny domain name root zone resolution to Iran because of its bad human rights record. Suppose it ordered Verisign to remove .IR from the DNS root and make it nonfunctional. Make no mistake about it: the Iranian government is about as bad as it gets with respect to human rights. But would we want ICANN/the Internet governance regime to be used as a political/strategic tool to reform Iran? What happens to global interoperability when the core infrastructure gets used in that way?"[334]

Internet Corporation for Assigned Names and Numbers (ICANN)

Introduction

ICANN is a non-profit public-benefit corporation which is responsible at the overall level, for the coordination of the, "global Internet's systems of unique identifiers, and in particular to ensure the stable and secure operation of the Internet's unique identifier systems."[335] In other words, in order to reach or connect to another computer on the internet, one has to provide the address of the computer.

Such an address must be unique so that the computers are able to locate each other. ICANN is responsible for coordinating these unique identifiers across the globe. ICANN, thus, plays a major role in internet governance.

In technical terms the ICANN coordinates the: domain name system(DNS), internet protocol (IP) addresses, space allocation, protocol identifier assignment, generic (gTLD), country code (ccTLD) top level domain name system management and root server system management functions. These functions were previously performed by the Internet Assigned Number Authority (IANA) under a US Government contract.

History

The Internet Corporation for Assigned Names and Numbers was established on September 18, 1998. Subsequently it was incorporated on September 30, 1988.In June 1998 the US Department of Commerce came out with a white paper on the administration of internet name and numbers. The main purpose of the white paper was to move administration of internet domain names and IP addresses out of the control of US federal government and vest it in a non-profit, internationally representative organization.[336]

Governing Documents

- Articles of Incorporation

ICANN Articles of Incorporation was finalized on November 21, 1988. According to the Article of Incorporation, the main function of the ICANN was laid down as the following:

334. Milton L Mueller, What Really Happened in Dubai www.internetgovernance.org/2012/12/13/what-really-happened-in-dubai/ , last accessed on January 28, 2014.
335. Article I, Bylaws for ICANN (As amended on March 16, 2012) available at https://www.icann.org/en/about/governance/bylaws/bylaws-16mar12-en.htm , last accessed on January 29, 2014.
336. Milton L Mueller, ICANN and Internet Governance| Sorting through the debris of 'self-regulation', Vol. 1, No. 6, Dec. 1999, Camford Publishing Ltd. available at http://www.icannwatch.org/archive/muell.pdf , last accessed on January 29, 2014.

"In furtherance of the foregoing purposes, and in recognition of the fact that the Internet is an international network of networks, owned by no single nation, individual or organization, the Corporation shall, except as limited by Article 5 hereof, pursue the charitable and public purposes of lessening the burdens of government and promoting the global public interest in the operational stability of the Internet by:

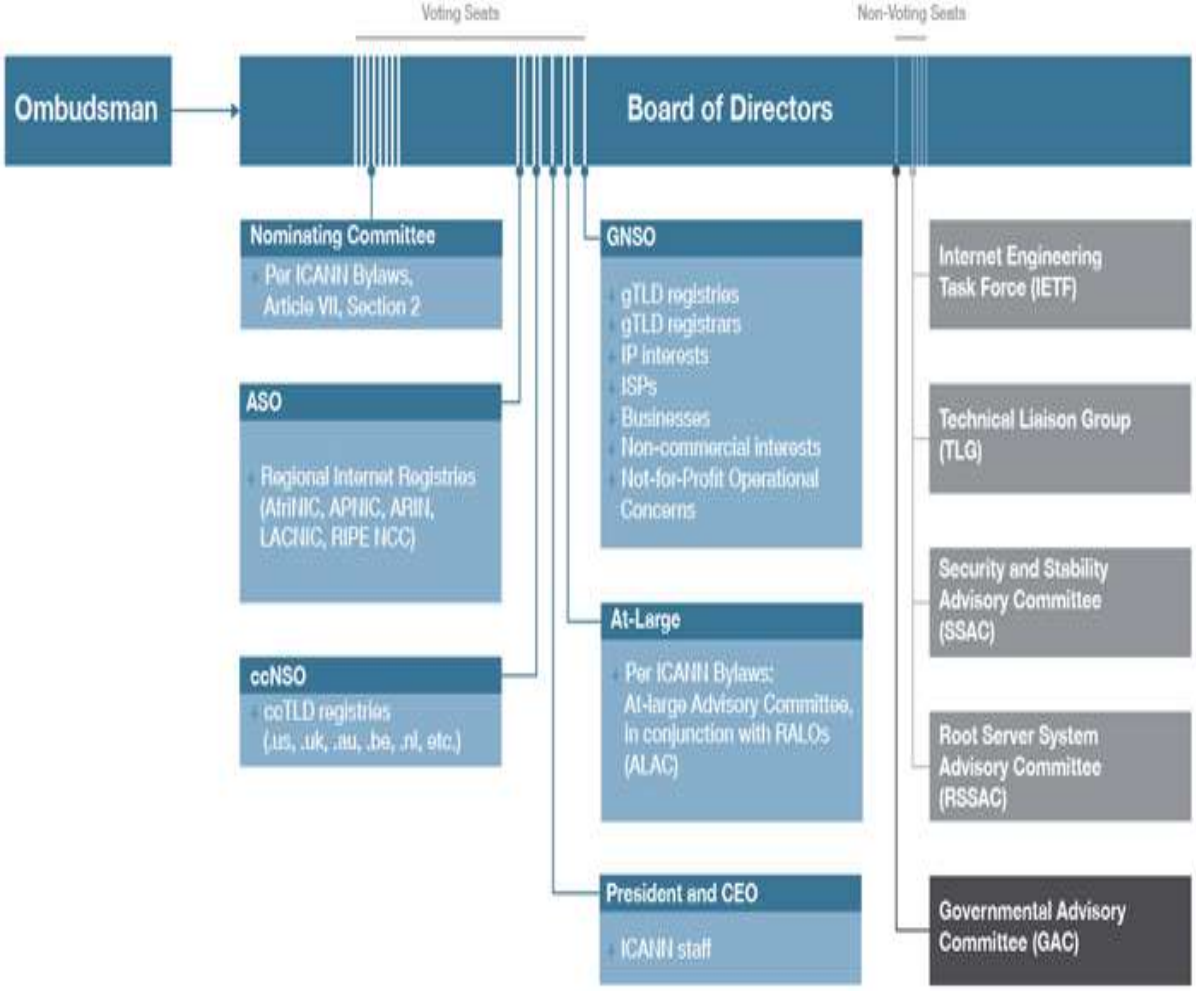
1. Coordinating the assignment of Internet technical parameters as needed to maintain universal connectivity on the Internet;
2. Performing and overseeing functions related to the coordination of the Internet Protocol ("IP") address space;
3. Performing and overseeing functions related to the coordination of the Internet domain name system ("DNS"), including the development of policies for determining the circumstances under which new top-level domains are added to the DNS root system;
4. Overseeing operation of the authoritative Internet DNS root server system; and
5. Engaging in any other related lawful activity in furtherance of items (i) through (iv)."[337]

ICANN By-Laws

The by-laws outline the powers and responsibilities of the ICANN by laying down its mission and core values. It also establishes the offices of the Ombudsman (Article V), Board of Directors (Article VI), Nominating Committee (Article VII), Address Supporting Organization (Article VIII), Country Code Name Supporting Organization (Article IX), Generic Name Supporting Organization (Article X) and Advisory Committees (Article XI). It also lays down guidelines related to fiscal matters, membership, offices and seal and the procedure for amendment of by-laws.[338]

337. Articles of Incorporation, ICANN as revised on November 21, 1988 available at https://www.icann.org/en/about/governance/articles , last accessed on January 29, 2014.
338. By-Laws for ICANN as amended on December 20, 2012 available at https://www.icann.org/en/about/governance/bylaws , last accessed on January 29, 2014.

Structure of the ICANN[339]



As per ICANN, it has adopted a bottom-up, consensus driven, multi stakeholder approach. The ICANN currently comprises of three supporting organizations and four advisory committees apart from the Board of Directors and Other Advisory Committees.

Board of Directors

The Board of Directors comprises of 16 members ("Directors") who have voting rights. Additionally it has five non-voting liaisons. The five liaisons appointed by Governmental Advisory Committee, Root Server and Stability Advisory Committee, Technical Liaison Group and Internet Engineering Task Force. Each body appoints one liaison member. The Directors are expected to act in the best interest of ICANN rather than acting in the best interest of the entity they have been selected from. The main function of the Board of Directors is to put to vote various policy recommendation made by the Supporting Organizations and the Advisory Committees.

Supporting Organizations

The Supporting Organizations are Address Supporting Organization, Country Code Name Supporting Organization and Generic Name Supporting Organization. They are tasked with policy making on IP Addresses, country code top level domain and generic top level domain respectively.

339. See ICANN organisation chart at http://www.icann.org/en/groups/chart, last accessed on January 29, 2014.

Advisory Committees

ICANN also takes into consideration suggestions and recommendations from the Advisory Committees. This also assists the ICANN to make note of the demands and interests of the stakeholders, who do not participate in the Supporting organizations. The four Advisory Committees are:

1. Governmental Advisory Committee (GAC) – The GAC is composed of representatives from the national governments across the world.
2. Security and Stability Advisory Committee (SSAC) – The SSAC comprises of cyber security experts tasked to study security issues related to ICANN's mandate.
3. Root Server System Advisory Committee (RSSAC) – The RSSAC also comprises of technical experts who provides recommendation and advise on the operation of the DNS root server system.
4. At-Large Advisory Committee (ALAC) – The ALAC consists of representatives from the organizations of individual internet users. The main function of the ALAC is to "consider and provide advice on the activities of ICANN, insofar as they relate to the interests of individual Internet users"[340]
5. Internet Engineering Task Force (IETF)- Discussed below.
6. NRO- Number Resource Organization- It is a body that co-ordinates the 5 Regional Internet Registries that manage the distribution of Internet number resources. These include IP addresses and the Autonomous System Numbers.
7. Nominating Committee (NomCom)- This committee invites Statements of Interest and candidate recommendations from the Internet community to fill important leadership positions to carry out ICANN's role in technical and policy coordination.

Other Advisory Mechanisms

The other Advisory Mechanisms are put in place in order to seek expert advice on ICANN's policy development and setting of technical standards. The two Other Advisory Mechanisms are: (i) External Expert Advice and (ii) Technical Liaison Group.

Amongst its many accomplishments ICANN in collaboration with Verisign and National Telecommunication and Information Administration (US) completed the deployment of the Domain Name System Security Extensions for the root zone. The ICANN has also been successful in setting up of a cost-effective Uniform Domain Name Dispute Resolution Policy which has been efficient in solving domain name disputes.

ICANN has commissioned a picture called "Who Runs the Internet?" This picture, however, doesn't take into account the economic ownership of the internet. We have made a similar picture that attempts to show a different view of the ownership of the internet.

World Intellectual Property Organization

WIPO is a specialized agency of the United Nations which deals with issues related to intellectual property rights throughout the world. Under Article 3 of the Convention Establishing the World Intellectual Property Organization, the United Nation agency seeks to

340. Article XI, By-Law for ICANN available at www.icann.org/en/about/governance/bylaws#XI , last accessed on January 29, 2014.

"promote the protection of intellectual property throughout the world through cooperation among State..."[341]

With the proliferation of the internet, issues related to copyright have become more and more prominent. Internet has made sharing of content easy and efficient. It has also opened up avenues for e-commerce, sale and purchase of music, movies, e-books and other related content. In India, special music services and video services are made available to mobile users by the telecom service providers as value added services through internet technologies such as wireless access protocol (WAP) and general packet radio service (GPRS). Moreover, business models such as iTunes and Flyte consumers to download MP3 music for a fee. In this context, digital copyright has become an important topic of discussion.

Copyright law has faced difficulties coping up with digital technologies and especially the internet. Enforcing copyright has been a tough task, given that protected works can be easily shared and transferred through the internet. In order to adjust the legal system to be in consonance with the latest technological developments the WIPO has laid down two treaties which are known as Internet Treaties. They are WIPO Copyright Treaty (WCT) and WIPO Performances and Phonograms Treaty (WPPT). These two treaties are considered to be the updates and supplements to the Berne Convention for the Protection of the Literary and Artistic material.

"The WIPO Internet Treaties are designed to update and supplement the existing international treaties on copyright and related rights, namely, the Berne Convention and the Rome Convention. They respond to the challenges posed by the digital technologies and, in particular, the dissemination of protected material over the global networks that make up the Internet. The contents of the Internet Treaties can be divided into three parts: (1) incorporation of certain provisions of the Trade Related Intellectual Property Rights Agreement (TRIPS) not previously included explicitly in WIPO treaties (e.g., protection of computer programs and original databases as literary works under copyright law); (2) updates not specific to digital technologies (e.g., the generalized right of communication to the public); and (3) provisions that specifically address the impact of digital technologies."[342]

Treaties

Berne Convention[343]:

The Berne Convention was first accepted in 1986. It was an international agreement that sought to govern copyrights. Its basic purpose was to make the signatories recognize the copyrights of the works of authors of other signatory countries at the same level as copyrights in their own countries. The three step test is a test contained in different forms in a few international treaties on copyright law. It provides a limit on the exceptions and limitations that a treaty member can provide under its domestic law. However, the Three Step Test was first laid down in Article 9 of the Berne Convention and it states:

341. Article 3 – Objectives of the Organization, Convention Establishing the World Intellectual Property Organization, available at http://www.wipo.int/treaties/en/convention/trtdocs_wo029.html, last accessed on January 29, 2014.
342. The Impact of the Internet on Intellectual Property Law, *World Intellectual Property Organisation*, available at www.wipo.int/copyright/en/ecommerce/ip_survey/chap3.html#3a , last accessed on January 29, 2014.
343. For more see Berne Convention for the Protection of Literary and Artistic Works, *World Intellectual Property Organisation*, available at http://www.wipo.int/treaties/en/ip/berne/trtdocs_wo001.html, last accessed on January 29, 2014.

It shall be a matter for legislation in the countries of the Union to permit the reproduction of such works in certain special cases, provided that such reproduction does not conflict with a normal exploitation of the work and does not unreasonably prejudice the legitimate interests of the author.

There are two divergent views on the limitations to copyright. Civil law sees copyright as a natural law right, meaning that an author already has the right to his work, and the law merely recognises it. Hence, civil law limitations to rights tend to be narrow. Common law adopts a utilitarian approach and advocates use of common law principles to spur creation of socially valuable works. In pursuance of such socially beneficial measures, Common law limitations are open ended.1When the three step test was first conceived, it was to reconcile these divergent views of copyright limitations. So, at its core was the aim to allow national legislations sufficient latitude with regard to limitations. The effects of this treaty are enormous in that it affects the accessibility of almost every book or movie online for the average internet user.

The Standing Committee on Copyright and Related Rights (SCCR) was set up in 1998-1999 in order to examine issues of substantive law or harmonization in the field of copyright and rights related to copyright. The committee is comprised of all the member states of WIPO. However, intergovernmental and non-governmental organizations only have observer status.[344]

WIPO Performances and Phonograms Treaty (WPPT), 1996[345]:
The WPPT benefits primarily two different kinds of people:

1. "Performers (actors, singers, musicians, etc.), and
2. Producers of phonograms (the persons or legal entities who or which take the initiative and have the responsibility for the fixation of the sounds)."

The purpose of the Treaty was to protect the rights of performers and producers of phonograms in the most effective and uniform manner possible without making void contractual obligations that pre-date the treaty. The Treaty grants performers four different kinds of economic rights in their performances fixed in phonograms:

1. "The right of reproduction,
2. The right of distribution,
3. The right of rental, and
4. The right of making available."

The term of protection has been agreed for at least 50 years. The Treaty also constituted an Assembly that has the power to decide whether intergovernmental organizations can become party to the treaty.

WIPO Copyright Treaty:[346]
The WCT was adopted in 1996 by 89 countries. After many advances were made in information technology since the formation of previous copyright treaties, this treaty attempted to add protections for copyrights. Mainly it ensures that computer programs were protected as literary

344. For more see Standing Committee on Copyright and Related Rights (SCCR), *World Intellectual Property Organisation*, available at http://www.wipo.int/policy/en/sccr/, last accessed on January 29, 2014.
345. For more see "Summary of the WIPO Performances and Phonograms Treaty (WPPT) (1996)", *World Intellectual Property Organisation* available at http://www.wipo.int/treaties/en/ip/wppt/summary_wppt.html, last accessed on January 29, 2014.
346. For more see WIPO Copyright Treaty, available at http://www.wipo.int/treaties/en/ip/wct/trtdocs_wo033.html, last accessed on January 29, 2014.

works (Article 4) and also that the arrangement and selection of material in databases is protected (Article 5). It bolsters the protection further by providing authors with control over the rental and distribution of their work according to Article 6 to 8 which wasn't directly prevalent in the Berne Convention. Many theorists feel that it is far too broad and offers too much protection to the copyright holder. For example, the circumvention of technical protection measures in pursuit of legal and fair use rights can be prevented because it is prohibited in this treaty. It also applies a uniform standard to all the signatory countries even though they are all at different stages of economic development and knowledge industry.

Protection of Broadcasts and Broadcasting Organizations Treaty:
In 2006, the WIPO Standing Committee on Copyright and Related Rights (SCCR) made a basic proposal to develop protection rights for all broadcasting organizations. This treaty would allow broadcasting organizations like media broadcasters to protect the content of their transmissions. They basically will have the right to protect their transmissions from reproduction, retransmission and even from public communication and will retain the copyright protection for 50 years. The problem with this treaty is that is adds a layer protection to the copyright that already exists on the material that is being broadcasted. This would allow broadcasters to restrict access to works that are currently available in the creative commons just because they happened to transmit it. This means that the average citizen could now find them self-unable to access works that they could previously access. The easier and fair way of solving the problem that broadcasters face, which the piracy of broadcast signals would have been to criminalize the piracy at an international level, many NGO's are currently arguing.

Treaty Proposal on Copyright Limitations and Exceptions for Libraries and Archives:
The International Federation of Library Association (IFLA) is currently working closely with the member states of WIPO in order to draft a binding international instrument for copyright limitations and exceptions. These exceptions and limitations are necessary for the libraries to preserve their collection, lend materials and facilitate/ support education and research. This treaty proposal is mainly being drafted by NGO's and civil society actors in partnership with librarians and intellectual property experts. IFLA has collaborated with the International Council on Archives (ICA), Electronic Information for Libraries (EIFL) and Corporación Innovarte to produce the Treaty Proposal on Copyright Limitations and Exceptions for Libraries and Archives[347]
Some of the things that the treaty proposes are:

1. Parallel importation (i.e. buying books from abroad)
2. Cross-border uses of works and materials reproduced under a limitation and exception
3. Library lending
4. Library document supply
5. Preservation of library and archival materials
6. Use of works and other material under related rights for the benefit of persons with disabilities
7. Use of works for education, research and private study
8. Use of works for personal and private purposes
9. Access to retracted and withdrawn works

347. For more see Treaty Proposal on Limitations and Exceptions for Libraries and Archives, International Federation of Library Associations and Institutions, available at http://www.ifla.org/files/assets/hq/topics/exceptions-limitations/documents/TLIB_v4.3_050712.pdf,last accessed on January 29, 2014.

10. Orphan works[348]

348. For more see “Treaty Proposal on Copyright Limitations and Exceptions for Libraries and Archives”, IFLA, available at http://www.ifla.org/node/5856, last accessed on January 29, 2014.

Education

There is another treaty being discussed currently on copyright exceptions for education and research. The main issue is deciding the order in which these treaties will be negotiated and which matter is most pressing or urgent to address presently. Developing countries are in favor of both exceptions for libraries and archives as well as for education while developed countries are of the mind that exceptions for these things already exist in the current framework of international treaties and conventions. The US is expressly opposed to more discussions on more copyright exceptions and wants to move forward on the broadcast treaty discussions. Electronic Frontier Foundation, Knowledge Ecology International, Public Knowledge along with other civil society groups formed a joint statement for the copyright exceptions for education in the digital age:

"(...) Education should be accessible for all without barriers of space, time, or cost. Digital technologies, from the portable computer to mobile phones to tablets, are being introduced as crucial educational tools in countries ranging from South Korea to Nigeria, from Brazil to the USA. Educational materials and, therefore, its market, is increasingly becoming digital and policymakers must consider this trend when drafting copyright exceptions and limitations in a way that is appropriate for future generations and the digital age.

The increasing adoption of Information and Communication Technologies (ICTs) in the classroom and in libraries and archives has proven that teachers, learners, researchers, librarians and archivists need rights to access, use, remix, text-mine, exchange, and collaborate on educational materials. Similar rights must be ensured beyond the classroom and library or archive, taking into account the growing importance of e-learning, online communication, and the increasing practice of exchanging educational and other information content across geographical and institutional borders.

The international copyright system has recognized the need for exceptions and limitations from its earliest days. Without these, the copyright system would not be able to achieve its fundamental purpose of encouraging creation and innovation for the benefit of all humankind. (...)"[349]

Case Study: WIPO

In June 2013, 186 member states of the WIPO adopted a landmark treaty known as the Treaty for the Visually Impaired (Formally known as: "Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled.") [The United Nations. World Intellectual Property Organization. Historic Treaty Adopted, Boosts Access to Books for Visually Impaired Persons Worldwide. Marrakesh: 2013. Web.] The purpose of the treaty was to increase the access to books for blind, visually impaired and print disabled people across the globe.

Aspects of the Treaty:

1. It required an exception in domestic copyright law for people with print disabilities and the visually impaired.
2. It allowed for the import and export of accessible versions of books without the permission of the copyright holder.

349. See Civil Society statement on Exceptions and Limitations for Education WIPO 24th SCCR, Geneva, 16 – 24 July 2012, available at https://www.eff.org/file/35218#page/1/mode/1up, last accessed on January 29, 2014.

3. However, only “authorised entities” such as blind peoples organizations can avail this provision under the treaty’s terms.
4. Article 2 of the Treaty states that accessible books changing hands under its provisions should be solely for the use of “beneficiary persons”. It also states that “authorised entities” take “due care” when handling these books, and that they discourage the reproduction and distribution of copies that are unauthorized

This treaty has the potential to change the way in which access to information is experienced by the visually impaired. This shows that civil society actors can take an active part in the drafting of important legislation as such a landmark treaty was originally proposed by the World Blind Union and Knowledge Ecology International after a meeting that was convened in 2008. There was input sought from NGO’s throughout the process as well

After the adoption of the treaty, however, the function of NGOs just increases. There are many steps required in order to ensure the effective implementation of the provisions of the treaty on the ground. Saksham Trust is one such NGO that works towards empowering marginalized sections of society by working on things like this. The following is an interview with Mr. Dipendra Manocha of Saksham Trust.

Q: What kind of work in accessibility does your organization do?
A: DAISY forum of India is a network of organisations that produce and distribute books in accessible formats to persons with print disabilities. These organisations produce digital e-text and digital talking books. The organisation works in the area of Policy, capacity building, awareness, technology and Mainstreaming accessibility in the area of books for persons with print disabilities.

Q: What are the main impediments to ensuring accessibility on the ground?
A: Our policies and laws do not make it mandatory to use standards for digital content. Standards such as Unicode, accessible digital formats etc. are not followed in production of digital content. Due to this we are forced to re-publish everything that gets published in India.Books that are available as accessible content in other countries cannot be brought in India. We also cannot send books in accessible format to other countries with common Languages.Enough resources are not allocated to produce accessible books for persons with print disabilities.There are several technology gaps such as non-availability of TTS or OCR in Indian languages due to which production and reading options of accessible books is very expensive. The only option of reading in many languages is hard copy Braille or human voice recorded talking books. Both these are much more expensive than reading of digital e-text with the help of text to speech technology. Organisations and individuals in large parts of the country are not aware of latest developments and methods of getting accessible content from common catalogue or online libraries etc.Reading technology has not reached the end users of the country in a large scale.Main stream publishing industry is producing digital books but these are produced in a way that they are not usable by persons with print disabilities.

Q: How important do you think treaties are?
A: These are extremely important as it takes best practise model of accessible books all over the world. Various stake holders came together thinking and working together to find th best possible solution that takes care of the interests of all stake holders.

Q: Not even 2% of the blind individuals worldwide have sufficient access now. Countries like Namibia don’t even have a basic infrastructure to implement what the Treaty for the

Visually Impaired offers. Therefore, in these places, what are the subsequent steps that an organization like yours has to do after the treaty enables?
A: Allocate resources to establish infrastructure for distribution providing sufficient protection to content to enable developing countries to participate in international exchange programme.Develop mechanisms for international exchange of content. Address technology gaps so that local language content can be produced and read by persons with print disabilities. The developed world will act according to its commercial interests.

Q: Most of the knowledge is produced in the developed countries and most of the disabled are in developing countries. What are ways to make this equation seem more lucrative?

A: South-south cooperation: Even relatively smaller subscriptions and remunerations for already developed content will be additional resource of funds even for companies or organisations of developed countries if they begin distribution of their content in developing countries.

Technological Protection Measures and Rights Management Information
In order ensure that unauthorized copying of a protected material can be prevented or detected, the WIPO Copyright Treaty (WCT) included new provisions dealing with TPMs and RMI.

TPMs are technological safeguards which are put in place which prevents the copying of a protected work in digital format to be copied multiple times. This includes limiting the number of devices on which a song can be copied, using software which does not allow the consumer to copy the protected works from an optical disc.

RMI are generally put on the protected work to ensure that the label of the owner of the work is always embedded in the work. For example, in case of a movie, the film studio may use an RMI which would be positioned as the logo in the movie. It can be also stored as metadata along the video or the protected work.

Article 11 of the WCT and Article 18 of the Wipo Performances and Phonograms Treaty, 1996, (WPPT) states that the States must provide legal protection for TPMs and RMI apart from making provisions for legal remedy in case of circumvention of the technological protection measures. It is interesting to note that India is not a signatory to both the treaties that is WPPT and WCT. This could be because of the strict copyright provisions in the treaties which undermine many goals of accessibility currently being pursued by the India.

70,000,000

print-disabled people in India. Highest in the world.

99.5%
Of the books in india are **not available** to the print-disabled

Book Famine
causes the exclusion of people with this disability from education systems, thus limiting their career choices.

There are **no national policies / plans to ensure that books in accessible formats** in all Indian languages are available to people with this disability.

To remedy this, CIS helped with the Indian activities for the global "**Right to Read**" campaign which aimed at reform of both national & international copyright laws to aid visually impaired and print-disabled persons.

THE IMPACT IN INDIA
it was a great success with India now having one of the most progressive exceptions for per- sons of disabilities anywhere in the world [(with section 52(1) (zb) of the Copyright Act of non-profit use, and compulsary licensing under Section 31D for for-profit use)]

IMPACT ACROSS THE WORLD
it has proven more difficult. We and the Indian Government have been pushing hard for a treaty for the visually impaired and it's currently in its final stages with a diplomatic conference set for June 2013.

CIS works both nationally and internationally (at the World Intellectual Property Organization, a UN body) to help reform laws and policies that affect access to knowledge.

CIS's submission to the Parliamentary Standing Committee on the Copyright Amendment Bill (on behalf of 21 organizations) was the only general submission from civil society, and carried on from previous work by the Alternative Law Forum. Here's our analysis of the Act, after it was passed.

Good

- Blind people and their friends can now convert books without permission (if not for profit)
- You have 'fair dealing' rights (such as for personal use) for all copyrighted works
- Creative Commons and open licensing (like free software licences) have more legal certainty now
- Libaries can now save electronic copies of books, etc., and perhaps even lend them.
- Some Internet intermediaries (which engage in "transient or incidental storage", like search engines) are now no longer illegal.
- Compulsory licensing is now applicable to foreign works too, and not just Indian works.

Bad

- All photographs are now copyrighted for a few decades more: their 60 year term now starts from death of the author, instead of publication of photo. No photographer asked for this. This will hurt Indian Memory Project, and other such archives of old photos.
- All the people who created versions of Kolaveri Di are still regarded as criminals.
- Majority of video lending libraries remain illegal
- Digital locks now have legal protection in India, which they shouldn't; but at least our law is better than the US law on this. Buying books from abroad ("parallel importation") is still legally uncertain.
- Grandchildren of dead authors can now prevent use of out-of-copyright works, even if the authors wouldn't have minded.
- There's now backdoor to censorship using copyright law, with new content removal provisions being added.

Missed Opportunities

- Violating copyright is still a crime (punishable by jail), not just a civil wrong
- Fair dealing provisions are still narrow, and we don't have a general exception (as they do in the USA)
- Internet intermediaries are still not protected for infringement by their users (so YouTube can be deemed illegal).
- Taxpayer-funded government works still aren't free for taxpayers to use. Distance and digital education are still of questionable legality.

A2K

Access to knowledge is a programme to promote the fundamental principles of justice, freedom & economic development. It deals with reform of the laws & policies around copyright, patents & trademarks which are an important part of the digital landscape.

Internet Engineering Task Force

The Internet Engineering Task Force (IETF) is an open standards body with no requirements for membership and does not have a formal membership process either. It is responsible for developing and promoting Internet Standards. Internet Standards are technological specifications which are applicable to the internet and internet access. The IETF also closely works with the World Wide Web Consortium (W3C) and other standard setting bodies. It mainly deals with the standards of the Internet Protocol suite (TCP/IP) which is a communication protocol used for Internet.

The mission of the IETF is to, "produce high quality, relevant technical and engineering documents that influence the way people design, use, and manage the Internet in such a way as to make the Internet work better."[350]

Structure

The IETF consists of working groups and informal discussion groups. The subject areas of the Working Group can be broadly divided into the following categories:

1. Applications
2. General Internet
3. Operations and Management,
4. Real-time Applications and Infrastructure,
5. Routing,
6. Security, and
7. Transport

The working groups are divided into, areas as mentioned above and they are managed by Area Directors.

IETF Standards Process

The process of developing Standards at the IETF looks simple but faces certain complications when put into practice.

A specification for a internet standards goes through a period of development followed by reviews by the community at large. Based upon the reviews and experiences, the specifications are revised and then the standards are adopted by the appropriate body after which it is published.

"In practice, the process is more complicated, due to (1) the difficulty of creating specifications of high technical quality; (2) the need to consider the interests of all of the affected parties; (3) the importance of establishing widespread community consensus; and (4) the difficulty of evaluating the utility of a particular specification for the Internet community."[351]

The main goals of the Internet Standards Process are:

1. Technical excellence;
2. Prior implementation and testing;
3. Clear, concise, and easily understood documentation;
4. Openness and fairness; and

350. See Mission Statement for the Internet Engineering Task Force available at http://www.ietf.org/rfc/rfc3935.txt, last accessed on January 29, 2014.
351. The IETF Standards Process, *Internet Engineering Task Force*, available at http://www.ietf.org/about/standards-process.html, last accessed on January 29, 2014.

5. Timeliness[352]

World Wide Web Consortium
W3C is a multi-stakeholder organization that involves groups from various sectors including multi nationals. W3C is also an international community dedicated to developing an open standard, "to ensure the long term growth of the web". It is led by the inventor of the web Tim Berners-Lee.

The guiding principles of W3C[353] are:

Web for All
The W3C recognizes the social value of the Internet as it enables communication, commerce and opportunities to share knowledge. One of their main goals is to make available these benefits to all irrespective of the hardware, software, network infrastructure, native language, culture, geographical location, or physical or mental ability

Web on Everything
The second guiding principle is to ensure that all devices are able to access the web. With the proliferation of the mobile device and smart phones; it has become more important to ensure access to the web irrespective the type of device.

Web for Rich Interaction
The W3C Standards support and recognizes that the web was created as tool to share information and it has become more significant with the increasing demand for platforms such as Wikipedia and social networking platforms.

Web of Data and Services
Web is often viewed as a giant repository or data and information but it is also seen as a set of services which includes exchange of messages. The two views complement each other and how web is perceived depends on the application.

Web of Trust
Interaction on the web has increased and people 'meet on the web' and carry out commercial as well as social relationships. "W3C recognizes that trust is a social phenomenon, but technology design can foster trust and confidence." [354]

Unit 17: Multi-stakeholder Mechanisms in Internet Governance

This module will deal with:

1. Origins of the Internet Governance Forum and the events which led to its creation
2. The mandate of the IGF and its role in the management of internet related public policy.
3. It will also briefly deal with regional IGFs

352. Ibid.
353. W3C Mission, W3C, available at http://www.w3.org/Consortium/mission, last accessed on January 29, 2014.
354. Ibid.

World Summit on Information Society

The United States had the control over internet resources and its administration was controlled by the National Telecommunications and Information Administration. This was the principle agency in the US dealing with telecommunication and information policy and the ICANN managed the internet domain names and IP addresses. ICANN and indirectly the US government having control over the domain name system and the internet registry was an issue of concern for the rest of the world as well international organizations. The proposal for the WSIS by the United Nations was the reaction to such a concern.

Origins of the WSIS

The World Summit on Information Society was first proposed by the International Telecommunication Union in 1998. The main focus of the WSIS was to address issues related to the global digital divide. However, the scope of the WSIS was broadened later to include internet related public policy issues. The UN General Assembly approved the Summit in 2001[355] which was to be held in two phases. The first phase was held in Geneva from December 10-12, 2003 and the second phase was held in Tunis from November 16-18, 2005. The main aim of the Geneva Summit was to lay down a road map to building an information society accessible to everyone. The Tunis Agenda was more on the lines of developing a mechanism or framework which would be effective in dealing with management of the internet public policy issues.

Main Goals of the WSIS

At the beginning the main objective of the WSIS was to discuss issues on building better telecommunication and information infrastructure in the developing nations to bridge the digital divide. The self adopted purpose of the WSIS was, "to harness the potential of knowledge and technology to promote the development Goals of the Millennium Declaration."[356] However, during the meetings the focus of the WSIS was broadened and it covered not only issues related information infrastructure but also various issues related to communication and other public policy issues such as freedom of speech, privacy, etc.

Geneva Summit

The Geneva Summit saw overwhelming participation from the government, civil society, industry, international organizations and media. 11000 participants attended the Summit.

The Geneva Summit of WSIS was supposed to mainly focus on principles and the Tunis Summit was envisioned to deal with implementation of principles and follow-up mechanisms.

Though the Geneva Summit failed in reaching a consensus on the issue of the future of internet governance, there were two major outcomes of the Summit; the Geneva Declaration of Principles and Working Group on Internet Governance (WGIG).

Geneva Declaration of Principles and Plan of Action

355. Resolution adopted by the General Assembly, United Nations, *International Telecommunication Union*, A/RES/56/183 (January 31, 2002) available at http://www.itu.int/wsis/docs/background/resolutions/56_183_unga_2002.pdf , last accessed on January 29, 2014.
356. For more see World Summit on the Information Society, International Telecommunication Union, available at http://www.itu.int/osg/spu/wsis-themes/UNMDG/index.html, available at January 29, 2014.

The Plan of Action focused on information and communication infrastructure and recognized it as the essential foundation of the information society. It also emphasized on the importance of access to knowledge, capacity building and building of an enabling environment. It was also cognizant of cultural diversity and identity, linguistic diversity and development of local content.

One of the key features of the Geneva Summits was that it recognized the principles of multi-stakeholderism. The Geneva Declaration of Principles while recognizing the principles of multi-stakeholderism stated,

"Governments, as well as private sector, civil society and the United Nations and other international organizations have an important role and responsibility in the development of the Information Society and, as appropriate, in decision-making processes. Building a people-centred Information Society is a joint effort which requires cooperation and partnership among all stakeholders."

The Geneva Declaration of Principles also laid down principles related to role of ICT in development, access, human rights and international and regional cooperation.

Working Group on Internet Governance

The other outcome of the Geneva Summit was the Working Group on Internet Governance. The WGIG was constituted as a result of lack of consensus on the future of internet governance. The WGIG consisted of 40 members and it dealt with issues related to Internet Governance in a broader context. It was headed by Nitin Desai who was appointed as the chairman for the WGIG. The main objective of the WGIG was to "investigate and make proposals for action, as appropriate, on the governance of Internet by 2005." The Working Group was also requested to present a report at the Tunis Summit for consideration and appropriate action for the second phase.

The main functions of the WGIG included:

1. To "Develop a working definition of Internet Governance
2. Identify the public policy issues that are relevant to Internet Governance
3. Develop a common understanding of the respective roles and responsibilities of Governments, existing international organizations and other forums, as well as the private sector and civil society in both developing and developed countries"[357]

The final report of the WGIG divided issues related to Internet Governance in four sections:

1. Infrastructure
2. Privacy, security and safety on the Internet
3. Intellectual property and international trade
4. Development

Tunis Summit

The Tunis Summit resulted in the agreement on the Tunis Commitment, Tunis Agenda for the Information Society and the birth of the Internet Governance Forum. The Tunis Agenda and Tunis Commitment were the consensus statements at the Tunis Phase of WSIS where as the

357. Château De Bossey, "Report of the Working Group on Internet Governance" pp. 3, *WGIG*, available athttp://www.wgig.org/docs/WGIGREPORT.pdf, last accessed on January 29, 2014.

Internet Governance Forum was created as a multi-stakeholder platform for policy dialogue on internet related public policy matters.

The Tunis Commitment confirmed the agreement on Declaration of Principles among the stakeholders as well as reaffirmed the Plan of Action.

Tunis Agenda
The Tunis Agenda recognized the need to, "move from principles to action, considering the work already being done in implementing the Geneva Plan of Action and identifying those areas where progress has been made, is being made, or has not taken place."[358] It also reaffirmed the, "commitments made in Geneva and build on them in Tunis by focusing on financial mechanisms for bridging the digital divide, on Internet governance and related issues, as well as on implementation and follow-up of the Geneva and Tunis decisions."

The two other important parts of the Tunis Agenda were sections on:

- Financial mechanisms for meeting the challenges of ICT for development
  This part of the Tunis Agenda generally focussed financing infrastructure and equipment for providing better access to the internet in the developing areas.

- Internet Governance
  The section on Internet Governance dealt with management of the internet in a multilateral, transparent and democratic process with full involvement of governments, the private sector, civil society and international organizations.

Article 35[359] of the Tunis Agenda reaffirmed that the management of the internet shall take place in an inclusive and consultative process.

The third and the most important outcome of the Tunis Summit was the creation of the Internet Governance Forum. It was set up under Article 72 of the Tunis Agenda. The next section will deal with the Internet Governance Forum.

Internet Governance Forum
Introduction
The Internet Governance Forum can be best described as the Forum which brings "people together from various stakeholder groups as equals, in discussions on public policy issues relating to the Internet. While there is no negotiated outcome, the IGF informs and inspires those with policy-making power in both the public and private sectors. At their annual meeting delegates discuss, exchange information and share good practices with each other.

The IGF facilitates a common understanding of how to maximize Internet opportunities and address risks and challenges that arise.

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358. Introduction, Tunis Agenda for the Information Society, WSIS-05/TUNIS/DOC/6(Rev. 1)-E, November 18, 2005 available at http://www.itu.int/wsis/docs2/tunis/off/6rev1.html, last accessed on January 29, 2014.
359. "Policy authority for Internet-related public policy issues is the sovereign right of States. They have rights and responsibilities for international Internet-related public policy issues. The private sector has had, and should continue to have, an important role in the development of the Internet, both in the technical and economic fields. Civil society has also played an important role on Internet matters, especially at community level, and should continue to play such a role. Intergovernmental organizations have had, and should continue to have, a facilitating role in the coordination of Internet-related public policy issues. International organizations have also had and should continue to have an important role in the development of Internet-related technical standards and relevant policies."

The IGF is also a space that gives developing countries the same opportunity as wealthier nations to engage in the debate on Internet governance and to facilitate their participation in existing institutions and arrangements. Ultimately, the involvement of all stakeholders, from developed as well as developing countries, is necessary for the future development of the Internet."[360]

Creation of IGF

As it has been mentioned, the Internet Governance Forum was first conceived in the Tunis Agenda. Article 72 of the Tunis Agenda laid the foundation of the Internet Governance Forum. The Article 72 lays down the mandate of the IGF. It asks the UN Secretary General to put in place an open and inclusive process and to convene a new forum for multi-stakeholder policy dialogue which would be known as *Internet Governance Forum* (IGF).

Past IGFs

The first IGF was organized in 2006 in Athens. Since then it has been held each year in various locations. In has been held in Rio de Janerio in 2007, Hyderabad in 2008, Sharm El Sheikh in 2009, Vilinius in 2010, Nairobi in 2011 and Baku in 2012. The IGF in 2013 is to be held in Bali.

Overarching themes at IGFs so far:
2006 and 2007 – "Internet for development"
2008 – "Internet for All
2009 – "Internet Governance and creating opportunities for all"
2010 – 'Developing the Future together"
2011 – "Internet as a catalyst for change: access, development, freedoms and innovation" 2012 – "Internet Governance for Sustainable Human, Economic and Social Development".

The 2013 IGF has found strong support for two themes, "Building Bridges" and "Enhancing Multi-stakeholder cooperation for growth, development and human rights".

Apart from the over-arching themes, it focuses on certain themes which have been discussed across all the IGFs:

1. Human Rights/ Freedom of speech
2. Security, Cybercrimes
3. Spam
4. Data protection and privacy
5. Consumers Rights, Network Neutrality
6. Intellectual Property Rights
7. Development (issues related to digital divide)
8. Open Standards
9. Capacity Building
10. Issues related processes and priciples
11. E-commerce and e-governance

Structure of the IGF

The Secretariat of the IGF is based in the United Nations. The main function of the IGF is to coordinate with and assist the work of the Multistakeholder Advisory Group (MAG). The

360. What is Internet Governance Forum available at http://bit.ly/1eUJRl9 , last accessed on January 29, 2014.

Advisory Group to the IGF is known as the Multistakeholder Advisory Group. The MAG was first set up by Kofi Anan, Secretary General of UN in 2006. The main function of the MAG is to decide upon issues and themes which need to be addressed in each IGF. The MAG comprises of representation from all stakeholders and all regions.

During the IGF there are multiples sessions which are held around various issues as mentioned in the earlier section. The forum organizes and accommodates plenary sessions, workshops, open forums and best practices forums.

Dynamic Coalitions: The concept of dynamic coalitions was conceived in the first IGF in Athens, which are informal and issue-specific. It comprises of members from different stake holder groups. Currently there are ten active dynamic coalitions. For example, Dynamic Coalition on Accessibility and Disability, Internet Rights and Principles, Child Online Safety, etc.

Importance of IGF

One of the main critiques of the IGF is that the outcomes of the IGF do not have any binding effect on the participating governments, industry, non-governmental and inter-governmental organizations. But such a process is said to discard the involvement of multi-stakeholder through use of coercive power which is the main feature of government regulation. In this regard, Jeremy Malcolm notes,

"The IGF's output is explicitly "non-binding," which means that the participation of states in the IGF process does not involve the use of coercive power as is a typical feature of government regulation. In fact since the process is to be "multilateral, multi-stakeholder, democratic and transparent" with "full involvement" of "all stakeholders involved in this process," governments do not, at least in principle, enjoy any position of pre-eminence in policy formation through the IGF. Neither should they, if the IGF's legitimacy and effectiveness are to be assured."[361]

Institute of Electrical and Electronics Engineers[362]

The IEEE is a professional association whose primary purpose is to advance technological association. In the engineering sciences, research and technology fields, the IEEE also gives learning opportunities. Some of the programs offered are the IEEE elearning Library, the Education Partners Program, Standards in Education and Continuing Education Units (CEUs). The IEEE is in 333 local sections in 10 geographic locations and has more than 2190 chapter and operates worldwide.

Governing Documents

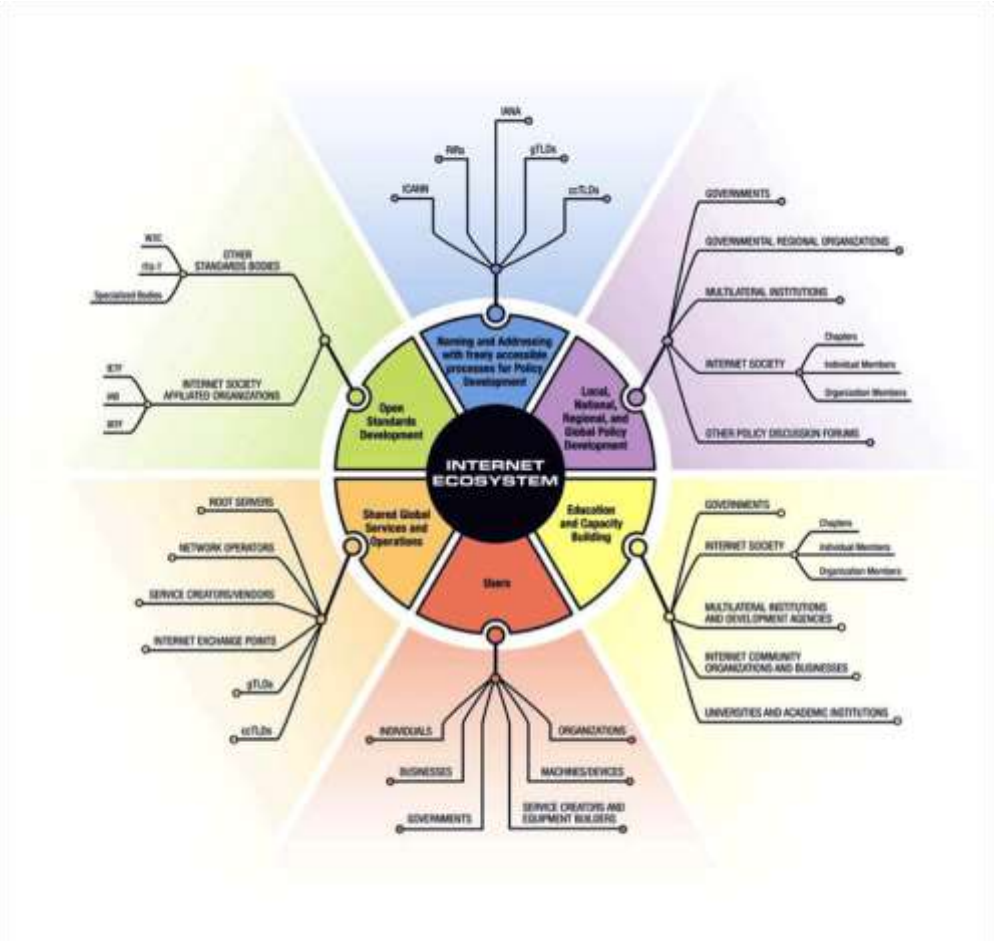
The non-for-profit organizations in New York State are governed by the New York State Non-for-Profit Corporation Laws which classifies the IEEE as a 501 (c)(3) organization. The IEEE Constitution and Bylaws along with the IEEE policies are the highest level governing documents. The Constitution states that "The IEEE shall strive to enhance the quality of life for all people throughout the world through the constructive application of technology in its

361. Jeremy Malcolm, Multi-stakeholder Governance and the Internet Governance Forum, Terminus Press, 2008 at pp. 3

362. "IEEE Society Memberships." *IEEE*, 27 Sep 2013, available at http://www.ieee.org/membership_services/membership/societies/index.html, last accessed on January 29, 2014.

fields of competence. It shall endeavor to promote understanding of the influence of such technology on the public welfare.[363]

Commission on Science and Technology for Development (CSTD)[364]
The CSTD is a subsidiary body of the Economic and Social council (ECOSOC) of the United Nations. The General Assembly (GA), through its resolution 46/235, established the body comprising 43 members. There are ad hoc panels and workshops that meet between Commission's sessions (once a year) and look at science and technology issues for development. This body provides the GA and ECOSOC with policy recommendations or options. Since 1993 the UNCTAD has been responsible for the substantial servicing of the commission. The UNCTAD is in charge of making the annual report on the World Summit on Information Society (WSIS) which it gives to the UN Secretary General for implementation of the results of WSIS and the best practices and guidelines discussed.



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Summary
The original architects of the internet intended the space to be beyond control of any body or governance. However, with its ubiquitous use and the massive use of the internet in many

363. "History of IEEE." *IEEE*, available at http://www.ieee.org/about/ieee_history.html, last accessed on January 29, 2014.
364. For more on CSTD related decisions, see http://unctad.org/en/Pages/CSTD/ECOSOC-Decisions.aspx , last accessed on January 29, 2014.
365. Image from the Netizen Project.

developing countries, many players are fighting over its control. The fear of Internet Governance first began with the World Summit on Information Society in Geneva in 2002. The original intent of the conference was to address the digital divide with better telecom infrastructure but it soon expanded (and many consider diverted) in two chief ways. The ambit of discussion included human rights issues in the context of the internet like the Freedom of Speech and Privacy.

This trend was confirmed by the Working Group on Internet Governance's (WGIG) report by broadening the scope of Internet Governance in their report. This definition went beyond the telecommunication infrastructure and included public policy and technical governance. According to the Geneva Declaration of 2003, internet governance "*should involve all stakeholders and relevant intergovernmental and international organizations.*"

Although the multistakeholder approach seems revolutionary, the public policy role was recognized as the sovereign authority of the state. This notion was then underlined and confirmed by the Tunis Agenda in 2005 which meant that a sectorally-defined multistakeholder system for Internet Governance was established while the traditional forms of State security was still protected from being diluted. Furthermore, the Tunis Agenda called for:"the need for enhanced cooperation in the future, to enable governments, on an equal footing, to carry out their roles and responsibilities, in international public policy issues pertaining to the Internet, but not in the day-to-day technical and operational matters, that do not impact on international public policy issues."

The enhanced cooperation that was called for not only included the framing of public policy issues on values like privacy and freedom of expression but also Critical Internet Resources (CIR).

Due to the sustained problem of ICANN domination as discussed in the introduction and in the section on ICANN, the ITU proposed a Parallel Enhanced Co-operation Model. This basically suggests that the ICANN's oversight function be replaced by a large organization that consists of representatives from countries all around the world. This model would firstly democratize the oversight function as all the governments would have representation. Non State actors, through technical governance, made public policy decisions which rely heavily on private interests while an intergovernmental body would yield that power back to elected representatives. The ICANN regime functions under and is subject to US law and democratizing the process will yield IG to laws that are more global in scope.

However, on an international arena, the State represents its own interest first which include national security and defense which may not be the chief concern of many citizens whose voices will take a backseat under an intergovernmental model. Apart from this, we have to recognize that many governments are not democratically elected which further undermines the claims to representation. Some argue that the layers of bureaucracy will slow down the fast technical changes that are required and sometimes, strong lobbies within governments may work further towards the slowdown. In Ethiopia, the use of VOIP services can be punished for up to 15 years in prison because the State-owned telephone company wants to maintain its monopoly.

To counteract these criticisms, the IGF proposed a parallel enhanced cooperation model for the purpose of ICANN oversight. This model allows all the stakeholders to participate in policy deliberation and policy decision making.This model will act as an efficient check on the power

of the Nation State to control policy decisions, keeping IG an even playing field. This model, however, directly yields the strings in the hands of completely unelected and undemocratic stakeholders like private sector groups that are looked upon as powerful agents already in the process of economic division. Therefore the weightage of the votes would have to be assiduously worked out to reflect need and to make sure that the polar interests can be reconciled without completely stalling the process.

Don't fix what isn't broken, as the saying goes. Another model suggests making ICANN an independent and self-regulating body. This would involve the US government relinquishing its control over the ICANN through the IANA contract and eliminating the Governmental Advisory Committee's (GAC) role. This model brings issues of technical and policy governance closer together since governments generally ignore the technical feasibility of the policies that they propose. The technical community in general feels that without a globally agreed set of principles for technical governance any change in the existing mechanism is unhelpful. However, many critics of this model claim that this gives an inordinate amount of power to the technical community which is closely linked to the private sector and its signals.

These various models of Internet Governance are just a brief summary of what is a substantial subject of debate with many nuances and details. Whatever the course taken in the future, the idea of traditional top down governing mechanisms are and will be consistently challenged by the potential of technology and the internet.

Interviews
Question #1: The extent to which civil society can participate at the proceedings of WCIT'12?

Professor Mueller: I did not attend WCIT-12. Civil society and industry were both influential in the process. CS created a great deal of critical publicity and leaked documents that had formerly been private. Industry and CS both lobbied governmental officials. (I was the first to leak an official ITU document, and this led to the creation of WCIT leaks by some friends of mine who took the idea much farther.)

Professor Malcolm: Actually I did not attend the WCIT'12 in Dubai. I did attend the WTPF in May, but was not permitted to speak. I did distribute a briefing paper by hand and managed to speak to a few delegates. I also contributed some talking points to an intervention by the representatives of the Informal Experts Group (IEG). Undoubtedly the work of the IEG was influential, and the civil society representatives were influential within that group, but the role of the IEG was poorly articulated and its procedures and relationship to the plenary WTPF were quite arbitrary.

Since then, the organization that I represent, Consumers International, has been granted sector membership status of the ITU-T and ITU-D with a waiver of fees, so that next time we will have the opportunity to speak at any meeting that is open to sector members. This is all well and good for us, less so for civil society organisations that do not have expertise in telecommunications and hence would find it more difficult to apply for sector membership.

Questions #2: What were the central debates at the WCIT'12 conference?
Professor Mueller: The central debates were: 1) the relevance of International Telecom Regulations to Internet governance, 2) the ETNO proposal to have quality of service charging 3) role of the ITRs in "security" 4) to which entity do the ITRs apply (Operating entities, recognized operating entities, etc.)

Professor Malcolm: Proposals that ITU Recommendations should have mandatory status; that it should expand its mandate to include ICTs as well as telecommunications; that it should take over Internet naming and numbering functions from ICANN (the Internet Corporation for Assigned Names and Numbers); and that Internet content hosts should share more of their revenue with the operators of telecommunications networks.

Questions #3: What were some good outcomes and what were some bad outcomes?
Professor Mueler: The only truly bad outcome was the way Resolution 3 was passed. But Resolution 3 was nonbinding.

Professor Malcolm: None of these proposals succeeded, and not all even officially made it to the table. With the sustained opposition of the United States, Google and other powerful stakeholders, there was never any likelihood that they would.

What did make it through into the final treaty text are two provisions that, given that they are notionally responsible for the refusal of many countries to sign the ITRs, bear that responsibility like a dwarf wears a baggy suit. First, on security – it's worth setting this out in full:

Member States shall individually and collectively endeavor to ensure the security and robustness of international telecommunication networks in order to achieve effective use thereof and avoidance of technical harm thereto, as well as the harmonious development of international telecommunication services offered to the public.

And on spam:

Member States should endeavor to take necessary measures to prevent the propagation of unsolicited bulk electronic communications and minimize its impact on international telecommunication services. Member States are encouraged to cooperate in that sense.

The theory, though it taxes the imagination somewhat, is that these provisions could allow ITU members to justify constraints on Internet content, on the pretext that they are merely addressing security or spam. But the ITU already has work programs on security and spam, and ITU members in turn already heavily regulate these fields, without having an explicit mandate in the ITRs.

Questions #4: Is the fear of the ITU's takeover of the internet real?
Professor Mueller: There is no sudden UN or ITU effort to take over the Internet. There is, instead, a longstanding struggle between the Net and states at the national and international level. The WCIT is just the latest episode; and compared to WSIS, a minor one.There is no evidence of any recent enlargement of the political support for states and inter-governmental institutions such as ITU. The same players are taking the same positions. There may even be erosion of support for inter-governmentalism, e.g. Brazil's abandonment of CIRP.

The ITU is a paper tiger. Neither WSIS nor any other international development has strengthened or approved ITU efforts to gain control of pieces of the Internet since 1996.

Professor Malcolm: No: IN THE wake of the anti-climactic conclusion to the World Conference on International Telecommunications (WCIT) earlier this month, readers could be forgiven for being confused about whether all the hype about the International

Telecommunications Union (ITU) staging a UN takeover of the Internet had ever represented a real threat, or had just been a beat-up by special interest groups with an agenda to push.

Question #5: Does the US, through ICANN exert too much unilateral influence on Internet Governance?
Professor Mueller: Off course. There are many examples of this. For example, the adoption worldwide of policies based on the DMCA and the Children's Online Privacy Protection Act, the seizure of domains registered to US-based registrars even if they are foreign-owned and do not infringe foreign law, and the linking of tough IP laws to trade concessions.

Professor Malcolm: Yes, the US exerts too much influence over ICANN, via the GAC and the IANA contract. WCIT (or more accurately, the ITU) is NOT the right track to solve this, because keeping the internet away from the ITU is one of the primary reasons the US exerts unilateral control. Any attempt to solve the problem via the ITU will fail.

Question #6: Are there any serious alternatives to ICANN?
Professor Mueller: It is inconceivable that IGF will ever evolve into a body that negotiates binding treaties. Its entire mission and purpose is to be an alternative to that. It is also an extremely weak and poorly funded institution.

Professor Malcolm: There are no longer any alternatives to ICANN that anyone seriously thinks are better. The only argument that people are making nowadays is that oversight of ICANN should become multilateral. Nobody (no longer even the ITU) is seriously suggesting that any other body than ICANN should be making these decisions. At most, the GAC wants more say, but even the GAC is still part of ICANN.

Question #7: Can we have a multi-stakeholder process that is truly democratic with legal force?
Professor Mueller: To reconcile legally binding authority with MS, you would need some dramatic institutional changes at the global level that would create new forms of representation. These new institutional forms would have to find some way to represent all the world's people and organizations, not states. Because states are unlikely to give up this power on their own, some kind of revolutionary action would be required to bring that about, roughly analogous to the democratic revolutions of the late 18th and early 19th century.

Professor Malcolm: In the far future, yes. In the near future no, but we still need to start talking about it, because the future starts from now. Mechanisms of multi-stakeholderism are still not well enough developed that they can substitute for the legitimacy of the nation state. But nation states do not properly overlap with those who are governed by transnational rules about the Internet, so eventually change must come.

Additional Readings

1. Milton L Mueller, "What Really Happened in Dubai", http://www.internetgovernance.org/2012/12/13/what-really-happened-in-dubai/
2. Chinmayi Arun, "The Trouble with Hurried Solutions", *The Hindu*, December 15, 2012, http://cis-india.org/internet-governance/blog/the-hindu-opinion-lead-december-15-2012-chinmayi-arun-the-trouble-with-hurried-solutions
3. Milton L. Mueller, "ITU Phobia: Why WCIT was Derailed" http://www.internetgovernance.org/2012/12/18/itu-phobia-why-wcit-was-derailed/
4. Chinmayi Arun, "Five Frequently Asked Questions about the Amended ITRs"

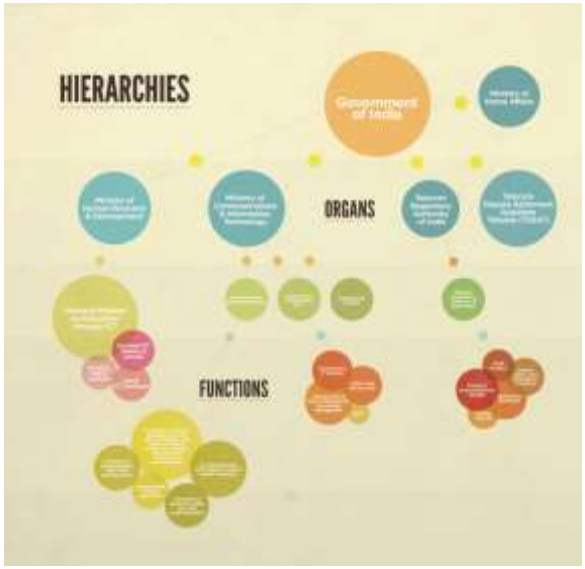
http://cis-india.org/internet-governance/blog/five-faqs-on-amended-itrs

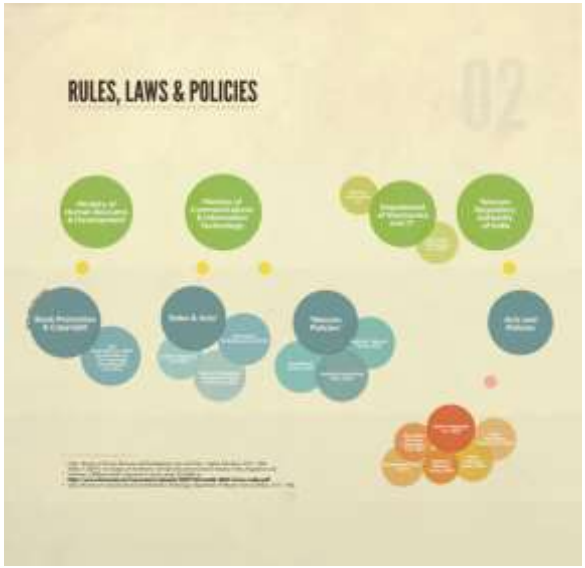
5. Smarika Kumar, "An Introduction to Issue in Internet Governance,*Centre for Internet and Society*, September 26, 2012,http://cis-india.org/internet-governance/issues-in-internet-governance.

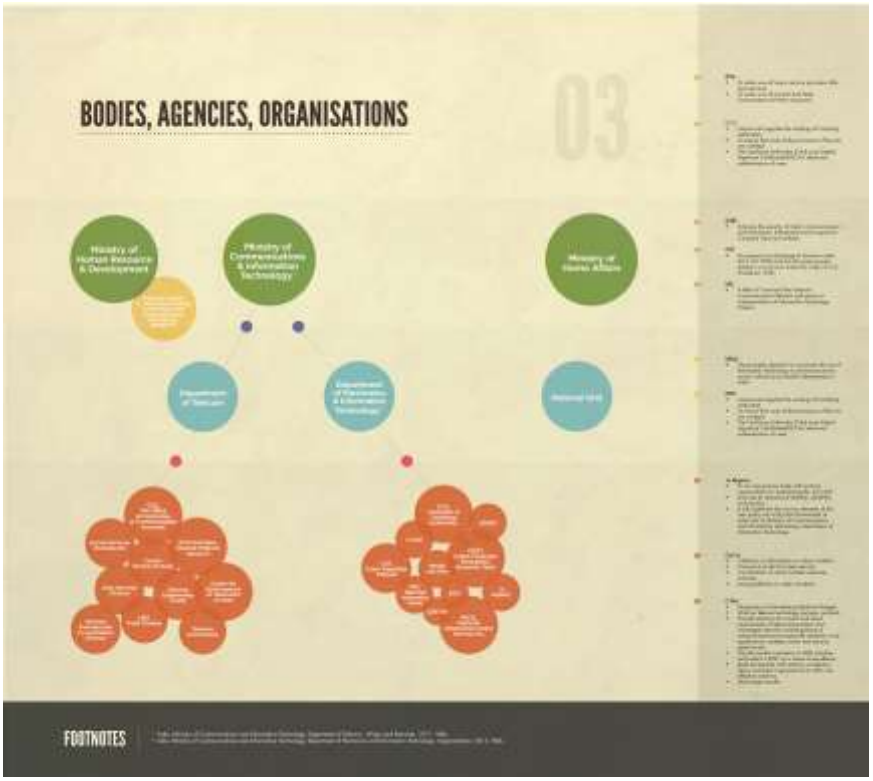
Unit 18: Government and Regulatory Bodies

This unit will cover various, ministries and regulatory bodies which have a role to play internet related public policy issues and internet access. Module 4.3 will deal with:

1. Role of Ministry Human Resource and Development
2. Powers and functions of Department of Telecommunication
3. Role of Department of Electronics and Information Technology in internet governance
4. Functions of various wings of the Department of Telecommunication







India Internet Governance Forum

The India Internet Governance Forum[366] is a Regional Internet Governance Forum. The main function of the regional IGF is to aggregate the policy issues and positions in a particular region. It is a process which enables richer participation and engagement at the main IGF.

Regional and national IGF initiatives are supposed to follow the principles and practices of open, inclusive, non-commercial and multi-stakeholder participation in both formulation of the initiative and in any other initiative related events.

In order to be listed on the IGF website as an IGF initiative, IGF initiatives should provide the following information to the IGF Secretariat:

1. A report of past activities indicating the members of the initiative
2. A list of members or main organizers comprising at least three representatives of different stakeholder groups
3. A dedicated webpage or website, with a contact person and a working email address.

There was debate as to whether the regional event in India should be called India Internet Governance Conference. However, the MAG decided otherwise and it was known as India Internet Governance Conference (IIGC) which was held in October, 2012. It was India's first comprehensive multistakeholder meeting on Internet Governance. The main theme of the IIGC in 2012 was, "Internet for Social and Economic Development: Building the Future Together". This debate has been put to rest and since the multi-stakeholder event fulfils all categories mentioned above it is now known as India Internet Governance Forum.

366. See Internet Governance Forum, available at http://www.intgovforum.org/cms/igf-initiatives, last accessed on January 29, 2014.

The main objective of the meeting was to provide an open and inclusive forum for all the stakeholders: government, civil society, industry, academia and the technical community to have a policy dialogue on issue related to internet public policy.

The MAG of the IIGC saw participation from the all the stakeholders. A range of issues was discussed and debated at the IIGC. It included topics such as global internet governance models, transition to IPv6, network neutrality, access to broadband, freedom of speech on the internet, etc. In order to increase transparency and greater participation at the MAG, the secretariat i.e., FICCI had announced an open call for nomination on the MAG, 2013.

The second India Internet Governance Forum is to be held in October, 2013. The MAG has decided that the theme for the 2013 meeting would be, "Internet to Equinet: Open, Safe and Sustainable."

Telecom Dispute Settlement Appellate Tribunal

The Telecom Dispute Settlement Appellate Tribunal ("Tribunal") was set up to address disputes related to telecommunication services. Generally, tribunals are setup in order to address disputes which requires specific and in depth knowledge of issues related to the disputes. Generally, courts are not well equipped to deal with cases which require expertise in a specific field. Therefore, the legislature establishes bodies which have similar powers to a court to decide on matters related to a specific field such as telecommunication.

The Telecom Dispute Settlement Appellate Tribunal was established under the Telecom Regulatory Authority of India Act, 1997 (TRAI). It was set up as a dispute resolution body in the communication sector. It can adjudicate upon any dispute between[367]:

1. Licensor (Central Government) and a licensee
2. Two or more service provider
3. Between a service provider and a group of consumers

However, the Tribunal does not have any jurisdiction to try any matter which deals with anti-competitive practices.

Composition of the Tribunal

The Tribunal consists of a chairperson and two other members, appointed by the Central Government. Selection of chairperson and the two members is done in consultation with the Chief Justice of India.

The minimum qualification for a Chairperson is that he is or has been a Judge of the Supreme Court or a Chief Justice of a High Court and the minimum qualification for a member is that he should have been at the post of a secretary to the Central Government or at any equivalent post in the Central Government. A person can also be qualified as a member of the Tribunal if he has held the position of Secretary under the State Government for a period of more than two years and has knowledge and experience in technology, telecommunication, industry, commerce or administration.

Term of Office

The Chairperson can hold office till attains the age of seventy five or complete three years, whichever is earlier. The members of the Tribunal can hold office till they attain the age of sixty five years or complete three year, whichever is earlier.

367. India. Telecom Dispute Settlement and Appellate Tribunal.*Profile*. 2013. Web.

Procedure of the Tribunal

Procedure and powers of the Tribunal is laid down under section 16 of the TRAI Act. The Civil Procedure Code, 1908 which lays down the procedure of the conventional courts is not applicable to the Tribunal.

An appeal from the Tribunal's final order in a matter can be directly referred to the Supreme Court under Section 18 of the TRAI Act. However in the circumstance where the Tribunal has passed an order with the consent of the parties to the dispute, no appeal can be made to any court or tribunal. Within five years of its creations the Tribunal had already decided 400 cases consisting of complex questions of law. We are going to explore one of these questions of law:

Case Study: Vodafone Mobile Services Limited v. Union of India[368]

The licensor under Clause 43.5 has the right to modify and amend the procedure of allocation of spectrum including quantum of spectrum at any point of time without assigning any reason. The issue before us for our consideration will be whether the power of licensor to modify the procedure of allocation of spectrum includes the power of licensor to change the price during the validity of the license.

The Respondent has argued that the licensor has the right under Clause 13.2 of the license agreement to modify any time the terms and conditions of the license if in the opinion of the authority it is necessary or expedient to do so in the interest of general public or for the proper conduct of telegraph or on Page 6 of 10 security consideration. The Telecom Regulatory Authority of India (TRAI), which is an expert body, has also recommended for charging One Time Spectrum Charges. According to the Respondent, maintaining level playing field among operators is a matter of public interest.

Module 5: Legislations and Policies

This module will cover various policies and regulation in force, their evolution and objectives along with different mechanism set under these laws. It will mainly cover policies that relate to telecom in India and the various ways in which it is governed and managed. This is integral to understanding the regime over and of the internet access in India.

Unit 19: Policies

National Telecom Policy, 2012

The National Telecom Policy, 2012 was approved by the Union Cabinet on 31st May, 2012. The vision of the policy is, "to provide secure, reliable, affordable and high quality converged telecommunication services anytime, anywhere for an accelerated inclusive socio-economic development". The policy also aims at recognizing telecom as infrastructure in order to realize the potential of ICT for development.

The main components of the policy are:

1. Mobile Devices as an instrument of social empowerment (e-governance, m-governance)

368. *Vodafone Mobile Services Ltd. v. Union of India* (Petition no. 19 of 2013), Bombay High Court, available at http://bombayhighcourt.nic.in/generatenewauth.php?auth=cGF0aD0uL2RhdGEvanVkZ2VtZW50cy8yMDEzLyZmbmFtZT1PU1dQMTAzODEzLnBkZiZzbWZsYWc9Tg%3D%3D, last accessed on January 29, 2014.

2. Access to telecommunication services including Broadband access (especially in rural and remote areas)
3. Affordable, reliable and high quality access to telecommunication services
4. R&D, Standardization and indigenous manufacturing of telecom equipment
5. Security Concerns
6. Spectrum Management
7. Licensing, convergence and Value added services
8. Consumer protection and quality of service
9. Skill development (training and education relevant to the telecom industry)
10. Participation of PSUs

Vision of the National Telecom Policy, 2012

The vision of the policy is, "to provide secure, reliable, affordable and high quality converged telecommunication services anytime, anywhere for an accelerated inclusive socio-economic development". The vision is to transform the country into a empowered and inclusive knowledge based society through telecommunication as the platform. Information and access to information is major part of any development scheme, better communication systems can help in increasing awareness and knowledge about various issues in the society.

Background

The growth of telecommunication in rural areas has been slow, with only 34% of the total connections. There is an urgent need to bridge this digital divide and communication gap by providing better and advance telecommunication services in the rural and remote areas. The current National Telecom Policy, 2012 also aims at an investor friendly policy. It also seeks to generate employment in various telecom sectors through this policy. One of the salient features of the policy is make available **broadband on demand** and use of telecom infrastructurewhich in turn would enable businesses in urban as well as rural areas to engage in the web-economy and e-commerce for inclusive development.

Mobile Devices as an instrument of social empowerment (e-governance, m-governance)
The Policy endeavours at making mobile devices as tool for social empowerment. "Mobile phones to be repositioned from a communication devices to an instrument of empowerment." This will be achieved through enabling participation of citizens in e-governance and m-governance projects in key sectors such as health, education, skill development, employment, governance and banking on mobile devices. Cloud-computing will be also used to enable social networking and participative e-governance. One Nation- Full Mobile Number Portability to be implemented and work towards One Nation Free Roaming.

Mobile devices not only to be used for communication but also to be used as a device to authenticate proof of identity facilitate secure financial transactions, multilingual services and other capabilities which will assist in increasing literacy rate in the country.

Licensing Framework for Telecom Services: A Historical Overview
This unit provides a brief timeline of events in relation to telecom policy, regulation and management in India after the liberalization of the markets.

1991: The government allowed private telecom companies to manufacture telecom switches for telephone exchange.

1992: The Department of Telecommunication (DoT) invited bids for licenses for cellular service across the four metropolitan cities. The DoT offered two licenses per metro city. The process involved two stages. First stage was the technical evaluation of the bidder and the second stage involved financial evaluation of the bidder.

The rejected bidders challenged the selection process on the grounds that it was unclear and arbitrary.[369] The Supreme Court decided that it would not interfere into the government decision making function until and unless they are patently arbitrary and unfair.

The litigation delayed the launch of the cellular mobile services by three years. Finally the first mobile services were launched in Calcutta in the year 1995. It also brought to the fore-front the lack of policy with respect to licensing and regulatory framework for telecommunication.

License Fee and Tariff: A minimum license fee was specified for each metro. The annual license fee was highest in Bombay. It was set at Rs. 30 million, which was increased to Rs. 240 million by the seventh year, similarly license fee for Delhi, Calcutta and Madras were set at Rs. 20 million, Rs. 15 million and Rs. 10 million, respectively. However, by the seventh year the license fee for the three metros were 160 million, 120 million and 80 million, respectively.

The license fee was revised and the DoT asked the operators to pay Rs. 5000 per subscriber as annual license. The license fee was again revised and service operators had to pay Rs. 6,023 per subscriber.

The DoT also placed caps on the rental and tariffs. The service providers could charge a maximum Rs. 156 only as rental. The call tariff was set at a standard rate of Rs. 8.40; off peak was set at half the standard rate and peak rate was double the standard rate. DoT placed a cap on security deposit which had to be paid by the subscriber; it was restricted to Rs. 3000.

369. *Tata Cellular v. Union of India*, 1994 SCC (6) 651.

The change in the annual license fee in the four metro cities is illustrated in the table below:

Metros	Bombay	Delhi	Calcutta	Madras
Licensees	BPL Telecom Maxtouch	Bharti Cellular Sterling	Usha Martin Modi Telstra	Skycell RPG Cellular
Annual License Fee (Rs million)				
Year 1	30	20	15	10
Year 2	60	30	30	20
Year 3	120	80	60	40
Year 4-6*	180	120	90	60
Year 7-*	240	160	120	80

*The service operator has to pay either the annual license fee or Rs. 5000 per subscriber, whichever was higher.

[Source: TRAI, (1999c: 24-25) *as cited in* Ashok V. Desai, Indian Telecommunication Industry: History, Analysis and Diagnosis, Sage Publication 2006, pp. 77].

May, 1993: The DoT commissioned ICICI to study and prepare a report on the possibility of private participation in the telecommunication sector.

1994: The DoT took a step back, after falling into controversy, in its previous attempt to allow licensing in the telecom sector. However, the Finance Ministry was in favour of private participation in the telecom sector and it argued that the incumbents need assistance from the private telecom service providers for increasing the tele-density in the country. In order to study the issue, a committee was set up under ICICI. The report finally culminated into the National Telecom Policy, 1994.

The National Telecom Policy, 1994 laid down the following criteria for the entry of private operators:

1. Track record of the company
2. Compatibility of the technology
3. Usefulness of technology being offered for future development
4. Protection of national security interests
5. Ability to give best service to the customer at the most competitive cost
6. Attractiveness of the commercial terms to the Department of Telecommunication[370]

1995: DoT allowed bidding for cellular licenses and wireline licenses. Spectrum was bundled with the telecom service provider license. For the implementation of the licensing scheme, the country was divided into 21 circles (excluding four metros) and it was categorized in to circles namely A, B and C on the basis of the potential of the circle to generate revenue. DoT awarded two licenses in each circle; one to the state operator and the other to the private operator. The potential service providers in order to be eligible for bidding for licenses had to partner up with a foreign company. The foreign shareholder was allowed to hold equity share

Metros: Delhi, Mumbai, Kolkata, Chennai **Cirlce A:** Gujarat, Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra

370. Para 9, National Telecom Policy, 1994 available at http://www.trai.gov.in/Content/telecom_policy_1994.aspx, last accessed on January 28, 2014.

Circle B: Haryana, Punjab, Kerala, Rajasthan, West Bengal, Uttar Pradesh (West), Madhya Pradesh, Uttar Pradesh (East)
Circle C: Bihar, Northeast, Assam, Orissa, Himachal Pradesh, Jammu & Kashmir

Eligibility for the private companies to bid for the license: (i) financial net worth of the company making the bid and (ii) experience of the company in providing telecom services. The minimum net worth to qualify for bidding was set by DoT. A service provider in order to be eligible for bidding should have a minimum paid up capital of Rs. 1 billion and net worth of Rs. 10 billion. The auction of the licenses was carried out through a first price sealed bid auction.[371] Two licenses were awarded in each circle in order to avoid monopoly of service provider in a circle.

License fee and Tariff: A total of 34 licenses were issued. The term of the license was fixed at ten years which was revised to 15 years. The service providers had to pay an annual license fee which was agreed upon during the auction of the license. The annual license fee was based on the projection of revenue generation. There was no allocation spectrum but the government levied charges for spectrum usage as well. The tariffs were same as for the metro licenses.

Wire line Licenses: DoT also issued six licenses for basic telephone services.

Financial Breakdown: After the issue of cellular licenses in 1995, six of the service providers were in default due to non-payment of license fee by the early 1997. By the year 1998 the number of defaulters increased to eight.

The Bureau of Industry Cost and Prices (BICP) was requested to look into the matter. The BICP after investigation reported that 13 operators were running in loss. According to the BICP report, the telecom service providers were running in loss because of the high license fee, interconnection charges and spectrum usage charges imposed by the DoT. One of the recommendations of the BICP was that the rental should be increased from Rs. 156 to Rs. 600. This would decrease the demand for mobile phones but allow service providers to sustain their business.

ICICI conducted a study, as well. The study revealed that 17 per cent of the consumers had not used their cell phone at all and 37 per cent of the subscriber had bills below Rs. 500 a month. This clearly showed that projection of revenue by the DoT was faulty.

Reasons for the Financial Breakdown (TRAI Report, 1999)
Later, in 1999 the TRAI studied the cellular operators. The study showed that main reasons for the financial failure of the telecom service provider were:

1. Heavy capital investment for setting up infrastructure, which was underutilized
2. Number of subscriber lower than projected
3. The average revenue per user (ARPU) was lower than the costs incurred by the service provider. The ARPU in circles A, B and C were Rs. 1100, Rs. 800 and Rs. 600 respectively.
4. Significant amount of the finances of the service provider were used to pay license fees.
5. Operational charges also took a toll on the service providers.

371. In first price sealed bid auction, the bids are kept secret; the bids are then compared and the highest bidder wins and pays a sum equal to the bid amount.

None of the studies took into consideration that the industry was oligopolistic in nature and the incumbents flooded the market with basic telephone connections.[372] The obvious conclusion was that the revenue generated by the cellular operators was not able to cover their costs.

The financial failure of the telecom operator under the 1994 policy led to the implementation of New Telecom Policy, 1999.

1998: Internet services were rolled out in 1995 by Videsh Sanchar Nigam Limited (VSNL). In November, 1998, the government opened it up to the private sectors.

1999: The New Telecom Policy, 1999 allowed the migration of the licensees from a Fixed License Fee Regime to a Revenue Arrangement Scheme (w.e.f. 1/08/1999). Under the new scheme a license fees was collected as proportional tax on the service provider's revenue. Previously, there were two operators in each circle and the 1999 Policy allowed the government as the third operator in the circle.

The 1999 Policy issued licenses for the following services:

1. Cellular Mobile Service Providers (CMSPs);
2. Fixed Service Providers (FSPs) and Cable Service Providers, collectively referred as 'Access Providers';
3. Radio Paging Service Providers;
4. Public Mobile Radio Trunking Service Providers;
5. National Long Distance Operators;
6. International Long Distance Operators;
7. Global Mobile Personal Communication by Satellite (GMPCS) Service Providers;
8. V-SAT based Service Providers

License and Tariff: License holders under the 1994 policy migrated to the new licensing regime, under the New Telecom Policy, 1999. In order to shift from the fixed license fee regime to revenue arrangement scheme the service providers had to pay previous arrears in license fee on a pro-rata basis till July 31, 1999. Under the new adjusted gross revenue, the service providers had to pay 15 per cent of their adjusted gross revenue.[373] The circle operators also had to pay spectrum usage charge.

TRAI regulated the tariff under the New Telecom Policy, 1999. It brought down the call tariff from the peak rate of 16.80 to Rs. 6 per minute with a pulse of 20 seconds. This allowed the consumers to make calls for a minimum of Rs. 2.00. TRAI also put a cap of Rs. 600 on the rental charges. After notification of tariffs in the year 1999, TRAI examined the accounts of the service providers and found out that under the 1999 licensing regime there was healthy competition and the service providers were providing mobiles services at price, below the TRAI ceilings.

372. Ashok V. Desai, "India's Telecommunication Industry: History, Analysis, Diagnosis", 2006, pp. 83-84 *Sage Publications,* available at http://www.sagepub.in/books/Book228909?siteId=sage-india&prodTypes=any&q=Desai&fs=1, last accessed on January 29, 2014.
373. A licensee's adjusted gross revenue usually refers to the total amount of its gross revenue (including all charges, sees, sale proceeds, and miscellaneous revenue) minus interconnection and roaming charges paid to other licensees and service taxes paid to rhe government. See Model Cellular License, Schedule-II, at paragraph 20.1.

Tariffs	DoT ceiling on tariffs under National Telecom Policy, 1994 (in rupees)	TRAI ceilings on tariffs under the New Telecom Policy, 1999 (in rupees)	Industry rates under the New Telecom Policy (in rupees) – *average rates*
Call Rates (peak-time)	16.80 per minute	6.00 per minute	2.03 per minutes
Rental	156	600	195
Security	3000	-NA-	-NA-

2000: The government issued license for national long distance telephony (NLDO). There was no restriction on the number of operators to whom the license was granted. The license was issued for a period of 20 years on a non-exclusive basis and could be extended upto a period of 10 years once. The entry fee for NLDO license is Rs. 2.5 crore.[374] There are 32 companies other than BSNL, the incumbent, which have been granted license for national long distance services. This has facilitated healthy competition in the market.

2001: License for basic telephone services using wireless in local loop (WLL). This was the first time that the first-come-first-serve scheme was implemented for issuing licenses.

2001: A bid for cellular license for a fourth operator was introduced in January 2001. The auction was carried out in three stages. The fourth licensee had to pay a sum of 17 per cent of the revenue in addition to the entry fees.

2002: DoT issued license to private operators for International Long Distance Telephony (ILD) services. The entry fee for ILD license is 2.5 crores.[375] The license was valid for term of 30 years. Currently the annual license fee on ILD service is 7 per cent on the adjusted gross revenue. However, DoT has revised it to a uniform rate of 8 per cent on the adjusted gross revenue from the year 2013-2014.[376]

2002: The Universal Service Support Policy came into effect in April, 2002. Subsequently, the Universal Service Obligation Fund was established by the Indian Telegraph (Amendment) Act, 2003. The resource for meeting the universal service obligations was raised from charging a 5 per cent Universal Service Levy from the license holders. The main objective of the universal service obligation fund was to provide basic access and services in rural areas.

2003: Introduction of calling party pays (CPP). Under CPP, no charges can be levied on receiving a call in the home circle.

2003: Unified Access Service Licensing (UASL) regime was introduced by DoT on the recommendation of the TRAI. The UASL"permitted an access service provider to offer both fixed and/or mobile services under the same license, using any technology." [377]The country was divided into 23 service areas, 19 telecom circles and 4 metro circles for the purpose of implementing unified access services (UAS).[378]

374. Department of Telecommunication, Annual Report 2011-12 pp. 18.
375. Id. At pp. 19
376. Notification no. 10-54/2010-CS-11 dated 28th June, 2012 *available at* http://bit.ly/Q5nI5O
377. Recommendations on Spectrum Management and Licensing Frampework, TRAI, 11th May, 2010.
378. Unified Access Services available at http://bit.ly/lOQZW7.

TRAI announced the guidelines for migration to the UASL regime on November 11, 2003.[379]An operator under the UASL was allowed to provide for free within its own area of operation, service which cover collection, carriage, transmission and delivery of voice and/or non-voice messages over licensee's network by deploying circuit and/or packet switched equipment.
License Fees: The license fee for the service operator was two-fold. Fee was charged for migration from Cellular Mobile Telephone Service (CMTS) license to UASL. This fee was equal to the amount paid by the fourth licensee introduced in the market in the year 2001. Apart from the migration fee, an annual license fee is also levied according to the circle in which the service provider is operating. The annual license fee is 10 per cent, 8 per cent and 6 per cent on the adjusted gross revenue in the circles A, B and C respectively.

2007: DoT allowed issuing of licenses for operating on dual technologies that is CDMA and GSM. DoT also allowed single license to Internet Service Providers (ISP) but restriction was put in VoIP.

2011: The government introduced mobile number portability (MNP) which injected further competition in the telecom market. Under the MNP, a cellular subscriber can avail services of another service provider while keeping the same mobile number. Previously, change of mobile number used to be the biggest deterrent to change service provider, this was done away with the MNP scheme.

2012: Bharat Broadband Network Limited was set up in February 2012 as a special purpose vehicle to deploy the National Optical Fibre Network which would connect 250,000 panchayats with high speed broadband connection.

2012: National Telecom Policy, 2012 introduced Unified Licensing Regime. Under the regime, service operators can provide converged services. The spectrum has been delinked from the license.

Internet Service in India
1995: Videsh Sanchar Nigam Limited (VSNL), the incumbent launched internet services in India.

1998: Licenses were issued by the Department of Telecommunication for internet services. This was known as internet service provider license or ISP license. The private operators were allowed in the market.

2002: Internet telephony was introduced in India however, ISPs were not permitted to provide unrestricted internet telephony even though they had necessary infrastructure for providing unfettered internet telephony services.

2003: The National Internet Exchange of India was established to manage traffic with in the Country.

2004: The first national broadband policy was introduced.

2006: License fee was imposed for internet telephony services

379. Unified Access Services available at http://www.dot.gov.in/uas/uasindex.htm

2006: The restrictions on the internet telephony was lifted for the Unified Access Service Providers under the Unified Service Access License

2007: The Internet Service Provider Licensing policy was changed.

2012: The National Telecom Policy, 2012 was introduced with special focus on broadband access.

2013: Universal License (Access Service)

Spectrum Management

This unit will look at the issue of spectrum allocation. We will explore the ultimate goals of spectrum allocation and the various methods of allocating it. We will then look at the costs and benefits of each method keeping the ultimate goals in mind.

What is the Objective of Spectrum Allocation?

1. Ubiquitous and affordable spectrum for everyone, or
2. Raising revenue for the government.

The main aim of spectrum allocation and distribution in India, or the guiding principle behind it is public interest. Though the collection of fees for the government is an inevitable and positive externality for the government, maximum fees for the government isn't the goal as much as enabling capacity to the people.

The reason for this is that at India's current stage of development, the infrastructure fundamentally determines the extent of productivity. Along with services that the government provides such as energy, water, sanitation and transportation, telecommunications is a basic necessity for the quality of life. Depending on how expensive these services are, there are many consequences that follow. The cost of the outputs then decides the competitiveness in the markets. Also, a lot of the people will not be able to afford these services which create the problem of access diminishes the quality of peoples' lives in general.

Currently the benchmarks of telecommunication services exist in modalities of incumbency, efficiency and technology. Instead of the government looking at the best possible means using arbitrary standards, it would be preferable to the status quo if the government focused on user needs. Once these desirable ends are appropriately discussed, the governments can then work backwards and meet these goals. If the goal is to provide ubiquitous, true broadband for the people, then it would bring about unprecedented opportunities in education, healthcare, information and entertainment. All we would have to do then is find the best pathway, mix of policy and incentives to achieve this goal.

If this mode of spectrum allocation is to become viable, there first has to be a multi-partisan political will to undertake the arduous task and finish it within a short timeframe. Not only does this goal require the sacrifice of greed, but also of incompetence which will be difficult indeed. Such an exercise would require a multi-faceted process requiring the coming together of government and the private sector.

Spectrum policy involves a range of ideas on the involvement of government.

Exclusive Spectrum

Beauty Contest: A beauty contest is kind of administrative licensing that is usually known as a comparative tender. Usually, a committee sets many criteria with different weighing scales. A jury is typically convened that selects the various candidates' offers based on the criteria. While looking at spectrum allocation for mobile services, the general criteria usually includes reliability, financial capability and investments in research. There are also more specific criteria such as the requirement for geographic/ population coverage, speed of network rollout, pricing, quality, competitiveness and technology. It is important to note that in order to be eligible for auctions, there may be a set of technical and service parameters that the participants have to meet and as mention earlier, the beauty contests have a monetary requirement as well. However, the main distinction lies in emphasis on the pricing mechanism. Competition is crucial to auctions while it is not for beauty contests.

Pros

1. Beauty contests allow various aspects to be taken into account apart from the financial aspect. This way, the government can look at the existing infrastructure, the investment in R&D etc. This will ensure that the spectrum is in the right hands.
2. The administrative costs are similar to or more than those of a simple auction which means that it wont be an expensive bureaucratic process.
3. If a price is applied, this can help incentivise efficient use and ensure spectrum goes to those who value it most highly.
4. It doesn't financially burden the companies to the extent that they are not able to make further investments on telecom.
5. It does, however, generate some revenue for the government.

Cons

1. It is really difficult and time consuming for the government to form a criteria and evaluate different companies.
2. This becomes an opaque process that often leads to legal and political controversy, which apart from elongating the time, also lead to favouritism and corruption.
3. Sometimes, Governments chose firms because they are from their own countries and protectionism of this kind doesn't lead to benefits for the consumer or the taxpayer.

Case Study: Beauty Contests

Beauty contests can give away spectrum at a fraction what they are worth. In the UK's previous 2G license scheme, the "administrative costs" were worth just £40,000. This leaves the money that could've come to the government in the hands of the shareholders of the firms.

Auction

What is it?

Currently in India, as in most other countries, spectrum is being treated as a property, where "chunks" of spectrum are sold to the mobile phone and telecommunications operators with the highest bid. Commonly there are 3 – 4 operators in a developed country; however, in India there are up to sixteen. The extreme competition has resulted in the Indian bidders paying outrageous fees that they are never able to recuperate. There are currently many methods of conducting and auction.

Pros and Cons

Pros

1. This model doesn't rely on government bureaucrats to decide the merits of the competing firms and their business plans. Instead it forces companies to bid for

spectrum which yield the government new information: How much are the firms actually willing to pay?

2. An Auction can lead to substantial amounts of money for the government which can then be used for public services. Eg: In the UK, the auctions yielded 2.5% of the GNP which was enough money to build 400 hospitals.

Cons

1. Firm's high costs are passed on to the customer. However, some economists argue that the start up costs are a sunk cost and the final price of the spectrum will depend on the market value and nothing else. However, if the start up cost is exorbitant and there are only a few firms with many licenses, then they have an incentive to tacitly coordinate to increase the prices.
2. Large amounts of investment in auctions can lead to lower investment in infrastructure, networks, serve customers and return profits to shareholders.

Case Study: The US Spectrum Auction

Prior to 1994, the US used to allocate spectrum on demonstrated capacity and merit ("beauty contests"). The spectrum auction of 1994 saw record bids from the telecom companies. The Federal Communications Commission chairman reportedly said: "Auctions have proven once again to be a success not only by awarding licences to those that value them most, but also by decreasing the national debt." Then disaster struck, with a number of "successful" bidders declaring bankruptcy. As BusinessWeek put it in 2010 with the benefit of hindsight, "... over time, beauty contests have delivered fewer problems and higher value to society than have airwave auctions."

1994: India Telecom Licences

India had an early start in the field of auctioning of spectrum. Initially, under the 1994 policy, spectrum was included within the telecom licence. The licences were auctioned by the Department of Telecommunication, the incumbent regulator, policy maker and enforcer.

The National Telecom Policy, 1994, acknowledged the fact that it was not possible for the Government, alone to achieve targets under the Policy and there was a need for private participation. As a result, in 1995, the Government invited bids for private investment through a competitive process in the field of basic telecom services sector.

For the implementation of the service the country was divided into 20 circles. It was further categorized in A, B and C on the basis of the potential of the region to generate revenue. DOT awarded licences to two operators per service area for cellular mobile telephone services and in the case of basic telephone services; DOT would be an operator other than a private operator.

The potential service providers in order to be eligible for bidding for licences had to partner up with a foreign company. It was considered that a standalone Indian company will not have the financial capability and technical know-how to provide cellular/basic telecom services at a large scale.

The bidding was a two stage process for all licences.

Beauty Contest: The first stage was to fulfill the criteria, which was based on the financial net worth of the company (in relation to the category of circle) and the experience of the company in providing telecom services.

Auction: The second stage was with respect to the valuation of bids. The licence was awarded to the telecom service provider which had fulfilled the pre-requisites and was the highest bidder for the licence. A single stage bidding process was followed in circles. There were separate licences issued for the four metropolitan cities (Kolkata, Chennai, Mumbai, and New Delhi). The licences were awarded through beauty contest in metros.

The technology preferred for cellular services was GSM and for basic telephone service, a combination of fibre optics and wireless in local loop technology was implemented. In 1995, Government auctioned 2*4.4. MHz of startup spectrum for the GSM based mobile services.

Drawbacks in the mechanism of issuing telecom licence:
The problem which arose due to the implementation of the above model is that multiple licences were awarded to a single entity. A single company was able to secure licences for nine circles and had a very high bid. This created problems as to the ability of the company to pay the licence amount for all the circles. In figures the annual turnover of the company was $0.06 billion whereas the estimated licence fee was $15 billion. There were also concerns with respect to replacing the public monopoly on telecom services with a private one. In order to counter these problems the Government changed its policy and allowed the winning bidder to choose 3 circles out of the nine circles. There was rebidding in 15 circles with the government specifying a reserve price.

This was due to the change in policy as the highest bidder was not able to operate in more than 3 circles. The response to this was very poor and it was perceived by the bidders that the reserve price was too steep.

Spectrum Management under New Telecom Policy, 1999
The policy criteria on spectrum management under the NTP, 1999:

1. With the immense growth in new technologies there has been an increase in demand for telecommunication services. This has led to an increase in demand for spectrum.
2. There was a need for a transparent process of allocation of frequency spectrum.
3. Revision of the National Frequency Allocation Plan (NFAP) was made public by the end of year 1999.
4. NFAP was to be reviewed no later than every two years and it should have been in tune with regulations under the International Telecommunication Union.
5. Revision of spectrum allocation, in a planned manner in order to make available required frequency bands to the service providers.
6. Allocation of spectrum frequency should be in conformity with the ITU guidelines.

The following actions were to be adopted:

a. Spectrum usage fee shall be charged.
b. Inter-Ministerial Group was to be constituted, known as Wireless Planning Coordination Committee as a part of the Ministry of Communications for the purpose of review of spectrum availability.
c. Computerization of WPC wing.

Implementation of the Spectrum Management Policy under NTP, 1999
With the advent of the 1999 Policy, cellular mobile service providers were allowed to provide all kinds of mobile services (voice, non-voice messages, data services and PCOs), which would utilize any type of network equipment that met the ITU/TEC (International Telecommunication Union/ Telecommunication Engineering Centre) standards. The mandate

of only using GSM was done away with and the cellular licence was made technology neutral. The New Telecom Policy, 1999 allowed the migration of the licensees from a Fixed Licensee Fee Regime to a Revenue Arrangement Scheme (w.e.f. 1/08/1999). The National Telecom Policy also laid down that the licences will be awarded for a period of 20 year and it can be extended for a period of another 10 years. The Government entered the telecom market as the third mobile operator. It granted licence to MTNL in 1997 for two metros (Delhi and Mumbai). In 2000, a cellular mobile operator licence was granted to BSNL, as the third operator for all areas except Mumbai and Delhi. The 900 MHz band was given to the government operator on a pro-bono basis. In 2001, a fourth cellular mobile service operator was allowed in the telecom sector. The licence for the fourth operator was issued through a three stage auction. A start-up spectrum of 2*4.4 MHz in 1800 MHz was allotted to the winner of the auction. The licensees were also required to pay a percentage of annual revenue as spectrum charge. This was collected in addition to the entry fees.

The other licences which were rolled out under the NTP, 1999 were licences for National Long Distance Service operators (without any bar on number of operators), International Long Distance Service and Internet Service Providers.

Unified Access Service Licence

In 2003, TRAI proposed a Unified Licensing Regime which was introduced by the Government in November, 2003. The unified access service licence "permitted an access service provider to offer both fixed and/or mobile services under the same licence, using any technology."

An entry fee was charged, which was based on the bid price paid by the fourth mobile operator.

The TRAI reviewed the spectrum allocation process in the year 2005. It took into account spectrum availability and also considered efficient techniques for the utilization of already allocated spectrum. The consultation paper prepared by the TRAI in 2005 stated that the spectrums allocated by the GSM and CDMA operators are well below the international averages. TRAI recommended that the existing operators should be allocated sufficient spectrum before allocating spectrum to new service providers.

First Come First Served

This is a method of spectrum allocation where a random date for the start of allocation is set. There is usually some paper work that needs to be done which includes applications and documented proof of competence but other than that, the first person who submits the application for the spectrum can pay the fees and become the owner of the spectrum.

a. Pros and Cons:

Pros:

1. This is the simplest methods of allocation for the administrator.
2. This method actually works well when supply of bandwidth is plentiful, i.e. greater than demand

Cons:

1. However, this method cannot deal with situations where the demand of spectrum exceeds supply.
2. There are high chances that this method could be inefficient as the first comer may not be the highest value user of spectrum.
3. This may lead to distortions in competition and could have a high potential for institutional graft.

4. It is opaque in the sense that competitors may not know applications are being made and assignments granted.

Case study: The main case study of the first-come-first-served auction is in India when it was applied to telecom licenses and it led to catastrophic consequences. The next section deals with this in detail.

Corruption Aspect: Chronology of Events Observed by the Supreme Court on the 2G Case

1994: The Department of Telecommunication issued 8 Cellular Mobile Telephone Service Licenses ("CMTS Licenses"). Two licenses were issued for a period of 10 years (the "1994 Licenses") in each of the four Metro cities of Delhi, Mumbai, Kolkata and Chennai. There was a technical and financial evaluation done after which rankings were determined by the DoT based on the following criteria: (i) financial net worth of the company making the bid and (ii) experience of the company in providing telecom services. The minimum net worth to qualify for bidding was set by DoT. A service provider in order to be eligible for bidding should have a minimum paid up capital of Rs. 1 billion and net worth of Rs. 10 billion. The auction of the licences was carried out through a first price sealed bid auction. They were required to pay a fixed license fee for the first three years and then it was based on the number of subscribers as adumbrated in the Unit 6.1. The cumulative maximum that would be permitted was 4.5 MHz in the 900 MHz band. The licensees only had to pay a "license fee and royalty" which was the annual Spectrum usage charges and didn't have to pay any charges upfront.

December 1995: 34 CMTS Licenses were granted based on auction for 18 telecommunication circles for a period of 10 years (the "1995 Licenses").

Permitted Bands to Licensees: 4.4 MHz in the 900 MHz band.

Upfront Charges: Nil. They were only required to pay annual spectrum usage charges ("License fee and Royalty").

1995: Basic Telephone Service licenses (BTS Licenses) bids were invited. Licensee could provide fixed and wireless BTS's.

*Unit 6.1: The technology preferred for cellular services was GSM and for basic telephone service, a combination of fibre optics and wireless in local loop technology was implemented. In 1995, Government auctioned 2*4.4. MHz of startup spectrum for the GSM based mobile services*

1997: the Telecom Regulatory Authority of India Act, 1997 was enacted and the Telecom Regulatory Authority of India (the "TRAI") was established.

1997-98: 6 licenses were granted in the year by way of auction through tender for providing basic telecom services (the "1997 BTS Licenses"). Fees: No separate upfront charges. Licensees were required to pay annual Spectrum usage charges ("license fee and royalty".)

1st April, 1999: the New Telecom Policy 1999 ("NTP 1999"was brought into effect on the recommendation of a Group on Telecom ("GoT") which had been constituted by the GoI.

Provisions of NTP 1999:

1. Cellular Mobile Service Providers ("CMSP") were granted a license for a period of 20 years on the payment of a one-time entry fee and license fee in the form of revenue share.
2. BTS (Fixed Service Provider or FSP) Licenses for providing both fixed and wireless (WLL) services for a period of 20 years would be issued.

22nd July, 1999: All existing licencees were offered a migration package from a fixed license fee to a one time entry fee based on revenue share regime.

1st August 1999: The offer comes into effect. The license period for all the CMTS and FSP licenses was extended to 20 years from the date of issue.

1997 and 2000: CMTS Licenses were also granted in 2 and 21 Circles to Mahanagar Telephone Nigam Limited ("MTNL") and Bharat Sanchar Nigam Limited ("BSNL") respectively (the "PSU Licenses").

Fee: No entry fee for the PSU licenses but the annual spectrum usage charges were still applicable.

Spectrum: CMTS licenses (issued to BSNL and MTNL): GSM Spectrum of 4.4+ 4.4 MHz in the 900 MHz band.

January 2001: "Multistage Informed Ascending Bidding Process"- Tendering process for issuing CMTS Licenses for the 4th Cellular Operator.

17 new CMTS Licenses issued for a period of 20 years in 4 Metro cities and 13 Telecom circles known as the "2001 Cellular Licenses".

Fee: 1 time non-refundable entry fee + annual license fee + annual spectrum usage charges. No separate charges for the allocation of the spectrum.

2001: BTS Licenses were issued for fixed line and wireless basic telephone services.

Fee: One time entry fee and annual license fee as a percentage of Adjusted Gross Revenue (AGR) was prescribed for grant of BTS Licenses. No separate upfront charge for the allocation

of spectrum. Licensees were to pay revenue share of 2% of AGR from WLL subscribers as spectrum charges. A time entry fee and annual license fee is separate.

27th October, 2003: TRAI recommended a Unified Access Services Licence ("UASL") Regime.

The UASL "permitted an access service provider to offer both fixed and/or mobile services under the same licence, using any technology."[1] *The country was divided into 23 service areas, 19 telecom circles and 4 metro circles for the purpose of implementing unified access services (UAS).*

TRAI announced the guidelines for migration to the UASL regime on November 11, 2003.[1] *An operator under the UASL was allowed to provide for free within its own area of operation,*

service which cover collection, carriage, transmission and delivery of voice and/or non-voice messages over licensee's network by deploying circuit and/or packet switched equipment.

11th November 2003: Guidelines issued stating the procedure for the migration of the existing operators to the UASL regime. All the new applications for the Access Services License were placed in the category of the UASL.

Fee: The entry fee for the new Unified Licensee was fixed as the same entry fee as the 4th cellular operator.

Spectrum: According to the recommendations of the TRAI, the new licensees were to be given spectrum according to the existing terms and conditions in the respective license agreements.

14th December, 2005: The FDI limit in the telecom sector is increased from 49% to 74% so the guidelines for the UAS license grant were revised.

Fee: Licenses were to be issued without any limits on the number of entrants. A one-time non-refundable entry fee was required. An annual license fee was also required which was a percentage of the AGR. The spectrum charges were on a revenue share basis. No separate upfront charge for allocation of spectrum was prescribed.

Spectrum: Cumulative maximum of 4.4 MHz + 4.4 MHz for TDMA based systems or 2.5 MHz + 2.5 MHz for CDMA based systems subject to availability. With respect to the CDMA system, the allocation was not more than 5 MHz + 5 MHz or 6.2 MHz + 6.2 MHz in respect of TDMA based system.

March 2007: Since the introduction of the UASL regime in 2003, 51 new UASL Licenses were issued based on policy of First Come-First Served (FCFS), on payment of the same entry fee as was paid for the 2001 Cellular Licenses (the "2003-2007 Licenses") and the spectrum was also allocated based on FCFS under a separate wireless operating license.

Fee: There was an annual spectrum usage charges as a percentage of AGR and there was no upfront charge for allocation of spectrum.

28th August 2007: Next round of recommendations from the TRAI on the allocation of spectrum, the issuing of licenses and the entry fees took place.

2007 and 2008: GoI issued Dual Technology Licenses. Licensees were allowed to hold a license and a spectrum for services provided through GSM AND CDMA.

Fees: The licensees who chose Dual Technology Licenses paid the same same amount required to obtain a new UAS license in the same service area.

No separate upfront charges for Spectrum allocation. The licensees of Dual Technology had to pay license fees on a revenue basis as a percentage of AGR

Spectrum: Cumulative maximum of 4.4 MHz + 4.4 MHz was to be allocated in the case of TDMA based systems. A maximum of 2.5 MHz + 2.5 MHz was to be allocated in the case of CDMA based systems. However, spectrum not more than 5 + 5 MHz in respect of CDMS system and 6.2 + 6.2 MHz in respect of TDMA based system was to be allocated to the licensee.

February 2nd, 2012: Finally, the Supreme Court of India delivered a Judgement in which it declared the allotment of spectrum as “unconstitutional and arbitrary” and voided all the 122 licenses issued in 2008 during the administration of A. Raja as the Telecom Minister (The main official accused in the case). It imposed a Rs. 50 million (US$ 1,018,122 fine on Unitech, Tata Teleservices and Swan. Another fine of Rs. 5 million was levied on Loop Telecom Pvt Ltd, S-tel, Allianz Infratech and Sistema Shyam Tele Services Ltd.

August 3rd, 2012: As per the order of the Supreme Court, the GoI changed the spectrum price to Rs. 140 billion (US$2.2 billion). This completely undermined the “zero loss theory” and established the loss in revenue as Rs. 1760 billion (US$ 28 billion).

Shared Spectrum

Sharing spectrum is not a radically new idea: it's probably being shared in many places in your living room. Your family's phones could be communicating with your laptops using Bluetooth; your Wifi router is sharing Wifi spectrum with your next door neighbour's. Here, there is no central brain that tells each device how to share spectrum, but each device pair (phone+laptop, for example) has some unique identifier (a code) that enables them to hear each other over the noise created by the other devices. Each device can use the same frequencies at the same time and place, but does not know in advance which other devices are going to use them. This kind of sharing happens with unlicenced spectrum, on which you can read more in point 4. From a technological viewpoint, this is one of two kinds of sharing: the second is where the devices are told in advance which frequencies to use - when and how (footnote: This is what you'd get in your first few Google search results when you look for “shared spectrum”, because the former has become so widely accepted that it's now part of the background). This is what happens with GSM cellphone technology: the service provider's tower allocates frequency from the pool of frequencies available to users on a per-call basis: this is called Frequency Division Multiple Access, or FDMA (footnote: GSM further divides access between different users in the same frequency channel in the time domain with ~5 millisecond bursts of data, something called Time Division Multiple Access or TDMA). This currently happens only within the spectrum of a service provider; adjacent spectrum belonging to another service provider could be lying dormant. In theory, there's nothing to prevent two or more service providers putting their spectrum into a common pool from which frequecies can be allocated to users as before. This would increase trunking efficiency, and thereby the maximum number of users per tower dictated by quality of service limits, making more efficient use of the spectrum. Modern technology provides another twist to this by allowing phones to communicate using the same frequencies at the same time and place, but differentiated by codes (similar to WiFi but using different encoding schemes and technology), an example of which is Code Division Multiple Access, or CDMA. This is supposed to further increase the efficiency of spectrum usage; LTE and LTE-Advanced is supposed to increase it even further. There are different technical challenges involved with making each technology work together with spectrum sharing.

The European Commision has this to say about shared spectrum (footnote: http://ec.europa.eu/digital-agenda/en/promoting-shared-use-europes-radio-spectrum): “From a regulatory point of view, band sharing can be achieved in two ways: either by the Collective Use of Spectrum (CUS), allowing spectrum to be used by more than one user simultaneously without a licence; or using Licensed Shared Access (LSA), under which users have individual rights to access a shared spectrum band”.

CUS is what we called unlicensed spectrum, which does not require a central 'brain' allocating spectrum to users. It requires no setup or organization before use. LSA is what shared spectrum would be like when used by service providers: it requires setup and organization but could offer better efficiency and quality of service because the central 'brain' – in this case the CPU at the cellphone tower – can figure out the most efficient way to allocate spectrum to users.

The National Telecom Policy of 2012 allowed spectrum sharing. According to a draft of the order, telcos will have to get special permission to share their spectrum and it will last for 5 years after which it has to be renewed. The catch is that telcos will only be able to share air waves once they have paid the one-time fees for the combined quantity of spectrum being shared. The discourse around spectrum sharing is intensifying in the international scene as well with the exponential growth of commercial calling. A recent study of the ITU states that spectrum sharing may well be the way of the future.

Pros

1. Increases trunking efficiency, thereby making it a more efficient use of the spectrum. For example, if 10 mgz of spectrum allows you to have 100 channels, each of which can support one person calling one person at a time. Supposing there are a 1000 people out of which 90 people call at any one time, then these 100 channels are sufficient for them. Supposing the channels were artificially subdivided into 10 groups of 10 channels each, such that a user belonging to one particular group cannot make a call using channels from another group just like Airtel users cant use Vodafone spectrum). Out of 90 people making a call it is possible that 11 people belong to one group which means 1 person cant make a call. Therefore dividing spectrum into groups like this is sub optimal. If all the companies can use spectrum from a common pool of spectrum, then that one caller can also be accommodated. Therefore this is more efficient, so it is better than separating it into groups.
2. Reduces the regulatory conundrum that is spectrum allocation- If the government has to pick companies which will have exclusive rights to spectrum, then trunking efficiency dictates that having a few players with more spectrum is more efficient as established above. This leads to the cumbersome, technically complex and corruptible process of spectrum allocation as we have it today.
3. Within the confines of exclusivised spectrum, the dictates of trunking efficiency render oligopolies most efficient. Therefore, the spectrum allocated to smaller players becomes less efficient both from the players' and users' points of view.

Cons

1. There is a high cost of implementation. The communication between towers will require infrastructure whose cost has to be taken into account for shared spectrum.
2. The government will have to come up with stringent rules by which competitors can play together. Etiquette between users.
3. Because of possible interference between base stations, even with shared spectrum there isn't complete freedom and there might be an limit on the optimal number of base stations.
4. The distance involved between cellphone and tower (as against laptop and router) causes the near-far problem. Remember that the receiver on the tower has to demux (split) the signals received from many cellphones, and while a Wifi router would perhaps service multiple laptops in the same building, a CDMA tower has to work for a couple of hundred phones a building-length away and phones in the order of a

kilometer away. Every receiver has its own maximum signal to noise ratio, where the strength of the signal received has to be more that a certain fraction (which can be quite small, for a good receiver) of the strength of the electromagnetic (radio) noise it receives from other sources; cellphone towers have to deal with much larger signal to noise ratios than Wifi routers. For an FDMA or TDMA system, different users' data arrives at different frequency- or time-slots, so as long as those slots are properly differentiated, one user's signal won't be another user's noise. For the commonly used asynchronous CDMA system, however, this is not the case, so at a receiver on a tower, the signal transmitted by a distant cellphone could be swamped by that from a much closer phone. The way this is dealt with is to have phones closer to the tower decrease their transmission power. So even in CDMA, the tower is still telling the phone what to change; only in this case it's the transmission power as opposed to the exact frequency and time.

Case Study: Bandwith

Brazil 2008: ANATEL in Brazil issued licenses 4 licenses per licensed area for 3G wireless deployment in the whole country. Operators are allowed to share network components such as towers as well as spectrum in order to provide services in municipalities with less than 30,000 inhabitants.

EU 2005: The EU now proposes that one third of the spectrum below 3GHz could have flexible usage rights and be tradable by 2010.

Hong Kong 2004-2006: Consultations with stakeholders to obtain input on issues related to specific bands for BWA, e.g. 3.5 GHz.

Mauritius 2005- 2006: ICTA conducted public consultations on proposed BWA frequency band allocations, technical characteristics and regulatory requirements and issued its decisions within 3 months. Those decisions opened the 2.5 GHz band for Mobile and Nomadic BWA (IMT--2000) applications by 2010, the 3.5 GHz band immediately for Fixed BWA and the 5.1--5.3 GHz band for low power in--building applications. In 2006, ICTA additionally opened the 5.4 GHz and 5.8 GHz bands for BWA.

Unlicensed Spectrum

Almost all the usage of radio frequency (RF) spectrum requires the procurement of licenses from a regulatory body or the government. Many countries, however, have allocated some spectrum specially for unlicensed use and these spectrum bands can be for a general purpose or specific to some application. Robert Horvitz, who is one of the founding members of the Open Spectrum Alliance has explained, "*Essentially any equipment that does not violate the technical standards can be used for any means in general purpose unlicensed bands. There are other unlicensed bands where that is not the case. For example, there is a band for the control of modern airplanes. There is no license needed to operate in it, but you can only use it for the control of modern airplanes*."

Unlicensed spectrum is barrier free and cheap since it doesn't require operators to procure expensive licenses and this is one of the means of meeting the communication requirements of the people. Yochai Benkler, when he studied the different wireless markets (mobile broadband, wireless healthcare, smart grid communications, inventory management, access control, mobile payments, fleet management and secondary markets in spectrum), he found that unlicensed spectrum applications were dominant in seven out of eight markets. This shows that

unlicensed spectrum could potentially bridge the digital divide. Soon India could become the largest internet using country in the world right after China. Most of the users are urban and in order increase accessibility to rural regions, AirJaldi and Digital Empowerment Foundation shown us that community-wide wireless communication networks can be set up in rural India using unlicensed spectrum. Unlicensed spectrum also facilitates services like e-governance, distance education, telemedicine and e-commerce which can contribute greatly to the economic development of rural or remote communities.

Countries like the U.S and the U.K have creative spectrum management techniques in their telecom policies. Since the nature of spectrum applications and radio devices have evolved to diminish the risk of interference between signals within the same spectrum band, spectrum sharing is more feasible. In other words, the carrying capacity of spectrum is increasing because of the technology in use.

The EU has been slowly adopting a policy of light regulation/ deregulation of spectrum by loosening strict allocation of spectrum to specific technologies. This has lead to a faster response rate to market developments and improvements and infrastructure based competition. The European Commission calculated that the net gain from flexible spectrum management and usage policies will be EUR 8-9 billion.

In India, the Supreme Court ruled in 1995 that airwaves would be public property and that it should be controlled and regulated by a public authority in the interest of the public. It also claimed that it would be in the greater interest of the people if additional spectrum was not subject to licensing so currently, only a small portion of frequencies are unlicensed.

A. Existing licence-exempt bands in India

Unlicensed Frequency Ranges in India	**Application/Specifications**
50-200 kHz	Very low power devices
13553-13567 kHz	Very low power radio frequency devices, indoor only
26.957 MHz-27.283 MHz	Low power wireless equipment (max. Effective Radiated Power of 5 watts)
335 MHz	Low power wireless equipment for the remote control of cranes
402-405 MHz	Medical RF wireless devices (max. radiated power of 25 microwatt) with channel emission band width within 300 kHz
865-867 MHz	Low power wireless device (max. transmitter power of 1 watt-4 watts Effective Radiated Power) with 200 kHz carrier bandwidth
865 MHz - 867 MHz	Radio Frequency Identification Devices (RFID) (MTP of 1 watt-4 watts ERP) with 200 kHz carrier band width
2400 MHz - 2483.5 MHz	Low power wireless equipment (e.g. Wi-Fi) (max. transmitter output power of 1 watt-4 watts ERP) with spectrum spread of 10 MHz or higher

5150 MHz-5350 MHz	Low power equipment for Wireless Access Systems (max. mean Effective Isotropic Radiated Power of 200 mW and max. mean Effective Isotropic Radiated Power density of 10 mW/MHz in any 1 MHz bandwidth) indoor only
5725 MHz-5825 MHz	Low power equipment for Wireless Access Systems (MMEIRP of 200 mW and MMEIRP density of 10 mW/MHz in any 1 MHz bandwidth) indoor only
5825 MHz- 5875 MHz	Low power equipment (MTOP of 1 watt-4 watts ERPower) with spectrum spread of 10 MHz or higher

Many communities adopt wireless network systems that are based on license-exempt spectrum such as Wi-fi when they don't have the infrastructure required for data connectivity and communications. Information and Communications Technologies (ICTS) provide great economic and social benefits and help empower people. A low cost and accessible source of local information can be provided to marginalized communities through community wireless networks using unlicensed spectrum. Internet access should usually be provided through Panchayats. If one Panchayat is connected, then 2-3 villages could benefit from that. The cheapest way to do this is by using the unlicensed bands in the 5.7 GHz and 2.4 GHz frequencies.

Pros:

1. This form of spectrum allocation can also generate economic value, just that the government cannot reap all the benefits. A Microsoft study conducted showed that home Wi-Fi, hospital Wi-Fi, and retail-store unlicensed inventory systems (representing only one-third of the unlicensed marketplace) will generate between $16 to $37 billion per year in economic value for the U.S. economy over the next 15 years.
2. Unlicensed spectrum also makes way for a lot of innovation in the market. 20,339 different unlicensed devices have been certified for use in the 2.4 GHz spectrum band alone, almost three times the amount of innovation found in any licensed frequency band.

Selection of Band and Criterion for further Allocation of Spectrum

This section will go into the details of the allocation of specific bandwidth across various frequency bands and also analyze the change in allocation criterion for allocation of spectrum. This will also look at the process of allocation followed by India which has been quite different from the international practices.

Start-up Allocation of Spectrum (1995- 2001)

Before the liberalization of the telecom sector, the bandwidth intended for commercial exploitation was under the control of the Defence forces in India. This consisted of 800 MHz, 1800 MHz and 1900 MHz frequency bands. The commercial exploitation of the spectrum started with the grant of the Cellular Mobile Telephone services in the metro cities.As discussed in before, the first round of auction of spectrum was for two CMTS licences in each circles. The DoT auctioned 2*4.4 MHz (paired frequency division duplex spectrum assignment) for

GSM technology in the frequency band of 890-915 MHz paired with 935-960 MHz in each circle.

Subsequently, the Government entered the market as the third cellular operator in the 2001. A bandwidth of 2*4.4 was allocated to the start up Government cellular operator free of charge in the 900 MHz band. The fourth cellular operator entered the market in 2001 and start up spectrum of bandwidth 2*4.4 MHz was allocated to the operators in the frequency band 1710-1785 MHz paired with 1805-1880 MHz.

The DoT also allowed further allocation of spectrum apart from the start up spectrum allocations. This was based on the availability and justification provided by the operator for allocation of more bandwidth. In 2002, the DoT introduced the Subscriber Based Criterion for the allocation of spectrum. According to this criterion, surplus spectrum would be allocated to the operator, with a certain amount of subscriber base. This was followed by allocation of 2*12.5 MHz bandwidth to each operator within the each circle. However, this method of allocation of spectrum was totally different from the allocation of spectrum in the other countries. A sizeable bandwidth of 2*15 MHz was allocated as start-up spectrum in various countries.

Review of Spectrum Allocation Process by TRAI and Setting up of New Subscriber Base Criterion (2006-2008)

TRAI reviewed the spectrum allocation process in 2005 with the intent to account for unused spectrum and optimum and efficient utilization of scarce resource such as spectrum. The TRAI found that the maximum spectrum allocated to an operator is 2*10 MHz whereas the international average is around 2*20 MHz.

The main problem faced by allocation of spectrum was faced due to use of spectrum by defence forces and the railways.

Ministry of Defence and Railways uses sizeable portion of the 900 MHz frequency band for navigation and other purposes. It also uses the 1900 MHz band. The Defence forces utilize 2*20 bandwidth at 1880-1900 MHz paired with 1970-1990 MHz for fixed wireless local loop technology.

The 1900 MHz could not be fully utilized because the Air Force uses the frequency band.

The TRAI also commented that in the 800 MHz band only a maximum of 2*5 MHz had been allocated to the CDMA operators where as the world average standards stand at 2*15 MHz for CDMA operations.

TRAI recommendations in 2007 suggested that there should not be any limitation on the number of players in the telecom sector. The grant of new licences resulted in a list of license holders who were to be assigned spectrum as and when available. TRAI in its 2007 recommendation noted that the spectrum allocation criteria should be formulated in such a manner so that maximum and efficient utilization of the spectrum can be achieved. This led to the tightening of the Subscriber Base Criterion previously laid down by the DoT.

Allocation of Spectrum on the basis of the “Subscriber Based Criterion” in 2002 (Table 1) and 2008-Current (Table 2)

Table 1:

Quantum of Spectrum Allotted	Min. Subscriber Base Required (in millions)	Annual Spectrum Charges (% AGR)
2*4.4 MHz		2
2*6.2 MHz		3
2*8.0 MHz	0.5	3
2*10 MHz	1.0	4
2*12.5 MHz	1.2	5

Table 2

Quantum of Spectrum Allotted	Minimum Subscriber Base Required (in millions)	Annual Spectrum Charges (% AGR)
For GSM Services		
2*4.4 MHz		2
2*6.2 MHz	0.5 – 0.8	3
2*7.2 MHz	1.5 – 3.0	
2*8.2 MHz	1.8 – 4.1	3
2*9.2 MHz	2.1 – 5.3	
2*10.2 MHz	2.6 – 6.8	4
2*11.2 MHz	3.2 – 6.8	
2*12.2 MHz	4.0 – 9.0	5
2*14.2 MHz	5.7 – 10.7	5
2*15 MHz	6.5 – 11.6	6
For CDMA Services		
2*3.75 MHz	0.15 – 0.40	2
2*5.0 MHz	0.5 – 1.2	2

Allocation of 3G Spectrum (2010-Current)

In 2008, the DoT announced its policy on 3G mobile services. Pursuant to the 2006 TRAI Recommendations on Allocation and pricing of spectrum for 3G and Broadband Wireless Access, the DoT decided on a simultaneous ascending auction for allocation of spectrum. According to the recommendation, the DoT would allot 2*5 MHz bandwidth in the 2.1 GHz band.

Time taken to allocate

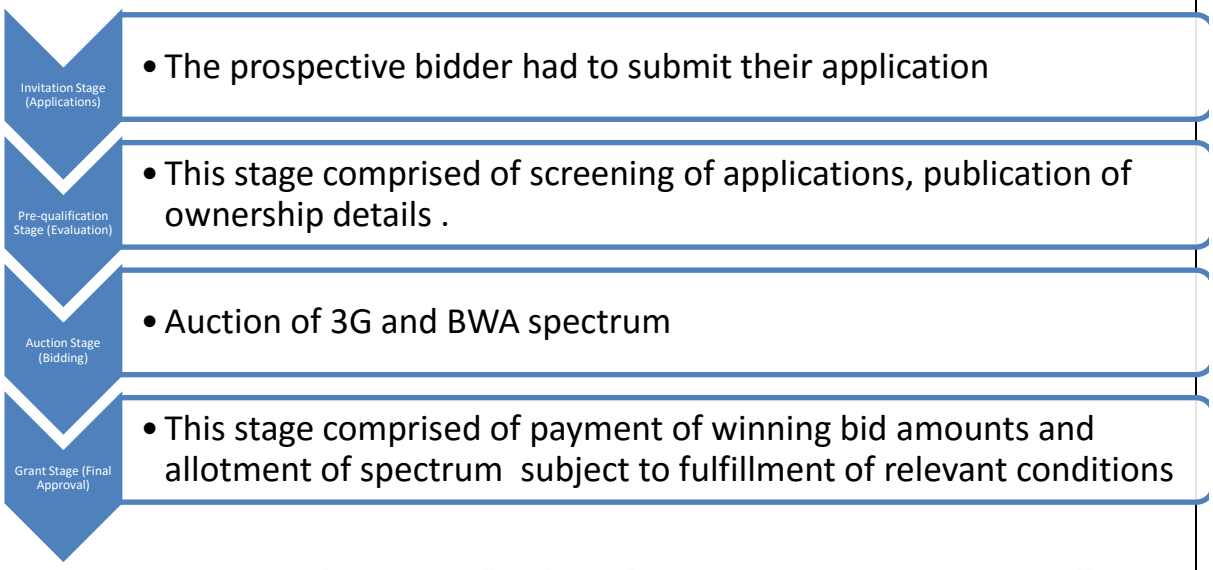
This section will look at the issues with respect to time taken by the DoT to allocate spectrum to the winning bidders. The DoT on various occasions has delayed the process of assigning specific frequency bands after the allocation of spectrum. This has in turn resulted in a delay in rolling out of services by the telecom operators.

There has been substantive delay in allocation of spectrum due to various other reasons, which has been listed in the Report on Examination of Appropriateness of Procedures followed by Department of Telecommunications in Issuance of Licences and Allocation of Spectrum during the Period 2001- 2009. However, according to the Report, the main reasons for the delay are:
Deviation from laid down procedures
Inappropriate application of laid down procedures
Violation of underlying principles of laid down procedures
For instance:
Ongoing litigation with respect to allocation of spectrum
During the first instance of allocation of spectrum for the metro cellular licences; the process was marred by litigation which resulted in delay in allocation of spectrum. Subsequently, there was delay in rolling out of service and the operators suffered huge losses and most of the telecom companies were rendered bankrupt.
Lack of availability/co-ordination with the Defence for vacation of spectrum
Initial as well as additional spectrum was allocated as per availability. Such delays were sometime more than a year, which amounted in not only loss of profit for the licence holder but also huge losses in revenue for the DoT.
Delay in processing of application
For example in allocation of additional spectrum for Idea Cellular Limited in the Maharashtra Service Area, there was a delay of four months given that co-ordination with the Defence was done by December 10, 2004. Spectrum was only allocated by April 1, 2005

Case Study: Allocation of spectrum for 3G and BWA services (2010-Current)
In 2008, the DoT announced its policy on 3G mobile services. Pursuant to the 2006 TRAI Recommendations on Allocation and pricing of spectrum for 3G and Broadband Wireless Access (BWA), the DoT decided on a simultaneous ascending e- auction for allocation of spectrum. "The e-auction was conducted over 34 days (from 9th April, 2010 to 19th May, 2010) and involved 183 rounds of bidding across service areas. All the 71 blocks that were put up for auction across the 22 service areas in the country were sold, leaving no unsold lots."[380] It is interesting to note here, that as per the decision of DoT a start up spectrum of 2*5 MHz was allocated in 2100 MHZ band and 2*5MHz is the minimum carrier requirement for rolling out 3G services using WCDMA technology in 2100 MHz band.

[380] Department of Telecommunications, Government approved results of the 3G auction, F.No. P-11014/13/2008-PP, May 21, 2010 available at *www.dot.gov.in/sites/default/files/**3G_Auction**_-_Final_**Results**_0.pdf See also* Nikhil Pahwa, India's 3G Auction Ends; Operator and Circle-Wise Results, Medianama, May 19, 2010 available at http://www.medianama.com/2010/05/223-3g-auction-india-ends-provisional-winners/

As noted earlier, each auction was a simultaneous ascending e-auction which happened over the internet.[381] The auction was a two stage process: (i) Clock Stage[382] and (ii) Frequency Identification Stage[383]. However, the complete process consisted of four stages:



Source: Figure 3.11 - The 3G/Broadband Wireless Access Auction Process, Vardharajan Sridhar, The Telecom Revolution in India: Technology, Policy and Regulation, Oxford University Press, 2012 at pp. 103

National Frequency Allocation Plan

While pursuing the mandates of the NTP 1999, the National Frequency Allocation Plan 2000 came into effect. **This was the basis for all the spectrum development, manufacturing and utilization activities in the country.** When the NFAP 2000 was formed, it was agreed that it would have to be reviewed once every two years along with the Radio Regulations of the International Telecommunication Union (ITU). This was done so that new and emerging technologies could be catered to and the most equitable, efficient and optimum utilization of spectrum can be made as it is scarce resource. Accordingly, NFAP-2000 has been revised and new National Frequency Allocation Plan-2002 (NFAP-2002) has been evolved within the overall framework of the ITU, taking into account spectrum requirements of the government as well as private sector.

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[381] Vardharajan Sridhar, The Telecom Revolution in India: Technology, Policy and Regulation, Oxford University Press, 2012 at pp. 103

[382] *See,* Department of Telecommunications, Auction of 3G and BWA Spectrum – Notice Inviting Applications, File No. P-11014/13/2008-PP, February 25, 2010 at pp. 32-33 available at http://goo.gl/BFuZxa
"A Clock Stage will establish the Bidders to be awarded a block in each of the service areas where there is at least one block available to auction (the "3G Service Areas"). In this stage, in each 3G Service Area Bidders will bid for a generic block (i.e. a right to a single 2X5MHz spectrum block but not linked to any specific frequency). The Clock Stage will consist of a number of rounds. These rounds will stop once (i) for every 3G Service Area the number of bids at the prices set in the last completed Clock Round is less than or equal to the number of blocks available; and (ii) there are no opportunities for Bidders to increase their demand allowed by the Activity Rules (the precise conditions under which the Auction can close are described subsequently). This will establish a common Winning Price for all blocks within a service area, and the Winning Bidders in each service area."

[383] Id. "The Clock Stage will be followed by a Frequency Identification Stage that will identify specific frequencies available to the Winning Bidders. The frequencies identified will be announced simultaneous with the outcome of the Clock Stage. The initial identification of the frequencies will be performed automatically by the Electronic Auction System through a random allocation mechanism."

National frequency Allocation Plan 2011: The fast emergence of new wireless technologies and applications necessitated the review of NFAP-2008. Accordingly, the review/ revision of NFAP has been undertaken which is also in line with the National Telecom Policy, 1999.[384]

The NFAP 2011 allocates spectrum to different radio communication services and applications in various bands. The main objective of the plan is the optimal and equitable utilization of spectrum. The expectation is that it will enhance and increase domestic manufacturing of telecom equipment and the efficient usage of the spectrum.

The NFAP 2011 is, as was originally meant to be, in line with the ITU's radio regulations. Within certain few frequency bands, there are provisions for indigenous development and manufacturing while keeping the protection of existing services and that of all the stakeholders. The final draft of the NFAP 2011 identifies at least 10 frequency bands including the S band and the 700 MHz band for broadband services. Even though technically spectrum allocation can be made from 9KHz to 1000 GHz, the lack of available equipment and the economies of scale means that the review of spectrum is only salient for frequency bands below 100 GHz. There are many devices that share the radio frequency spectrum for various applications like public telecom services, aeronautical/ maritime safety communications, radars, seismic surveys, rocket and satellite launching, earth exploration, natural calamities forecasting etc. This NFAP has made it possible for new technologies to enter the fray like ultra-wideband services, short range low power devices, intelligent transport system, E Band, etc.

Unit 20: Acts and Other Legislations

Information Technology Act, 2000[385]

The United Nations Commission on International Trade Law adopted a model Law on E-Commerce in 1997. Following this, India passed the Information Technology Act in 2000. The act addressed the legal recognition of electronic documents, the legal recognition of digital signatures, offenses and contraventions and justice dispensation systems for cybercrimes. It addresses the following issues:

1. Legal Recognition of Electronic Documents
2. Legal Recognition of Digital Signatures
3. Offenses and Contraventions
4. Justice Dispensation Systems for Cybercrimes

The ITA was amended in 2008 which had more of a concentration on information security, having sections on cyber terrorism, data protection, sensible personal information and reasonable security practices[386].

Case Study: Nikhil Chacko Sam v. State of Kerala

The complainant and the accused were in Chennai in 2009. The accused took photos of the complainant and another person that depicted them in a bad light and transmitted them through the internet. The accused was charged under 66A of the ITA.

66A. Punishment for sending offensive messages through communication service, etc.

384. For more see National Frequency Allocation Plan – 2011, Department of Telecommunications, Ministry of Communications & Information Technology, available at http://www.wpc.dot.gov.in/Docfiles/National%20Frequency%20Allocation%20Plan-2011.pdf, last accessed on January 29, 2014.

385. For more see the Information Technology Act, 2005, available at http://eprocure.gov.in/cppp/sites/default/files/eproc/itact2000.pdf, last accessed on January 29, 2014.

386. Gosh , Snehashish. "Section 66-A, Information Technology Act, 2000: Cases." *CIS Blog*.CIS, 03 12 2012.Web. 27 Sep. 2013.

Any person who sends, by means of a computer resource or a communication device,—

1. Any information that is grossly offensive or has menacing character; or
2. Any information which he knows to be false, but for the purpose of causing annoyance, inconvenience, danger, obstruction, insult, injury, criminal intimidation, enmity, hatred or ill will, persistently by making use of such computer resource or a communication device,
3. Any electronic mail or electronic mail message for the purpose of causing annoyance or inconvenience or to deceive or to mislead the addressee or recipient about the origin of such messages.

As mentioned in the act, it only applied to "gross offenses" and is a bailable offence.

Indian Telegraph Act, 1885[387]

The Telegraph Act since then has gone through numerous amendments in order to accommodate new communication technologies. This is evident from the current definition of 'telegraph' under Telegraph Act. It defines 'telegraph' as:

"any appliance, instrument, material or apparatus used or capable of use for transmission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, visual or other electro-magnetic emissions, Radio waves or Hertzian waves, galvanic, electric or magnetic means."

Explanation - "Radio waves" or "Hertzian waves" means electro-magnetic waves of frequencies lower than 3,000 giga-cycles per second propagated in space without artificial guide."

Framework of the Act

The Indian Telegraph Act, 1885 (Telegraph Act) contains six parts. Part I deals with definitions of key words used in the Telegraph Act. Part II grants government the exclusive privilege with respect to telegraph. Part II also gives power to issue licences to private operators to offer telegraph services. Part IIA was inserted in the Telegraph Act by the Indian Telegraph (Amendment) Act, 2003. It deals with setting up of the Universal Service Obligation Fund (USOF) for the purpose of meeting universal service obligation. Part III deals with procedures and guidelines to be followed; for installing and maintaining communication equipments. It also lays down guidelines for setting up communication devices in private property and also the procedure for resolution of any dispute which may arise between the service provider and the owner of the private property. Part IV lays down the offences and penalties with respect to unauthorized use of communication or telegraph services. Part V deals with other supplementary provisions.

Exclusive Privilege of the Government with respect to Telegraphs

Section 4 of the Act deals with exclusive privilege of the government to establish, maintain and use telegraphs. It also provides for the government to grant licences to establish maintain or work a telegraph. The government may grant such licences on certain conditions and for a licence fee.

387. See the Indian Telegraph Act, available at http://www.dot.gov.in/sites/default/files/the_indian_telegraph_act_1985_pdf.pdf, last accessed on January 29, 2014.

Section 5 of the Telegraph Act is commonly known as the wire-tapping clause. It gives power to the government to take possession of any licensed telegraphs in case of a public emergency or in the interest of public safety. It can also order interception of communication in the interests of the sovereignty and integrity of India, the security of the state, friendly relation with foreign states or public order or for preventing incitement to the commission of an offence. However, the government has to follow the procedure established by law for issuing such order.

The government also has the power to notify rates for transmission of messages to countries outside India. While notifying such rates the government must take into consideration: (i) the rates which are applicable at the time; (ii) foreign exchange rates at the time; (iii) rates applicable for transmission of message with India, at the time and (iv) such other circumstance that the Central Government may think fit to be considered.

Section 7 of the Telegraph Act vests with the government the power to make rules for the conduct of telegraphs.

The government has the power to make rule with regard to following issues:

1. Rates and other conditions and restrictions subject to which messages will be transmitted within India.
2. Precautions to be taken to prevent improper interception or disclosure of message
3. Conduct regarding telegram
4. Conduct and charges regarding use of telegraph lines[3]

Central Government may impose fine if there is any breach of rules made by it under the Telegraph Act. It may also impose fine upon licensees' if they are found to be in violation of the rules laid down by the Central Government under the Telegraph Act. The Central Government may also revoke any licence granted under the Telegraph Act, in case of breach of any condition or default of payment with respect to the licence.

Section 9 deals with government liability with respect to loss or damage. The government does not take any responsibility for any loss or damage caused by telegraph officer fails in performing his duties. However, such telegraph officer can be held liable if acts negligently, maliciously or fraudulently.

Case Study: People's Union for Civil Liberties v. Union of India

In 1997 the People's Union for Civil Liberties (PUCL) filed a case against the Central Bureau of Investigation (CBI) for tapping the phones of several politicians. Section 5(2) of the Act permits the interception of messages and phone tapping in the "occurrence of any public emergency" or in the "interest of public safety". The ruling stated that telephone tapping is a serious invasion on individual privacy. The ruling left room for lawful wire-tapping but it could not be issued except by the Home Secretaries of the State Governments. This power may be delegated to an officer of the Home Department of the GoI or Joint Secretary of the State Government if urgently required. However, the order should be sent to a review committee within a week and the issuing authority has to record:

1. The intercepted communications;
2. The extent to which the material is disclosed;
3. The number of persons and their identity to whom any of the material is disclosed;
4. The extent to which the material is copied; and
5. The number of copies made of any of the materials.

The term “public safety” means phone tapping is acceptable only in a case of public emergency or in the interest of public safety where it would be apparent to a reasonable person. The State cannot engage in it if it feels on its own and is convinced that the sovereignty and integrity of India is at stake. The total period of the interception cannot last for more than six months.

Copyright Act, 1957[388]

What is copyright law? Copyright is a concept in law that gives the creator of an original work exclusive rights over the entity, but usually for a limited time. The ultimate purpose of this law is to make sure that the creator, who has contributed to intellectual wealth gets compensated for the work and can control the economic destiny of the work. However, there is a dichotomy between the idea behind the work and the expression of it. Copyright law only protects the work in India and in most places around the world. The idea behind the work is not protected by copyright law. This is why there is a very specific definition of a “work” in the Copyright Act of 1957.

“(c) "artistic work" means-
(i) a painting, a sculpture, a drawing (including a diagram, map, chart or plan), an engraving or a photograph, whether or not any such work possesses artistic quality; [(dd) 10 "broadcast" means communication to the public-
(i) by any means of wireless diffusion, whether in any one or more of the forms of signs, sounds or visual images; or
(i) by wire, and includes a re-broadcast;]”

However, the copyright only protects the work for 60 years. The extension of “work” to include broadcasts as well shows that the reign of the copyright act extends into the internet as well. The internet is all pervasive and has been housing more and more percentage of newly created works and old works. The problem is that administration of these works and their copyright is very difficult when copying the material, adapting the material and circumventing the copyright is extremely easy on the internet.

Adaptation: In the Act, ‘adaptation’ refers to the conversion of a dramatic work, literary work, musical work and the like.

This is especially the case in the online piracy of movies which is one of the biggest issues for the production companies that hold the copyright. Many websites have been shut down around the world and even in India because of copyright infringement. The Andhra Pradesh Film Chamber of Commerce has an Anti-Video piracy cell that recently shut down more than 109 websites that were showing pirated movies. YouTube, however, has an effective method of policing illegal material that turns up on the site. The owner of the copyright of any material that turns up on YouTube illegally can send a message to Youtube and they are legally obliged to remove the content immediately. This is an effective way to solve the intermediary liability problem which has left law makers in a quandary whether when material is posted on a website illegally, the intermediaries (ISPs, search engines, social media platforms) or the individual posting should be held accountable.

388. See the Indian Copyright Act, 1957, available at http://copyright.gov.in/Documents/CopyrightRules1957.pdf

The Copyright Amendment Bill was passed by both houses of Parliament in 2012 and had many progressive exceptions for persons with disabilities. Section 52(1) (zb) has a provision for people with disabilities to access copyrighted works without compensation payment to the copyright holder and extends this right to organizations that work for the benefit of the disabled providing that it is non-profit based. The new amendment also, however, has doubled the term of copyright for photographs to 60 years after the photographers death which will hinder archiving projects like Wikipedia.

However, there were some welcome changes and exceptions in the Copyright Amendment of 2012.

Copyright Amendment, 2012
Exceptions[389]:

Provisions for Persons with Disabilities
After the copyright amendment bill, India has one of the most progressive exceptions for persons with disabilities. The act now covers "any accessible formats" and Section 52(1)(zb) allows any person with disabilities to be able to get access to copyrighted works without any payment of compensation to the copyright holder.

Extension of Fair Dealing to All Works
The law earlier dealt with fair dealing rights with regard to "literary, dramatic, musical or artistic works". Now it covers all works (except software), in effect covering sound recordings and video as well. This will help make personal copies of songs and films, to make copies for research, to use film clips in classrooms, etc.

Authors can relinquish their copyright with a simple public notice, which puts Creative Commons and other open licensing models on a sure footing.

Lending by non-profit public libraries has been clarified.

The amendment states:

"2(1)(fa) "commercial rental" does not include the rental, lease or lending of a lawfully acquired copy of a computer programme, sound recording, visual recording or cinematograph film for non-profit purposes by a non-profit library or non-profit educational institution."

Limited Protection to Some Internet Intermediaries
The new provisions s. 52(1)(b) and 52(1)(c) is applicable primarily to the Internet Service Providers (ISPs), VPN providers and the like.

52(1)(c) allows for "transient or incidental storage of a work or performance for the purpose of providing electronic links, access or integration, where such links, access or integration has not been expressly prohibited by the right holder, unless the person responsible is aware or has reasonable grounds for believing that such storage is of an infringing copy."

389. For more see Pranesh Prakash, Analysis of the Copyright (Amendment) Bill, 2012, *Centre for Internet and Society*, May 23, 2012, available at http://cis-india.org/a2k/blog/analysis-copyright-amendment-bill-2012, last accessed on January 29, 2014.

This suggests that it is mainly applicable to search engines and other online services depending on the interpretation of the word 'incidental' that is used.

Case Study: Civic Chandran v Ammini Amma

When the drama *"Ningal Are Communistakki"* was staged, it was sought to be restrained. The grounds were that it would infringe the copyright of a famous drama *"Ningal Enne Communistakki"* which was written by the late Mr. Thoppil Bhasi[1].

Section 52 (1) (j) talks about version recording.
"Section 52(1)
The following acts shall not constitute an infringement of copy right, namely…

(j) The making of sound recordings in respect of any literary, dramatic or musical work, if…..

(iii) Sound recordings of that work have been made by or with license or consent or the owner, of the right in the work;

(iv) The person making the sound recordings has given a notice of his intention to make the sound recordings, has provided copies of all covers or labels with which the sound recordings are to be sold, and has paid in the prescribed manner to the owner of the rights in the work royalties in respect of all such recordings to be made by him, at the rate fixed by the Copyright Board in this behalf;

Provided that ….

(i) no alterations shall be made which have not been made previously by or with the consent of the owner of rights, or which are not reasonably necessary for the adaptation of the work for the purpose of making the sound recordings;
(ii) the sound recordings shall not be issued in any form of packaging or with any label which is likely to mislead or confuse the public as to their identity;
(iii) no such recording shall be made until the expiration of two calendar years after the end of the year in which the first recording of the work was made; and
(iv) the person making such sound recordings shall allow the owner of rights or his duly authorized agent or representative to inspect all records and books of account relating to such sound recording

In the Act, the term "fair dealing hasn't been defined properly. However, Section 52 does refer to "fair dealing" but not the reproduction of the work. Therefore, it wouldn't be unreasonable to assume that only extracts and quotations will be permitted and not reproductions of the whole work.

In determining the quantity of extracts/ quotations, the court can consider: (i) The purpose for which it was removed, (ii) the likelihood of competition between the two works, (iii) the value of the original work compared to the value of the comments/ criticisms of it.

In this case, the purpose of the counter drama was not to reproduce the original but to criticize the original drama and idea that it propagated.

What is a work? Section 13
Therefore copyright only protects a work

Term of the copyright is 60+ years.
Issues of copyright on the internet- internet is all pervasive
Copyright infringement becomes easier, online piracy of movies, websites shutdown
YouTube + example- if you arre the owner you can send a message and they will take them down.

Domain names copyright/ trademark issue

When stuff is put up on websites, who is liable? Intermediary liability and the responsibility they have to ensure

Academic, library and archives, fair use (section 52)

Creative commons license (alternatives)- copyright holder should be able to dictate the economic destiny- ccd ccdy ccdy non derivative, share alike- you still control

If we want to move towards a2k, then do the above the Copyright Act governs all the rules applicable to copyrights in India.

Electronic Service Delivery Bill

This bill's primary purpose is to make sure that public services that are delivered by the government are done so in an electronic mode. This, purportedly, will increase transparency, accountability, accessibility, efficiency and reliability of these services. The bill attempts to make E-services mandatory for all the departments of the government. This is a gradual process but the services that are exempted will be decided in consultation with the Central Electronic Services Delivery Commission and are supposed to be made public with the reasons for their exclusion. The Bill does not make it mandatory for all Government services to be accessible to all including persons with disabilities. The Bill refers to the term "access", as defined in Section 2(1)(a) from the perspective of merely gaining physical access to the services or availability of such services rather than from the perspective of catering to the ability of a person with print (or other) disabilities from gaining access to the services in the normal format.

Section 5(2)(b) of the Bill requires the Government to prescribe a framework for all its agencies to ensure web presence or enablement which refers to rendering electronic services in the language chosen by the user.

According to 2(1)(g),
"―electronic service delivery means the delivery of services through electronic mode including, inter alia, the receipt of forms and applications, issue or grant of any license, permit, certificate, sanction or approval and the receipt or payment of money;"[390]

Broadband Policy (2004)

The Department of Telecommunications, Ministry of Communications & Information Technology, to accelerate the growth of Broadband services throughout the country, enacted

390. For more see Electronic Service Delivery Bill, 2011, *Department of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India*, available at http://deity.gov.in/hindi/sites/upload_files/dithindi/files/DraftEDSBill_11042011.pdf , last accessed on January 29, 2014.

the Broadband Policy, 2004.[391] The Policy aimed at enhancement in quality of life through societal applications including tele-education, tele-medicine, e-governance, entertainment and employment generation by way of high speed access to information and web-based communication.

Before the Policy came into force, broadband penetration was significantly low when compared to other Asian countries. At the time of its implementation, penetration of broadband, internet and personal computers were at 0.02 per cent, 0.4 per cent and 0.8 per cent respectively. There was no uniform standard for broadband speed and connectivity. Internet access was available at speeds varying from 64 kilobits per second to 128 kilobits per second.

Broadband Connectivity

Under the Policy broadband connectivity is defined as:

An always-on data connection that is able to support interactive services including Internet access and has the capability of the minimum download speed of 256 kilobits per second (kbps) to an individual subscriber from the Point Of Presence (POP) of the service provider intending to provide Broadband service where multiple such individual Broadband connections are aggregated and the subscriber is able to access these interactive services including the Internet through this POP. The interactive services will exclude any services for which a separate licence is specifically required, for example, real-time voice transmission, except to the extent that it is presently permitted under ISP licence with Internet Telephony.[392]

The key characteristics of broadband connectivity are:

1. Always on data connection
2. Ability to support interactive services including internet access
3. Minimum download speed of 256 kilobits per second
4. Does not include any services for which the internet service provider to procure separate licence such as real time voice transmission.

Targets of the Broadband Policy, 2004[393]

The Policy had the following targets:

Year Ending	Internet Subscribers	Broadband Subscribers
2005	6 million	3 million
2007	18 million	9 million
2010	40 million	20 million

Technology Options for Broadband Services

The Policy envisioned the following technology options for better access to internet and broadband

1. Optical Fibre Technologies
2. Digital Subscriber Lines (DSL) on copper loop
3. Cable TV network
4. Satellite Media

391. Broadband Policy, 2004, *Department of Telecommunications, Ministry of Information and Communications Technology, Government of India*, available at http://pib.nic.in/archieve/image/broadband_policy04.pdf , last accessed on January 29, 2014.
392. 1.0 Broadband connectivity, available at http://www.dot.gov.in/ntp/broadbandpolicy2004.htm
393. For more see Snehashish Ghosh, "Broadband Policy 2004", March 15, 2013, *Centre for Internet and Society* available at http://cis-india.org/telecom/resources/broadband-policy-2004, last accessed on January 29, 2014.

5. Terrestrial Wireless and
6. Other Future Technologies

Exercises:

Name which Act or Policy corresponds to the following situations:

1. Under which policy was the Universal Service Obligation Fund Established?
2. If you wish to adapt a play written by a playwright for a satirical screenplay which Act would govern this?
3. Which Policy's main target is to significantly increase the penetration of broadband in India?
4. What attempts to ensure that public services provided by the government are provided electronically?
5. If the government was to wiretap your phone during a public emergency, which Act would they cite as a justification?
6. If you posted something online that someone found grossly offensive, which section of the IT Act, 2000 would they use to accuse you.

Spectrum Refarming and Spectrum Reallocation

This section will look at the process of refarming of spectrum and also analyze the current (2012) debates on spectrum refarming in India. Refarming of spectrum is defined as a process which is used to bring about any basic change in the use of different frequency band in the radio spectrum. This can be due to

1. Change in technology
2. Change in application and used of the frequency band
3. Change in Government policy on allocation of spectrum.

Refarming of spectrum entails freeing up of spectrum which is in use and reallocation of such spectrum for some other purpose. It can happen due to change in technology which allows more efficient use of spectrum and hence results in vacation of spectrum. The two main instruments which effects spectrum refarming and reallocation are

1. Market Driven
2. Policy or Regulation Driven

Market Driven

A need for spectrum refarming may arise due to the changes in the market such as the entry of new players in the market. A market driven refarming and reallocation will take in to consideration financial and business related factors. For example a new entrant in the telecom market will always welcome refarming of spectrum in the 800 MHz or 900 MHz because it will bring down the infrastructure costs incurred by the new player in the market.

Policy or Regulation Driven

The policy driven change is an administrative change. The main aspects which are taken into consideration by the policy maker or regulator are:

1. Market Structure: The regulator may implement refarming of spectrum to allow refarming and reallocation of spectrum for facilitating competition in the market. The regulator has to take into consideration the costs incurred by the telecom operators or users of the spectrum for relocating to a different frequency band.
2. Access: The regulator may allow refarming of spectrum in order to implement new technologies which allows for better access and efficient use of spectrum.
3. Revenue: The Regulator may consider refarming and reallocation of spectrum in order to earn revenue and also allow equity in distribution of spectrum. Spectrum, being a

scarce resource has to be judiciously allocated by the Regulator. Spectrum which was previously allocated for almost two decade ago holds more value in the market due to changes in technology as well as the market structure. Therefore in order to earn revenue the Government may refarm and reallocate spectrum.

The main challenge with respect to refarming and reallocation of spectrum is the cost for such changes in the spectrum usage and allocation and the transition to a different frequency band. Normally, such a change in spectrum usage is compensated by the:

1. Telecom companies who have to re-buy the spectrum at a higher price
2. New telecom companies
3. Government may set up a refarming fund for such reallocation from the spectrum revenue. For example, such a fund exists in France and it is managed by the *Agence nationale des fréquences*. (National Frequency Agency).

Refarming and Reallocation in India
According to TRAI in its Recommendation Auction of Spectrum, 2012:

"Refarming of spectrum involves re-planning and reassigning of spectrum over a period of time for services with higher value. A key motive for refarming of spectrum is to use the refarmed frequency bands for communications services that yield greater economic or social benefit than existing use as well as to enable the introduction of new or emerging technologies." (para 2.6)

Previously the TRAI in its Recommendation on Licensing Framework and Spectrum Management, 2010 had pointed out that 800 MHz and 900 MHz should be refarmed for use of new technology (UMTS 900), which would allow more efficient use of the spectrum.

In the 2012 Recommendation, TRAI has made detailed suggestions by taking into consideration international practices, different methodologies of refarming of spectrum and comments from the stakeholders. The main recommendations are:

1. Spectrum in the 900 MHz band is a valuable asset both technologically and economically. Use of 900 MHz spectrum should be liberalized and restriction on the use of technology in the licence should be done away with.
2. It advises the Government to take back 900 MHz from the licensees, who were granted licence in 1994-1995 and the two Government operators. These licensees should be granted licence for liberalized spectrum at 1800 MHz frequency band at a price relevant in November, 2014
3. It also recommended that the 1800 MHz is not completely open for commercial exploitation and the Government Agencies should vacate the frequency band for successful refarming of 900 MHz.
4. The licence holder in the 800 MHz band should be reallocated to 1900 MHz band and it strongly recommends that the Government should make immediate arrangements to refarm 800 MHz and reallocate licence holders to the 1900 MHz band.

Recently in October, 2012, The Telecom Commission under the DoT has also recommended refarming of the entire spectrum used by the telecom companies in the 900 MHz frequency bands during the next phase of the renewal of licence. The Commission's recommendation implies that the complete 900 MHz band has to be reallocated.

In the light of the above recommendation, the telecom companies will have the option of shifting from 900 MHz to 1800 MHz. These recommendations, if implemented may result in huge investments by the telecom companies and would affect the end users. In 2012, the minimum reserve for auction of 1800 MHz spectrum was set at Rs. 14000 crores and the minimum reserve price for auction of 900 MHz would be twice the amount. The existing licence holder in the 900 MHz band, who would migrate to the 1800 MHz band would not only have to make a huge investment to procure spectrum but will also have to install 1.5 times more cell sites to ensure adequate coverage. This would result in further investment and in turn affect the tariff rates.

However, this has been welcomed by the new players in the market, who will have the opportunity to bid for 900 MHz spectrum band which is economically and technologically more viable and if liberalized it can also introduce new technologies such as UMTS 900 which would ensure better utilization of the spectrum.

Therefore, it is quite evident that the main challenge so far has been the question of who is liable to compensate for refarming and reallocation. On one hand refarming will ensure deployment of new technology and efficient use of spectrum and also create a level playing field for all the telecom companies and on the other hand, reallocation or re-auction of spectrum would hit the incumbent telecom companies hard.

Furthermore, the TRAI issued a consultation paper in July 2013 soliciting comments on the method to be adopted for refarming of the 900 MHz band in order to ensure that the telecom service providers whose licences are expiring in 2014 onwards get adequate spectrum in 900/1800 MHz for the continuity of services provided by them. In response to the Consultation Paper, the Centre for Internet and Society submitted its comments.

CIS in its comments stated that it is unlikely that refarming of spectrum will be beneficial to the Indian consumer. It also note that if the purpose of the is "potential benefits of services from 4G technologies and products, consider the likely nature of these benefits in India. The purpose of refarming in OECD countries is to use 900 MHz for 3G and LTE for high-speed data. This is appropriate for developed economies that have large numbers of data users. In India, high-end users comprise only a niche segment (15.09 million broadband users in April 2013, despite over 725 million active wireless subscribers). Developed economies have refarmed the 900 MHz band because 3G and 4G assume widespread use of data services in the entire network. In other words, if India had a large base of high-data users, 4G networks would be required to deliver high-speed traffic. Also, such users would presumably be (a) willing and (b) able to pay [for the expensive equipment required] for these services."[394]

Additional Readings

1. TRAI Recommendations and Consultations available at http://trai.gov.in
2. Ashok V. Desai, "India's Telecommunications Industry: History, Analysis and Diagnosis", *Sage Publications*, 2006.
3. Vikram Raghavan, "Communications Law in India (Legal Aspects of Telecom, Broadcasting and Cable Services)", *Lexis Nexis Butterworths*, 2007.
4. Varadharajan Sridhar, "The Telecom Revolution in India: Technology, Regulation and Policy, *Oxford University Press*", 2012.

[394] *See* Shyam Ponappa and A.B. Beliappa, Comments on TRAI Consulation Paper on Spectrum (July 2013) available at http://cis-india.org/telecom/blog/trai-consultation-paper-on-spectrum

Module 6: Investment and Ownership in Telecom and Broadband Market

Unit 21: Market Structure

Indian telecom industry can be broadly segmented in to:

1. Telecom Operators - Wired: Voice and data services are offered via telephone wires or optical fiber connectivity to home.Wireless: Voice and data services are offered using airwaves from the towers and providing seamless mobility. This is more popular as 2G, 3G LTE networks and WiMax for broadband networks.
2. Internet Service Providers (ISP): Offer broadband internet connections for consumers and corporates. ISPs could also use both wired and wireless technologies.
3. Tower Companies: 1 sentences.
4. Under Sea Cable Consortia:

There are few specialized services that need to be mentioned:

1. Very small aperture terminal (VSAT)service is used for direct satellite data links to mainly enterprises.
2. Cable service: Broadband data is transmitted using the same cable that offer Media and Television.
3. Microwave and Power line communications (PLC) are used for transmitting data across long distances.
4. Satellite communications: Voice and data through direct satellite channels.

Businesses who want to offer any of the above services to consumers or enterprises need to get license from Government of India and setup business as per defined ownership structure. There are regulations for foreign companies to setup and offer services in India.

Unified Access License

Indian government introduced Unified access license in 2003, which provides operator's license to offer voice and non-voice messages over their network. There was a provision to invest in both traditional circuits switched and packed switched (IP) networks. The license allowed operators to offer Voice Mail, Video Conferencing, E-Mail, Closed User Group (CUG) as Value Added Services over its network to the subscribers.[395]

The unified access service is issued for a period of 20 years and extendable by 10 years. There are total 23 service areas, with 19 telecom circles and 4 metros. The license fee payable to government is a % of the gross revenue of the telecom operator (6-10%) in addition to the royalty for the use of spectrum. The spectrum / frequencies are assigned by the Department of Telecommunications.

Investments

The telecommunications industry attracted foreign direct investments (FDI) worth US$ 12,889 million in the period April 2000–September 2013, according to data published by Department of Industrial Policy and Promotion (DIPP).[396]

395. Telecom at a Glance, *Department of Telecommunications, Ministry of Communications & Information Technology*, available athttp://www.dot.gov.in/about-us/telecom-glance, last accessed on February 4, 2014.

396. Indian Telecom Industry, *India Brand Equity Foundation*, available at http://www.ibef.org/industry/telecommunications.aspx, last accessed on February 4, 2014.

Indian telecom sector will witness huge investments to the tune of US$ 110 billion during 2012-2017. About US$ 70 billion estimated investment for green field 2G, 3G/4G and WiMax networks, while US$ 25 billion would be required to set up an extra 200,000-odd telecom towers across the Country.[397]

Investment Policy

At present 74% to 100% FDI is permitted for various telecom services. 100% FDI is permitted in the area of telecom equipment manufacturing and provision of IT enabled services.

This has made telecom one of major sectors attracting FDI inflows in India. Below we understand the various investment possibilities based on the services offered [Refer 4].

1. In Basic, Cellular Mobile, Paging and Value Added Service, and Global Mobile Personal Communications by Satellite, Composite FDI permitted is 74% (49% under automatic route) subject to grant of license from Department of Telecommunications subject to security and license conditions.
2. FDI upto 74% (49% under automatic route) is also permitted of the Following: -
   a. Radio Paging Service
   b. Internet Service Providers (ISP's) with Internet gateway
3. FDI upto 100% permitted in respect of the following telecom services, subject to the conditions that such companies would divest 26% of their equity in favor of Indian public in 5 years, if these companies were listed in other parts of the world.
   a. Infrastructure Providers providing dark fiber (without Internet gateway)
   b. Electronic Mail
   c. Voice Mail
4. For manufacture of Telecom Equipment - FDI up to 100% is allowed through automatic entry route.

Merger and Acquisition Policy

In December 2013, Government of India approved the guidelines on merger and acquisition in telecom sector. This policy is expected to fuel activities around consolidation of companies and possible buy of unused spectrum. Some of the salient points are:[398]

1. Market dominance criteria have been raised to 50% of subscriber base. This would allow for M&A between bigger players. *What is market dominance criteria.*
2. In a merger, the resultant entity has to pay market rates for holding spectrum above 4.4 MHz that was allotted to the companies administratively at old rates. This disincentivises M&As that are done in order to amass spectrum.
3. If two entities which are merging hold airwaves purchased through auctions, they will not have to pay market rate for spectrum
4. The merging companies will have to comply with the lock-in clause for sale of equity. *What is lock-in clause.*

It will be interesting to see how telecom companies use these policies. There are two major points that might be worth noting [Refer 8]:

1. Clarity on spectrum usage charges: Current policy charges companies based on the amount of spectrum used in slabs. Higher spectrum which results due to M&As will

397. Telecommunication in India,Overseas Indian Facilitation Centre, last accessed on http://www.oifc.in/telecommunication-india, last accessed on February 4, 2014.

398. Merger and acquisition policy in telecom gets EGoM nod, Business Today, December 4, 2013, available at http://businesstoday.intoday.in/story/merger-and-acquisition-policy-in-telecom-gets-egom-nod/1/201181.html, last accessed on February 5, 2014.

attract higher charges. There is a proposal from TRAI for a flat usage fee but there is no final decision on this topic

2. Clarity on spectrum trade where in companies can buy specific assets of companies as in underutilized spectrum in certain circles.*How is this connected to M&As.*

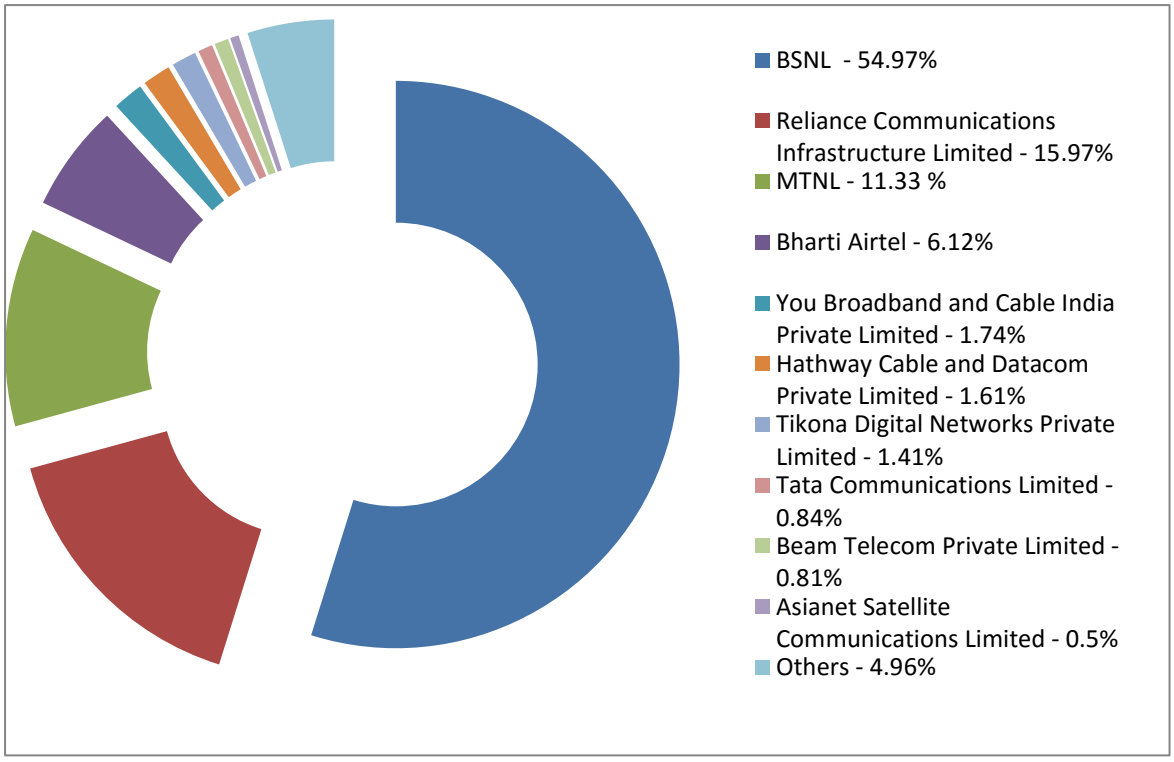
Competition in the Market (Wired and Wireless Access)

One of generally used to measure for competition in the market is the Herfindahl-Hirschman Index (HHI). It is determined by the calculating the sum of the squares of the percentage of the market capture by each player. The HHI calculated in the range of 0 to 1. Lower index values indicate better competition in the market.

Taking the data from the chart below, we can determine the level of competition in the market.
H= ∑_(i=1)^N▒s_i^2
H denotes HHI and si denotes market share of the players in the market and N indicates the number of the players in the market.

Applying the equation to the data in the pie-chart below we get an HHI of 0.35. According the index, the HHI index above .25 denotes high concentration in the market. The high concentration is evident because a large share of the market belongs to BSNL, which is a public sector.

Market share of ISPs as on December, 2011



Source: TRAI, Telecom Sector in India: A Decadal Profile

The broadband services came into forefront after the implementation of the Broadband Policy, 2004. It laid down that the minimum speed for a broadband connection has to be 256 kilobits per second. This has been revised to 512 kilobits per second under the National Telecom Policy, 2012. In India, 59.6 per cent internet subscription is broadband subscription.

Currently, the main technology used for broadband access is digital subscriber line (DSL). About 85.1 per cent of the broadband subscriptions are via DSL technology. While the other technologies such as fibre, leased line, wireless, ethernet, cable modem covers only 14.9 per cent of the market. The main internet service provider (ISP) in the market is BSNL which has a share of 54.97 per cent.

Summary

Indian Government intends to make India a teleport hub, enabling it to become an up-linking/down-linking center. The initiative is expected to facilitate foreign investments, better technology and sustainable employment opportunities in the country. The Indian government has recently given its nod to 74 per cent of FDI in DTH, IPTV, and mobile TV.[399]On the back of the ongoing investments into infrastructure, India is projected to witness high penetration of Internet, broadband, and mobile subscribers in the near future.

Unit 23: Competition in the Market (Wired Access and Wireless Access)

After the rollout of telecom policies, private operators drive Indian market and they dominate the sector. It's estimated that private operators own more than 85% of the market share. There are Indian government owned public sector players in the sector but they have not been able to compete effectively in the open market. During the recent times there are also foreign players entering the market by investing according to the FDI regulation but competing locally with their global brand names in the market.

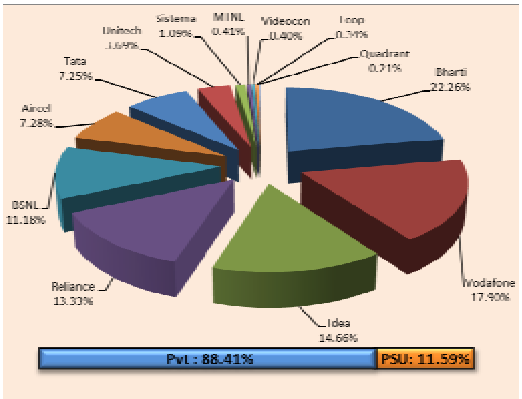
Players in the Market

Wired Fixed Line Market

In the fixed line telephony segment, the Government owned BSNL and MNTL have a majority stake of over 80%. Private operators like Bharti Airtel, Tata Teleservices; Reliance Communications own the rest of the market. However given the popularity of mobile wireless, fixed telephony is on the decline and are now a very small percentage of the Indian telecom connections. The number of fixed-phone line subscribers fell to 29.08 million in October 2013.[Refer 2]

399. Telecommunication in India, *Overseas Indian Facilitation Centre*, available at http://www.oifc.in/telecommunication-india, last accessed on February 5, 2014.

Mobile Wireless Market



The wireless segment includes GSM and CDMA services and is much larger than the wire line segment in India. The total number of mobile subscribers stood at 875.48 million by October 2013. The market is lead by Bharti Airtel followed closely by Vodafone, BSNL, Reliance, Idea, Tata DoCoMo, Aircel, Uninor and MTS.

The share of urban wireless subscribers is about 59.65% and rural stands at 40.35%. The overall wireless Teledensity is at 70.96 .[Refer 2]

Private operators hold 88.41% of the wireless market share (based on subscriber base) where as BSNL and MTNL, the two PSU operators hold only 11.59% market share.

Tower Companies

Telecom service providers like Airtel, Vodaphone and Reliance started out by owning and operating their own last mile infrastructure in the form of towers and transmitters. Since the subscriber base of a service might not be exactly proportional to - and depend only on - the number of towers owned by it, but also upon secondary factors such as pricing and QoS, it turned out to be less wasteful if service providers shared towers. Today, every service provider apart from BSNL and MTNL have formed consortia ("towercos") to jointly own towers, the largest of which is Indus Towers, of which Airtel and Vodaphone own 42% each and the remaining 16% is owned by Idea. The industry is not dominated by a single player - Indus Towers owns less than half the towers in India.100% FDI was permitted in towercos in 2009, and towers were given 'infrastructure' status by the government in October 2012, giving the towercos a higher borrowing limit for loans from abroad and lower interest rates.

Another reason for the telco's divestment is because they specialize in operating last mile telecom infrastructure whereas building and maintaining towers requires a different and highly specialized set of skills – particularly in India - for two reasons: one, the tower requires land to be built on, and the owners of that land might not obey the terms of a contract - particularly in states like UP, Bihar and Jharkhand; and two, the electricity supply is unreliable at best - requiring the ownership and maintainance of diesel generators, up to 15% of whose diesel may be stolen on site. The situation has improved somewhat as batteries have become better, with diesel generators being replaced by batteries in locations where the power outages are short enough, in parallel with UPS's becoming more popular in Indian homes. An interesting outcome of the lack of a reliable power supply is that towercos have begun to seriously consider renewable energy generated by nearby non-state actors, or even generated on-site; negotiations are on between the towercos and these secondary suppliers as of this writing.

Broadband Internet Market

As on 31st October 2013, there are 153 Service Providers (ISPs), which are providing wire-line broadband services in India. There is a healthy growth in the segment and currently there are 14.91 Million wire-line Broadband subscribers. Top five ISPs in terms of market share (based on subscriber base) are: BSNL (9.96 million), Bharti Airtel (1.32 million), MTNL (1.11 million), Hathway Cable (0.37 million) and Beam Telecom (0.34 million). [Refer 2]

For broadband and Internet sub-sector, high growth in broadband outreach is expected to drive the next phase of growth in the telecom industry. While broadband connections are increasing rapidly, their reach in India is still at 0.7 %, as against the worldwide outreach of 8.1 %. Following the 3G and Broadband Wireless Access (BWA) auction, the data sector is expected to grow rapidly.

Indian government is targeting broadband connectivity from 15 million currently to over 600 million in 2020. India has over 50 per cent mobile-only internet users, possibly the world's highest compared to 20–25 per cent across developed countries, according to Avendus Capital.

Industry Growth and Phases of Competition

As with most industries, companies compete differently based on the phase of evolution and growth. Competition in Indian market can be looked at from these three different stages: [Refer3]

1. Phase 1: Entry - based on the segments to target and the entry strategies Reliance entered the market with the Monsoon hungama scheme that drove the subscriber numbers and is an important milestone in Telecom growth of India
2. Phase 2: Growth – based on the investments and the available capacities Hutch and Airtel made because of their existing network coverage to build brands around network availability. State owned BSNL though had similar and in cases better coverage lost out in communicating this value and also the subscribers
3. Phase 3: Consolidation- based on price, consumption and profits New entrants started the price was which further drew the growth in subscriber numbers. This also is the reason for many financial issues faced right now by operators.

Case Study: Monsoon Hungama - Reliance Infocom Market Entry

Reliance Infocomm makes mobile telephony more affordable by launching Monsoon Hungama on July 2003 at Rs 501. This scheme was so popular with common man that with in a week over 0.5 million subscribers signed up. Additionally it was offered to 3 million Reliance industries shareholders for free.[Refer5,4]

This was a strong market entry strategy by offereing bundled services along with handset and locking in subscribers for 3 years. Reliance could get a lead over the CDMA competitor Tata Teleservices. The response was so positive that Reliance went on to compete strongly with existing GSM players in Airtel to capture market share. They also nullified the competition with the technologues used, like GSM and CDMA at that point in the market.

Case Study: Hutch Network Follows Campaign

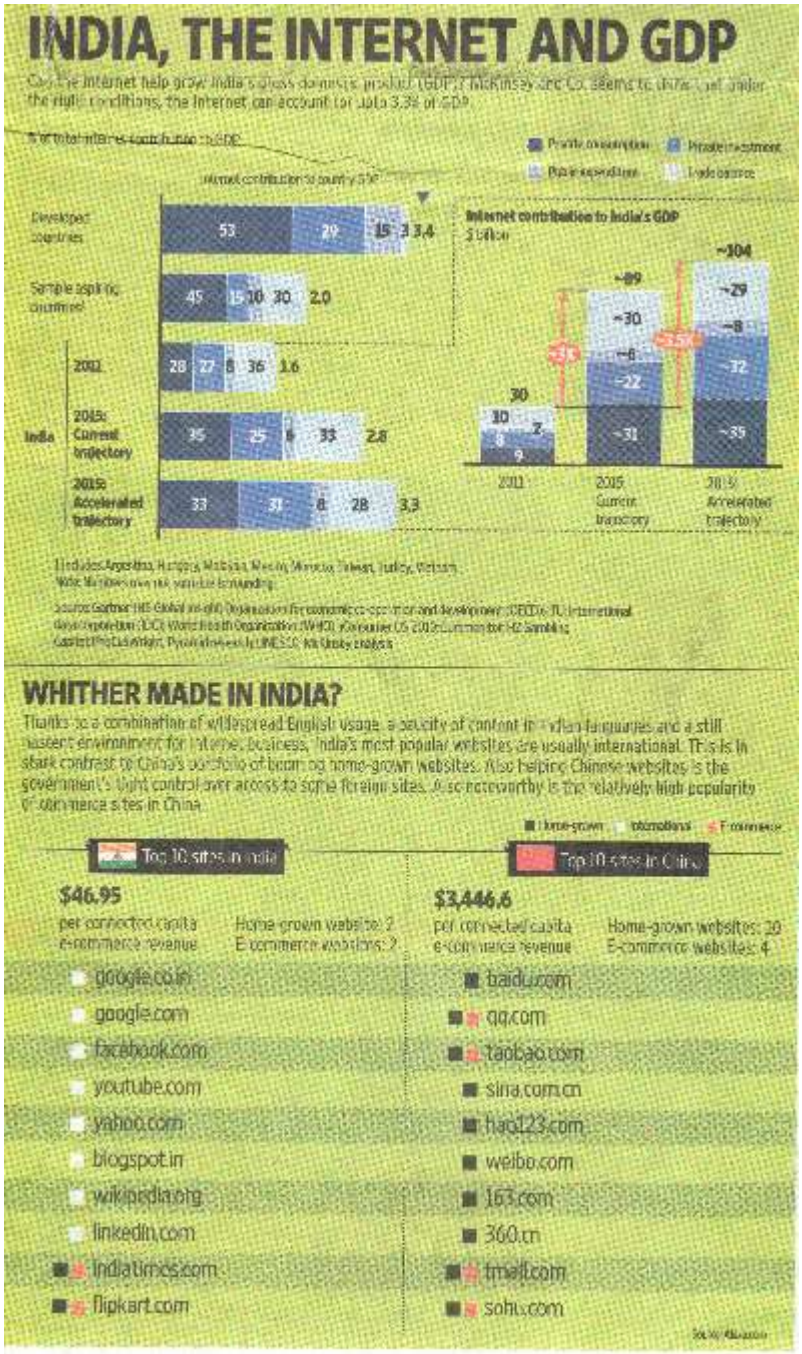
Hutchinson Essar created a brand campaign to drive a simple message of a wide network coverage they had achieved. This was also an indirect message for the amount of investment that was made to make the network work wherever you go. The campaign was reflective of competition at that phase where in Airtel, BSNL and Reliance were expanding their networks and Hutch had to convey that they have better coverage than others. Hutch later was bought by Vodafone and now is the second largest GSM operator in India.

Case Study: Price Wars and Making Service Affordable

By 2009, there was intense competition and new players entered the market with licenses. Notably they were Tata DoCoMo – Japan, Uninor –Telenor Norway, MTS – Russia. They had to compete with existing large players who had set the market prices and the way the services were offered. Price war was an expected strategy given that the network and service innovation were at similar levels.

Tata DoCoMo started it with one paisa per second for the call and Uninor followed this with 0.5 paisa per second[Refer6].

This price war was quite messy for all operators as they had to reduce the price and also TRAI followed with guidelines mandating some of the price points. There is a general view that financial problems of some of the operators stemmed from this phase of price wars.



Above a picture of India, Internet and GDP[400]

Competitive Forces

Mobile Number Portability

400.Image source: Livemint Newspaper published on February 3, 2014, page 21.

"Mobile Number Portability" (MNP) means the facility, which allows a subscriber to retain his mobile telephone number when he moves from one Service Provider to another irrespective of the mobile technology or from one cellular mobile technology to another of the same Access Provider.[401] MNP is a very important tool to uphold the consumer choice and as a means to keep the quality of service at competitive levels. MNP removes the consumer barrier of switching and more control with them. The reduction in barriers to switching is of particular benefit to challenger operators against dominant incumbents.[402]

MNP in India was launched in 2011 and the approach taken was to have a central database in two zones that manage the 'Ported In' and 'Ported Out' numbers. Syniverse and Telecordia are the companies that manage this centralized database. The MNP is right now is offered only with in a circle and not across India.

As per the guidelines contained in the National Telecom Policy-2012 regarding "One Nation-Full Mobile Number Portability", TRAI has proposed a PAN India MNP rollout to be done in 2014. This will allow consumers to change service providers across circles (states) and still keep their existing mobile number. This proposal is yet to be implemented.[403]

MNP in India has taken time to take off in India, as there were teething troubles in porting out of existing service providers. There were several complaints on service providers no fairly allowing consumers to port out of their networks. However in the last year, there has been a strong uptake of MNP in India and by Nov 2013 there were more than 106.87 million cumulative requests from consumers.[404]

Walled Garden Services

Walled garden services are closed systems of software where telecom service provider has full control on the applications, delivery of content and multimedia services. This is opposite of Open platforms and systems. Telecom service providers offer Voice, SMS and Multimedia in closed systems for Feature phones, which are prepaid, and with limited IP functionalities.
Some of the most popular services in Indian market are:

1. SMS based services
2. Ring tones, Ring back tones
3. Music streaming, Video streaming
4. WAP Portals with free access to Facebook, Google, etc.
5. Payment services tied to operator infrastructure

There is intense competition in differentiating using these proprietary services. Competitors copy and launch equivalent services in a short time.

Over The Top Services

401. Telecom Regulatory Authority of India, http://www.trai.gov.in/content/Regulation/0_9_REGULATIONS.aspx, last accessed on February 5, 2014.
402. Shruti Bhardwaj, "Infrastructure Sharing in Telecom Industry: Growth of New Business Models & their Prospective Trends", Institute for Research and Development India http://www.irdindia.in/Journal_IJRDMR/PDF/Vol2_Iss1/4.pdf , last accessed on February 5, 2014.
403. Full mobile number portability in six months, *Hindu Business Line*, available at http://www.thehindubusinessline.com/industry-and-economy/info-tech/full-mobile-number-portability-in-six-months/article5168193.ece , last accessed on February 5, 2014.
404. Mobile number portability up by 2.09 mn in November: TRAI, *India TV*, January 31, 2014, available at http://www.indiatvnews.com/business/india/mobile-number-portability-up-by-2-09-mn-in-november-trai-9899.html , last accessed on February 5, 2014.

OTT is often referred to services or content those are delivered over the service provider's infrastructure without their control. OTT services are delivered directly to the consumer using the telecom infrastructure as a bit pipe. These services started off with Messaging, Voice, Multimedia streaming and now has expanded to any service or content available on Internet.

The advent of Smart phones with ability to handle multimedia and high Internet speeds on telecom networks a new breed of services over IP has emerged. They provide existing telecom services with richer experiences prompting consumers to quickly adapt to them. Over the top mobile (OTT) voice and texting apps now affect traffic for almost 75 percent of mobile service providers operating in 68 countries surveyed by mobileSquared as part of a project sponsored by Tyntec.[405]

Some of the game-changing services that are impacting Telecom service provider business are:

1. Messaging: Whatsapp, WeChat, Line, Hike, Google chat, Facebook Messenger, etc.
2. Voice Chat and Calls: Line, Viber, Vonage, Google Voice, Skype, etc.
3. Content: YouTube, Vimeo, Facebook, Twitter, etc.

In order to compete with the new competition, Telecom service providers are looking at Telco-OTT where in various services are still delivered over IP but using various partner services. Telco-OTT service will enable operators to launch RCS (Rich Communication Suite) services. This technology will enable operators to enhance SMS and MMS services with new IP-based ones, such as chat, VoIP and video. Telco-OTT is also about offering services to consumer who use any competitor IP based network.

Technology Superiority

Telecom and broadband players also compete on several other parameters:

1. Technology superiority: The GSM vs. CDMA technology war has now been won by GSM with a very few operators offering CDMA networks. Tata DoCoMo and Reliance still offer CDMA services. There was also competition on Broadband wireless in terms of WiMax v/s 4G LTE. Right now with the investments it looks like 4G LTE would emerge as the prominent standard. Broadband over Fiber to Home (FTTH) is emerging as a reliable alternative to mobile broadband for steady data rates.
2. Value added services: Operators compete also on the type and level of new innovative value added services they offer. The early innovations were around the Ringtone and Ring back tone which has now become an industry standard.

TRAI and TDSAT

The Telecom Regulatory Authority of India (TRAI) was established in 1997 to regulate telecom services, including fixation/revision of tariffs for telecom services.[406]

One of the main objectives of TRAI is to provide a fair and transparent policy environment, which promotes a level playing field and facilitates fair competition. TRAI has issued from time to time a large number of regulations, orders and directives to deal with issues coming before it and provided the required direction to the evolution of Indian telecom market from a Government owned monopoly to a multi operator multi service open competitive market.

405. How Should Telecom Carriers Respond to Over the Top (OTT) Services?, Razorsight Blog, http://www.razorsight.com/blog/2012/08/how-should-telecom-carriers-respond-to-over-the-top-ott-services.html, last accessed on February 5, 2014.
406. Telecom at a Glance, *Department of Telecom, Ministry of Communications & Information Technology*, available at http://www.dot.gov.in/about-us/telecom-glance, last accessed on February 5, 2014.

The TRAI Act was amended by an ordinance, effective from 24 January 2000, establishing a Telecommunications Dispute Settlement and Appellate Tribunal (TDSAT) to take over the adjudicatory and disputes functions from TRAI. TDSAT was set up to adjudicate any dispute between a licensor and a licensee, between two or more service providers, between a service provider and a group of consumers, and to hear and dispose of appeals against any direction, decision or order of TRAI.

Telecom companies going in for merger and acquisition might have to go for a approval from TDSAT as per a not yet approved proposal from Indian government. It is also mandated that an existing service provider will have to convert its old licence to Unified License. And with the new Unified license norms, companies are barred form owning any stake in rival companies.[407]

Unit 23: Revenue Generation in Telecom and Broadband Market

Telecom operators traditionally made revenues from their networks through charging for calls and the additional services they offered. With broadband and new value added services the revenue models have changed and some of the key models are discussed below.

Revenue Generation through Direct Consumers

Fixed setup charges

Operators charge consumers for a fixed setup charge when they signup for the service. This is very common with fixed line service, which includes the handset and a month's charge. In broadband connections, the modem and wireless routers are charged at a discounted price. Almost in all types of new service an activation charge is included that covers the cost of operator setting up the connection.

In fixed and broadband connections, there is a need for a service engineer to physically visit the customer location and set up the device. These charges are often waived but in many cases consumers are charged for this service.

Prepaid and Postpaid

As the name goes Prepaid is a plan when consumers pay the money before the service is consumed and Postpaid when they are billed at the end of a periodic consumption of services.

407. Mobile Number Portability at http://en.wikipedia.org/wiki/Mobile_number_portability, last accessed on February 5, 2014.

From consumer standpoint, Prepaid connections are flexible and provide control on the consumption and the money spent. It's also convenient with real time control on the charges per call or on data. In most markets more than 80% of subscriber base is Prepaid connections.

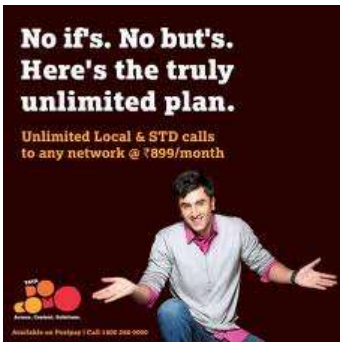
Postpaid connections are easy for operators to handle, as they don't have to worry about billing with every activity in real-time. Operators also prefer this connection as the revenue they generate out of these connectionsare higher than prepaid. Since the consumption is not tracked in real-time, its expected that consumers don't track and reduce consumption based on the bill.

Device bundled long term plans

Operators in US and Europe offer plans to keep the entry cost of acquiring mobile connection with a mobile phone affordable and make money over a long-term contract. The customer typically gets a locked phone that cannot be used on any other competitor network. The connection is also locked for a period of 2-3 years with a fixed monthly plan. The bundle on the outset is attractive but the consumer ends up paying more by the end of the contract period.

Indian operators are carefully introducing the bundling strategy. There were just few models of phones thatwere offered under the bundled offers. The most popular was the enterprise blackberry connections that were offered with a fixed long-term contract. The most recent has been IPhone 5S and 5C being offered by Reliance Infocom on a contract of 2 years with device free. This makes the most expensive iPhones affordable for the consumer as it also bundles all voice calls and data free for a payment of Rs 3000 per month.[408]

408. Telecom at a Glance, *Department of Telecom, Ministry of Communications & Information Technology*, available at http://www.dot.gov.in/about-us/telecom-glance, last accessed on February 5, 2014.



Unlimited packages and fair usage policy (FUP)

An extension of the bundled package is the unlimited package. These offer unlimited usage of services Voice or Data or SMS etc. for a month based on the terms and conditions. These are premium plans and mostly offered as prepaid plans.

One of the big challenges of this plan is to do with the abuse of the system by miscreants by using these connections to download unlimited data or use it in Internet parlors for business purposes. The operators have a dubious means to throttle the data speed to abysmal 64kps even if the connection is for 3G speeds. This topic us quite controversial as there is no standard policy for throttling that is made transparent by operator and also the usage of data might be genuine by a consumer downloading large files from Internet.[409]

Service charge based on volume and / or duration

Most of telecom service pricing includes access to services based on the volume of consumption (minute of talk time, number of SMSs, Download of data etc.). The plans are also capped by duration of the service consumption mainly with prepaid plans.

Smart additional packages

In case of postpaid plans when the user exceeds the consumptions limits, mainly with data, there are additional data packs that could be purchased to be included in the monthly bill. These are means to make consumers comfortable and get control on the consumption of data.

409. Gerald R. Faulhaber and Christiaan Hogendorn, "The Market Structure of Broadband Telecommunications", The Journal of Industrial Economics, Vol. 48, No. 3 (Sep., 2000), pp. 305-329, *Wiley-Blackwell Publishing*, available at http://www.wimo.inf.ed.ac.uk/media/rural_broadband/references/the_market_structure_of_broadband_telcos.pdf, last accessed on February 5, 2014.

Value added services[410]

Mobile value added services are a big segment of revenues for Indian telecom operators the market size is currently at $ 4.9 billion a year in revenues and expected to grow to $9.5 billion in 2015. {REFER 6]. Mobile Value added services are in the area of education, health, finance and entertainment with solutions using SMS channel. One of the most popular services is the mobile Ring back tones and ring tones.

However in the last year, the data revenue is replacing the mobile VAS revenue as seen from financial results from Vodafone India. Revenues from data (2G and 3G) have surpassed the VAS solutions revenue as now is a major source of solutions revenue.

Revenue Generation through Business Customers

Telecom operators market and media focuses mainly on the consumer segment but there is a strong revenue stream for operators from service enterprise businesses with their communication requirements.[411] Operators create the backbone through which the enterprises can offer services to their consumers and also optimize their internal costs. Some of the well-used services are discussed below:

1. Voice and Data packages: These are standard voice and data packages that are offered to enterprises with an option of bundled packages which make the calls within the enterprise cheaper. The hosted PBX solutions are also offered to small enterprises to reduce the cost of operations
2. Audio video and web conferencing solutions
3. International IP calling
4. International toll free solutions
5. Dedicated Broadband connections (Fiber / VSAT)
6. Internet of things (Fleet management solutions, Smart meters)
7. Antivirus and Software on the data connections
8. Hosted data centers and cloud based solutions as solutions on data connections

Revenue Generation through Partner Operators

1. Interconnect usage charges: These are charges that an operator has to pay when the call terminates in another competitive operators network. There are agreements between operators for charging the calls that pass through their networks. These charges are also prominent with international roaming calls.

410. Padmaja Shastri, "Reliance Monsoon Hungama draws in the crowds", *The Times of India*, July 9, 2003, available at http://articles.timesofindia.indiatimes.com/2003-07-09/pune/27206633_1_tariff-plan-subscriber-monsoon-hungama-scheme , last accessed on February 5, 2014.

411. See Press Release "Reliance Infocomm makes mobile telephony more affordable", Reliance Communications, available at http://www.rcom.co.in/rcom/StoreLocator/press_release_detail.jsp?id=56 , last accessed on February 4, 2014.

2. Tower / Infrastructure sharing: One of the main operating costs of operators is to setup, manage and maintain the wireless towers and the necessary infrastructure including power. Incumbent operators share their existing towers to new and emerging players and save on rentals and power consumption. [REFER 7,8,9,10,11,12]
3. Network sharing is where competing operators share the core networks or the radio equipment.
4. Spectrum sharing is not allowed in India and operators now owning a license for a operating circle cannot provide services using competitor infrastructure and spectrum. This was an issue when operators without 3G licenses in a circle offered 3G services using competitor licenses. TRAI issued an guideline making these arrangements void.[412]

Shared Backhaul Infrastructure

The biggest driver towards sharing backhaul would be the low marginal cost and high marginal utility (up to market saturation) of the increased bandwidth due to the choice of technology used. We have a discrete set of technologies to work with to create backhaul: satellite, terrestrial point-to-point microwave, and fiber-optic. Essentially, there are three questions to ask - one, what is the demand for data across the country, and how do we quantify its need; two, which is the most cost-effective way, in terms of bandwidth-per-rupee, for multiple service providers to get large volumes of data across; and three, how would these factors change in future. Roughly put, on the supply side, this gives us three choices of technologies, with two variables to consider for each technology, cost and bandwidth. On the side of demand, we have to consider population density and purchasing power. If our choice of technology is extremely expensive to put in place, but offers much higher bandwidth than is required by a single service provider, then the optimal scenario in terms of efficiency in resources used would involve sharing. Optical fiber satisfies those conditions - the largest factor in the rollout of optical fiber backhaul is not the cost of the cable but the cost of digging the ground to lay the cable, which happens to be high even compared to the revenues of the telecom industry, but optical fibre can carry much more data than any single service provider currently requires it to.

National Optical Fibre Network (NOFN) in India

NOFN is a Government of India Project to connect 2,50,000 Gram Panchayats (GPs) through OFC (Optical Fibre Cables). It was approved by GoI on 25.10.2011. NOFN will bridge connectivity gap between GPs and Blocks. The government expects the NFON to help it implement e-governance initiatives such as e-health, e-banking and e-education, projects amounting to Rs.50,000 crores initiated by the Department of Information Technology as well as deliver electronic services by the private sector in rural areas.

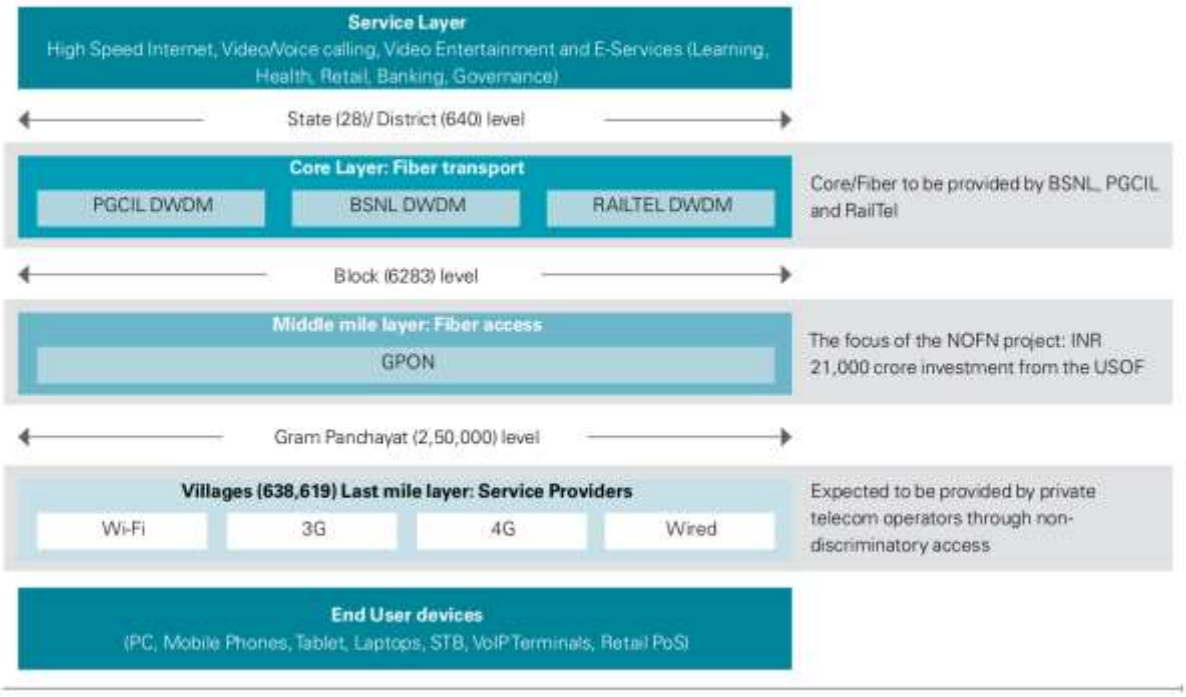
Information released by the government can be summarized as follows:

1. Project to be implemented by NOFN--SPV namely Bharat Broadband Network Ltd (BBNL).
2. Envisaged as a Centre--State joint effort.
3. Govt. of India to fund the project through the Universal Service Obligation Fund (USOF). Rs. 20,000 Cr. ($4B).
4. State Governments are expected to contribute by way of not levying any RoW (right of way) charges (including reinstatement charges)
5. Reinstatement to be done by BBNL

412. Sounak Mitra and Press Trust of India, "3G case: HC issues notices to Idea Cellular, others", *Business Standard*, May 27, 2013, http://www.business-standard.com/article/companies/3g-case-hc-issues-notices-to-idea-cellular-others-113052700424_1.html , last accessed on February 5, 2014.

6. Suitable Tri--partite MoU to be signed by GOI, State Govt & BBNL
7. NOFN will ensure that Broadband of at least 100Mbps is available at each GP
8. NOFN will provide non--discriminatory access to all categories of service providers.
9. On NOFN, e--health, e--education, e--governance & ecommerce applications & Video conferencing facilities can be provided.
10. NOFN Project implementation time -- 24 months (by 31.10.2013), has been passed.

Figure 1: NOFN infrastructure



Source: Adapted from 'Connecting India – Enabling Socially Inclusive Growth through National Broadband Network, Cisco, 2012'

Summary

Telecom operators have traditionally charged consumers for the services they offered like any utility service provider. However in the last years with the new smart phone revolution and mobile apps the spend from consumer is shifting towards applications over the air directly with the app developers. Operators have not made in-roads in to the App environment whereby they are potentially at risk of loosing their traditional revenue. It is expected that with current scheme of business models, Telecom operators would end up being more of a bit pipe and a utility provider and would not be able to appropriate revenues from innovations with 'App' ecosystem.

Module 7: Internet Users in India

Introduction

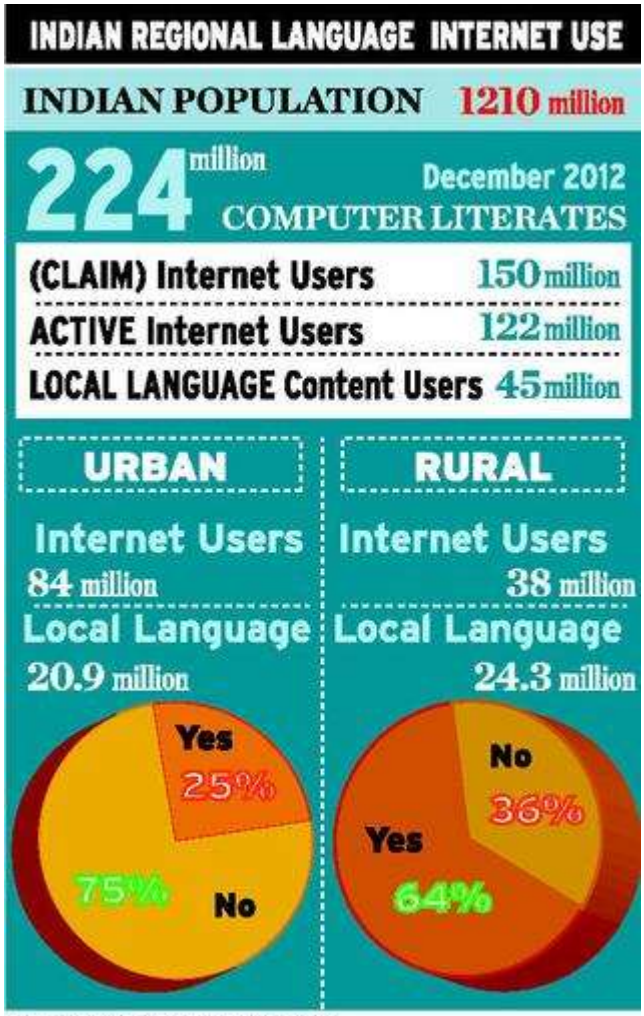
The increasing prevalence and usage of the internet and digital technologies in India in the last couple of decades has brought about significant changes in different socio-economic spheres – telecommunications and networking, governance and administration, transport, banking, e-commerce, and education to name just a few. While the digital revolution as such is often touted as one of the important developments of the last decade, even as it is spurred by more advancements in information and communication technology, questions about access to and the role of technology in social transformation and development continue to persist. This module is an attempt to provide an overview of internet usage in India and broach some key questions about its growth and proliferation in various domains.

Unit 24: Internet Users in India – Demographics and User Profiles

The pervasive influence of the internet is demonstrated by the amount of time spent online by users, and the diversity of uses, which has increased manifold in the last couple of years. According to the I-Cube 2013 report, released by the Internet and Mobile Association of India (IAMAI) and IMRB International in November 2013, India now has a user base of 205 million (up to October 2013), registering a Y-o-Y growth of 40% over last year. By December 2013, it is expected to reach 213 million.

As stated in a press release by the IAMAI "by June 2014, India will have 243 million internet users, at which point of time, it is expected to overtake the US as the second largest Internet base in the world. China currently leads with more than 300 million internet users while the US currently has estimated 207 million internet users". The report further states that the number of internet users in urban India is estimated to touch 141 Million by December 2013, while the number of rural internet users is expected to reach 72 Million by the same time. Mobile phones have dominated internet usage in India and the rise in internet usage is inextricably linked to the rise in telecom penetration as the study by the Telecom Regulatory Authority of India (TRAI) illustrates. The total telecom subscriber base by June 2013 was 903.09 million and 873.36 million of them were mobile subscribers.[413]

413. For more see Press Trust of India, "Mobile users form 89 percent of total Internet subscriber base in Q2 2013: TRAI", *New Delhi Television*, December 5, 2013, available at http://gadgets.ndtv.com/mobiles/news/mobile-users-form-89-percent-of-total-internet-subscriber-base-in-q2-2013-trai-454723, last accessed on January 29, 2014.



India Internet Users Percentage as in December 2012

A staggering 89% of internet usage was through mobile phones.

Interestingly, rural India has witnessed a y-o-y growth of 58% of active Internet users since June 2012.An active internet user is one who uses the internet at least once a month, according to the IAMAI study. In terms of frequency of usage, close to 50% access the internet at least once a day, and close to 90% access it at least once a week.

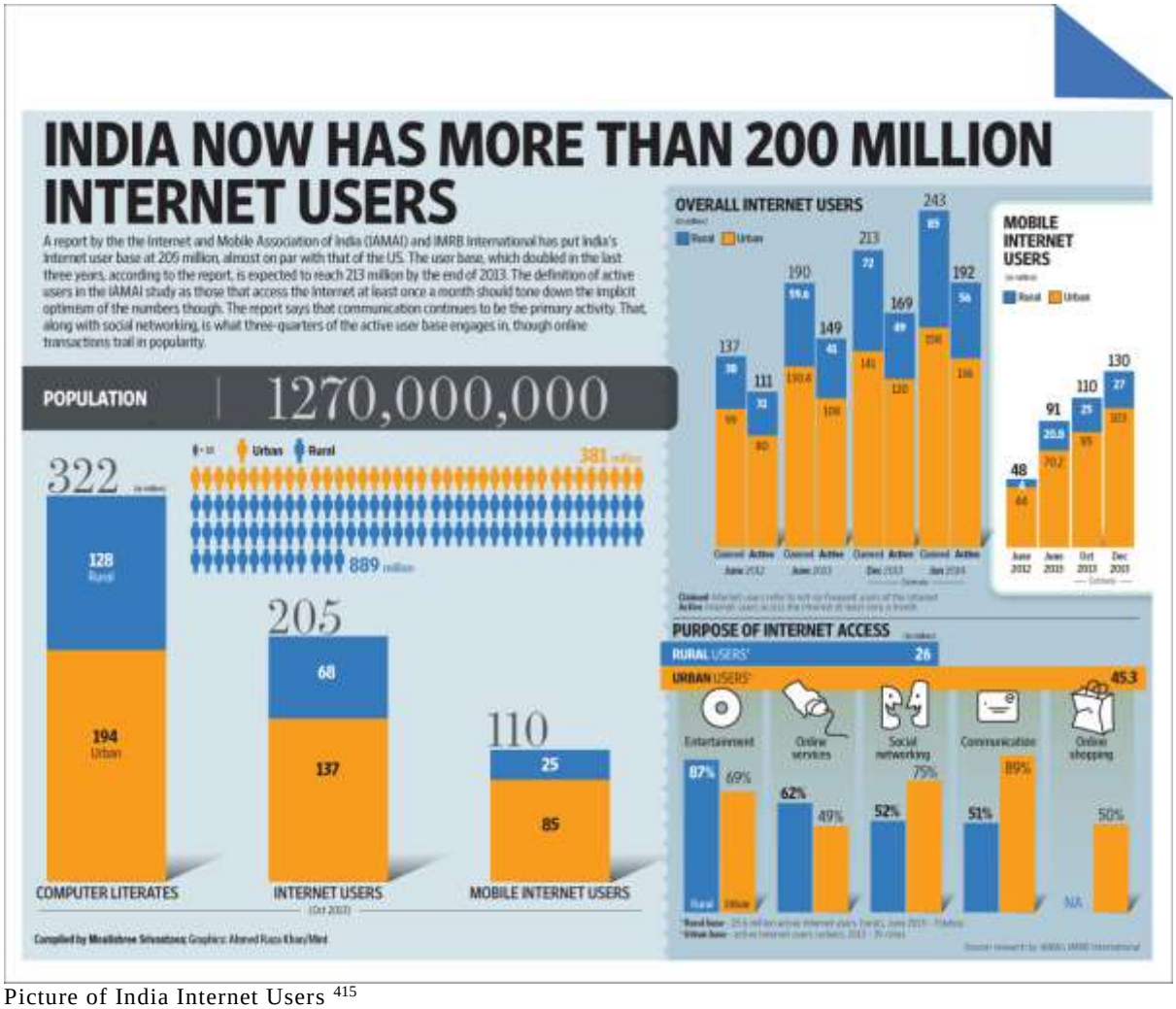
Although this puts India ahead of many countries as a numeric head in the number of internet users, India is still very far behind in terms of per capita internet usage. The ITU has been tracking the development of internet penetration in various countries and has the following findings:

	Percentage of Individuals using the Internet[414]												
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
India	0.53	0.66	1.54	1.69	1.98	2.39	2.81	3.95	4.38	5.12	7.50	10.07	12.58
China	1.78	2.64	4.60	6.20	7.30	8.52	10.52	16.0	22.60	28.90	34.30	38.30	42.30
Brazil	2.87	4.53	9.15	13.21	19.07	21.02	28.18	30.88	33.83	39.22	40.65	45.00	49.85
United States	43.08	49.08	58.79	61.70	64.76	67.97	68.93	75.00	74.00	71.00	74.00	77.86	81.03

The meager 12% penetration as of 2012 shows that not every demographic has an equal opportunity to access internet in India. The following are some of key findings of the study regarding usage and demographic profiles:

1. In the urban segment there has been a 29% growth in internet usage between January to June 2013, and a major chunk of growth has come from people belonging to smaller towns and lower SEC.
2. Youth, specifically college students are the largest user base of the internet in urban India, accounting for 29% active users, followed by young working men.
3. 42% users in rural India prefer accessing Internet only in local languages.
4. Online communication is the primary purpose of internet access in urban India (upto 90%), closely followed by social networking (close to 75%), whereas in rural India entertainment accounts for a large percentage of online usage (84%).
5. While the main access point for most users remains PCs at home, development of mobile connectivity has led to a rapid increase in the user base, particularly in the rural segment. The number of active mobile internet users is estimated to have grown to 27 million by December 2013.
6. On an average, people spend 204 minutes daily on the internet. This has grown by 19% over last year.
7. As of June 2013, there were 134.6 million Internet Non-Users. The three main reasons for not using the internet as identified by the report are i) Lack of Knowledge of Internet ii) Lack of Means (or infrastructure) iii) Beliefs (the Opinions held by the non-users)
8. English remains the language most widely used in accessing the internet, even in rural India (84%) as majority of the content is only available in the language, followed by Hindi.

414. Read more at http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, last accessed on January 29, 2014.



Picture of India Internet Users [415]

College Students

The college demographic is one that is most likely to have a laptop or PC which is one of the reasons for the recent rise in their internet usage. Previously, young men were the highest active users of the internet but in the past year, college growing students' who are using the internet have grown by 26% and have eclipsed the young men, now accounting for 29% of the active internet users. The social media apps and the general digital marketing catered towards the youth has been a huge cause of the growth in college students as users.[416]

While the figures speak for themselves in terms of the growth of the internet in India, questions of accessibility and usage remain a bone of contention. What are people using the internet for, and more importantly who are the people accessing and benefitting from the internet are key questions. The rise in the influence of the internet on students is having many questionable impacts on them as well. There are concerns about cyber bullying, which becomes easier when anonymity and is guaranteed and traceability is difficult.[417]

415. Image source: Livemint, available at http://www.livemint.com/r/LiveMint/Period1/2013/11/14/Photos/g_charticle_web.jpg, last accessed on February 6, 2014.
416. For more see "Internet in India 2013", Internet & Mobile Association of India, http://www.iamai.in/rsh_pay.aspx?rid=0xVjWOWUhSU=, last accessed on January 29, 2014.
417. For more see Marilyn A. Campbell, Cyber bullying: An old problem in a new guise?, available at http://eprints.qut.edu.au/1925/1/1925.pdf , last accessed on January 29, 2014.

There also concerns about addiction, to pornography and other forms of entertainment, which can have debilitating impacts on the youth's productivity in schools and colleges.[418]

Sexual exploitation and invasions of privacy are other concerns that, although need to be dealt with from other channels like law enforcement and security measures, nevertheless have been affecting students.

Emails or Gaming?

Clearly, the difference in internet penetration between urban and rural areas is marked, with the urban internet users being almost 50% more.

Among the 45.3 million urban internet users and the 29 million rural internet users, it has been established that an overwhelming majority (89%) of the urban population uses the internet for communication mostly through emails. A similar majority (87%) of rural users tend to use the internet for entertainment and gaming.[419]

This shows that in the urban work force, online networks are strongly established which facilitates the normalization of electronic communication while the internet is still a nascent phenomenon in the rural parts and isn't a staple for the work force. The second usage in urban populations is for social networking (75%) while it is online services (62%) for rural populations which further justify the notion that previously established online networks govern usage in urban populations and rural populations use the internet for its more direct functions.[420] The entertainment uses of the rural population include downloading music, movies and videos. A key factor here is also digital or more specifically PC literacy as a first step (which also determines the purpose of access and usage) which is still very limited in India. As a result, a lot of online services and e-commerce have yet to see steady growth. While digitization of sectors like telecommunications, banking and e-commerce has definitely transformed them and contributed to the GDP, the use of technology, specifically the internet is yet to scale up in several essential sectors such as agriculture, healthcare and several citizen services. Clearly, there are many constraints in the internet eco-system which prevent India from overcoming its digital divide.

Free Time Online

A recent poll in the UK showed that British housewives spend almost half their free time online, which is more time spent than any other social group in the world. A similar trend was observed with the television as housewives slowly annexed the medium as they became savvy with the technology. Housewives spent 47% of their free time online while students were the next demographic spending 39% of their free time online.[421] In India, statistics show that housewives are increasingly using their phones to access internet and they are mostly doing it

418. For more see Kimberley S. Young, "Internet Addiction: The Emergence of a New Clinical Disorder", *Cyber Psychology & Behavior*, January 1998, Vol.1, No.3: 237 – 244, available at http://online.liebertpub.com/doi/pdf/10.1089/cpb.1998.1.237, last accessed on January 29, 2014.
419. See citation 1.
420. See 'Social Media in India: 2012, Internet and Mobile Association of India and India Market Research Bureau, February 2013, http://articles.timesofindia.indiatimes.com/2013-03-12/social-media/37650668_1_media-users-social-media-active-internet-users, last accessed on January 28, 2014.
421. For more see Helen Pidd, "UK housewives are world's top internet surfers", The Guardian, December 31, 2008, available at http://www.theguardian.com/technology/2008/dec/31/internet-housewives, last accessed on January 29, 2014.

to access social media sites.[422] This is a demographic that remains relatively uninitiated in India but the potential for aggressive expansion in usage exists. While TV networks adapted their TV shows to the housewives and marketed it solely to them, the internet could become a space where the marketing is soon targeted less to the youth and more to the middle aged women.

Unit 25: All Type and No Play made Jack a Dull Boy

Is the porn loving, drink guzzling, pill popping addict, Jonathan Self, the hero of Martin Amis's Money a monster from another era? The way things have panned out, it would seem that Amis's satire of 80's excess has become a mirror of the shadow that the present has cast upon the past. The world Money created was one that was hyper saturated with porn. Porn was ubiquitous, not in it own skin, but through the porning of everything in society, from the Hollywood actors' names, (Lorne Guyland, Spunk Davis, Butch Beausoleil, Caduta Massi) to the fast food outlets (Rumpburger, Big Thick Juicy Hot One, Long Whoppers) to Self's girlfriend, who sleeps with him for money and makes him feel uncomfortable when her orgasms don't sound fake. When Self is browsing New York, a stripper questions him about what he does. He responds he's, talking about his life, "in pornography…Right up to here."

In 1984, porn was pre-coming to the mainstream, still in the roped-off back room of a video store with many social obstacles standing in one's way, culminating with the stare-down against the store clerk before dashing out with magazines and videos stashed surreptitiously in a brown paper bag. Pornography today has come into the mainstream and the mainstream has come to pornography with the proliferation of lad's mags, pole-dancing classes, book launches in sex shops, labioplasties and no age restrictions on the Google reservoirs. John Self, though, if he had lived on to 2013, would be finally wedded; to his computer.

The psychological effects of porn and its effects on society are beyond the scope of this discussion. We are more interested in a capitalistic discussion of pornography about the users and the choices that they seem to be making. Marx's idea of commodity fetishism itself changed, supplanted the idea of fetishising from a human-human dynamic to a human-thing dynamic so something that is so central to the modern economy being applied to sex can't be claimed as being novel. However, the concept of "search" has certainly forever emancipated the deviant (the word is used as literally as possible) from the purdahs around the harems of normativity or indeed heteronormativity. Mclintock talks about fetishism:

"The racist fetishizing of white skin, black fetishizing gold chains, the fetishizing of black dominatraces, lesbians, cross dressing as men the fetishizing of national flags, slave fetishism, class cross-dressing, fetishes such as nipple clips and bras in male transvestism, leather bondage, PVC fetishism, babyism and so on -- these myriad different deployments of fetishistic ambiguity cannot be categorized under a single mark of desire, without great loss of theoretical subtlety and historical complexity."

The free market for sexuality on the internet has provided a platform for exploring these desires but as markets tend to do, they have created oligopolies that house all the market requests. Xvideos is an adult content site that matches this description. According to the website Alexa, it is the 39th most visited website in the world and the 22nd most visited website in India. On this website, if you click on 'tags' you will find 2001 tags beginning with:

422. Read more at http://articles.timesofindia.indiatimes.com/2013-11-07/internet/43773633_1_internet-and-mobile-association-iamai-navi-mumbai

"-**hardcore** 1136, **18** 11887, **18y** 2370, **18years** 5248, **18yearsold** 8525, **18yo** 9312, **19** 1408, **19yo** 3132, **1on1** 2408, **69** 53021, **2011** 1640, **2012** 1128, **20inch** 10957, **21sextury** 4715, **3d** 5693, **3some** 7490, **POV** 142713, **about** 17782, **absolutely** 18835, **acrobat** 1565, **action** 3449, **actress** 2669, **adams** 1151, **adorable** 4839, **adult** 14420, **adultery** 3540, **african** 7021"….and ending with " **xxx** 41736, **years** 2463, **young** 182716, **youngandold** 1200, **younger** 41275, **youngteen** 2449, **youporn** 1194, **your** 1281, **yummytwinks** 2029, **zebra-lesbos** 1171, **zebragirls** 1216, **zorra** 1232, **zorras** 1476"

The case is similar with the other cyber-sex supermarkets like xnxx.com which ranks 84 on the Indian list of most visited websites in India and xhamster.com ranking in at 86. This online repository would like to state that an online repository like this does not grow to its staggering multi-national status without a strong demand for it. In fact, Google trends has come out with the Zeitgeist report for India which states that the Canadian Indian porn star Sunny Leone was the most googled name in 2013. Pornography has indeed become a preoccupation of the youth in India and sometimes even the not so young. In the past three years 199 cases have been booked under the IT Act and the perceived impacts of porn addiction continues to gnaw and pull at politicians, not least during state assemblies.

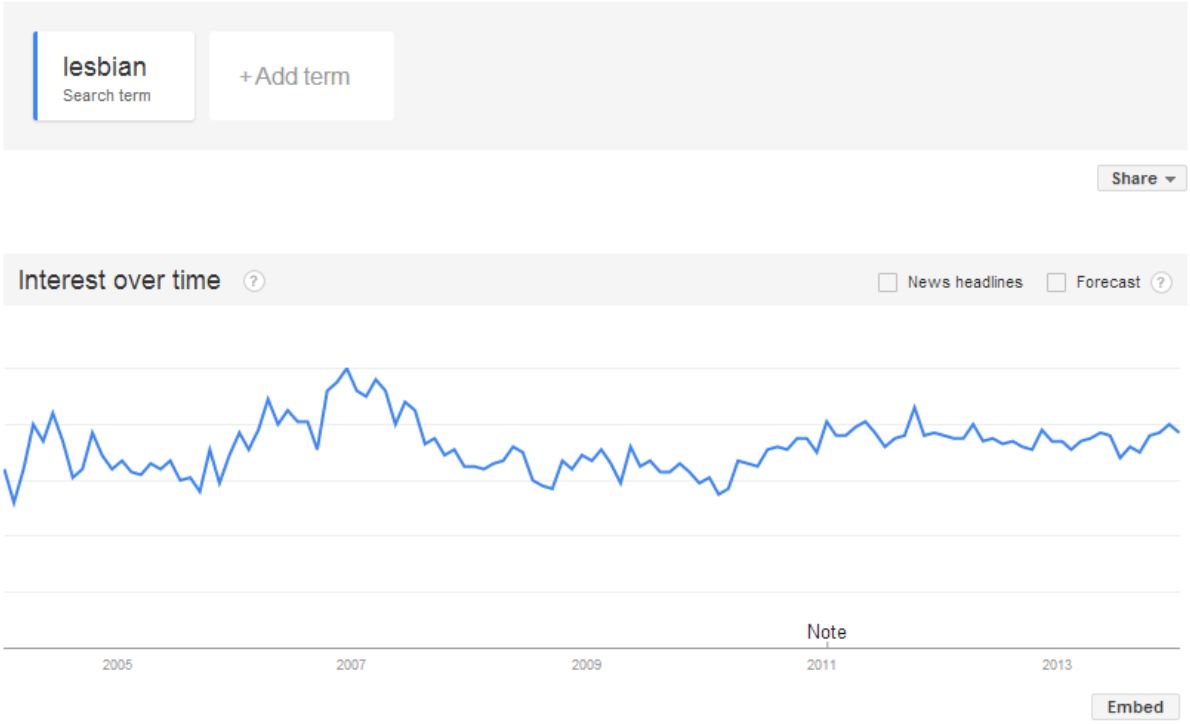
Picture of BJP MLA's browsing porn during the Karnataka Assembly. The mobile phone liberating our elected representatives.

In Ranchi, a 15 year old boy was caught by his father with pornography in his phone and laptop. When pushed further about how they came about there, he said a mobile phone accessory shop nearby uploaded them on to his phone. Mobile phone shops often sell porn clips to high school students at affordable prices. In what is imaginably an exciting experience for school children, especially in conservative societies, 10 minute long clips can be uploaded for Rs 10 and 20 minute clips can be uploaded for Rs 100 at mobile stores and sometimes even in cyber cafes.[423] With the advent of smart phones, these intermediaries have been removed from the equation.

[423] Read more at http://www.digitalattackmap.com/#anim=1&color=0&country=ALL&time=16106&view=map

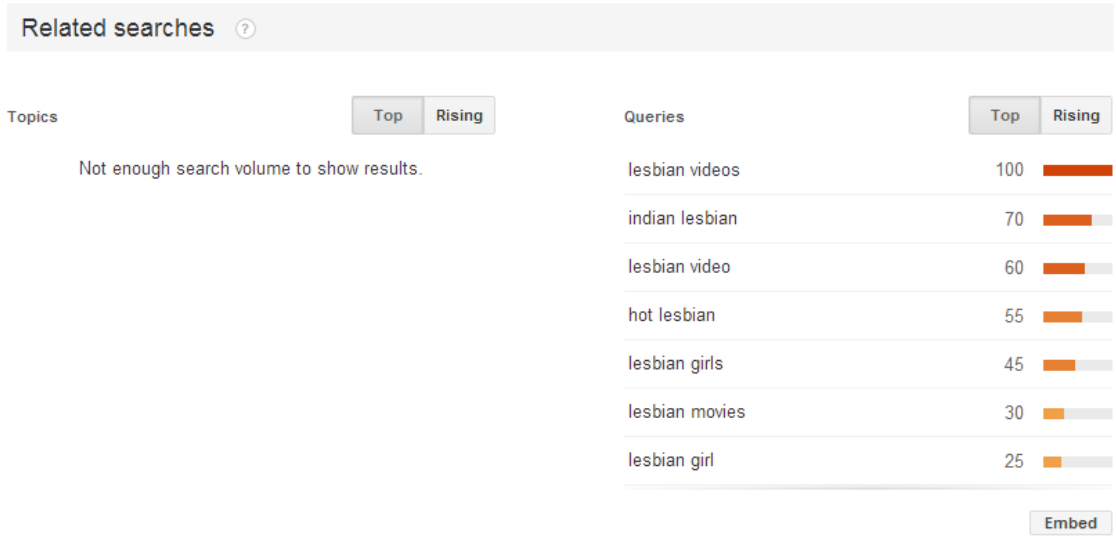
There are around 2 million hits per day on just YouPorn and Pornhub with market specific titles like “naked desi babes in bath” being one of the titles. [424]

Search histories, of course, like Antarctic ice illuminating carbon patterns tell us about the changing nature of sexual preferences through space and time. The word “lesbian” for example, has been a staple in the Indian Google searches, climaxing in 2007.

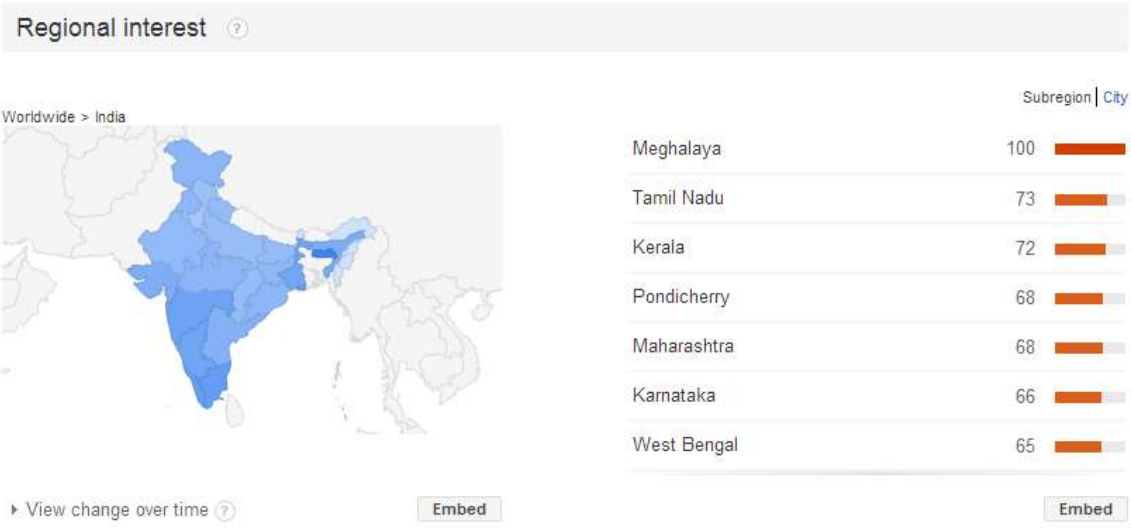


Some of the phrases that the word was found in include lesbian videos and hot lesbian so it is safe to assume that these searches were not in the quest to learn about the plight of sexual minorities in the country.

[424] Read more at http://articles.timesofindia.indiatimes.com/2013-07-13/ranchi/40553329_1_jharkhand-police-cyber-cafes-cyber-cell



The South dominates in the female queer research with the exception of Meghalaya which seems to be enamored by the idea.



Other searches like "gay" (other phrases being "gay sex", "porn gay" and "tranny" (other phrases being "tranny sex" and "tranny porn") seem to have peaked in 2007 with the exception of a sudden peak in late 2013 for the word gay which in all likelihood is explained by the Supreme Court's skit on anachronisms in the Indian Penal Code Section 377. It would be interesting to explore further, the significance of the years 2006-2007 in the context of sex and the internet.

The furtherance of privacy on the internet, facilitated primarily by physical privacy through mobile technology has also been a grand factor in the sexual diversification online. The significance of cyber cafés in India's past as a nation will be discussed further in the section on Access Points. India, as discussed in the obscenity section in Freedom of Speech, the production of porn is explicitly prohibited by law while the consumption is legal. If one wanted to view Indian actors in porn, then one would have to turn to user generated content in India in

the form of amateur porn. Traditionally, amateur porn involves unpaid actors and unprofessional directors but the advent of Web 2.0, a Porn 2.0 has arisen around the world and especially took off in India since the production of porn is illegal and the amount of pornography (especially if one considers things like Chatroulette or Omegle) is considerable.[425] According to Google Trends, Chatroulette became suddenly and extremely popular in 2010 and Omegle experienced the same phenomenon in 2011. Amateur porn is mainly circulated in India on video communities like Metacafe, Vimeo and Youtube and social sites like Tumblr and Twitter, general blogging like Blogger or Lookbook and photo hosting sites like Flickr and Photobuckets. There is the privacy concern in these cases it has escaped the industrial market and has become one of the most common place practices on the internet where it is impossible to establish the consent of the models. These radical changes show that the world of Jonathan Self with VHS tapes and Adult Movie Theatres has been profoundly changed in the age of the internet and laptops.

Unit 26: Internet Usage: Digital Natives

A quick look at the statistical growth of internet users and penetration, diversity in the users and the rate at which new users are joining the information circuits, is reassuring. One of the biggest concerns of the digital divide has been that because of a confluence of reasons – literacy, affordability, accessibility, geography, gender, etc. – the internet has created a divisive world where those with access are already experiencing and inhabiting a different universe. At the same time, the contexts that we live in – governments, administrative authorities, markets and even spaces of social communication and cultural production – are also rapidly transforming themselves to cater to the future that the digital technologies promise to build. Hence, mobile penetration, more agency and policies which encourage e-literacy and accessibility to communities of people who are on the fringes of development, are not only welcome, but significant to build more equitable futures.

However, the numbers are not always an indicator of what is happening on the ground. Is all internet access the same internet access? Jean Paul Sartre, had once imagined a community of seriality,[426] in his understanding of the broadcast technologies (radio, especially) and how it builds these structures of commonality. An example that illustrates Sartre's notion of seriality in relationship to electronic mass media is if a housewife at home making lunch, a homeless man in a queue waiting for a bus, a businessman riding in an elevator, and a robber holding a bank at gun-point, all belong to the same community of 'radio users' because of the then ubiquitous presence of the radio and the programme being broadcast in all these locations simultaneously. We can easily imagine how the digital world filled with ubiquitous technologies of computing and pervasive portable devices, has amplified this situation, where we are in an almost permanent condition of access. However, Sartre, and after him the cultural theorist Adorno,[427] had pointed out that this notion of common access needs to be further questioned. We know that when we encounter the internet, we do not have the same kind of access. Even when we might be using the same platforms, same applications or same interfaces,

[425] Read more at http://cis-india.org/internet-governance/blog/indian-express-august-25-2013-nishant-shah-out-of-the-bedroom

426. Jean-Paul Sartre, "7 Bureaucracy and the Cult of Personality", *Critique of Dialectical Reason*, 1960, available at http://www.marxists.org/reference/archive/sartre/works/critic/ussr.htm, last accessed on February 5, 2014.

427. Theodor Adorno and Max Horkheimer, The Culture Industry: Enlightenment as Mass Deception, *Dialectic of Enlightenment*, 1944, available at http://www.marxists.org/reference/archive/adorno/1944/culture-industry.htm , last accessed on February 5, 2014.

the meaning of access is very different, based on who we are, where we are located and what our intentions are.

Let's take the examples from different platforms. A student skimming through Wikipedia, trying to find some quick references for homework is very different from an editor who is bringing in new evidence to build a knowledge page on that platform. Somebody in a liberal country watching videos of cute cats on Youtube is in a very different relationship from somebody in a dictatorial regime trying to upload local videos of injustice or strife on the same platform. Innocent communication between friends on Facebook can take very sinister turns when it is used by paedophiles or predators to trap innocent and unwary victims. The email that we write for work is significantly different from the one that we share with our friends. We know that on an everyday practice level, the internet is not homogeneous and nor is our access to it. And yet, when we look at the statistical numbers, it presumes that people use the internet in the same way, and that all access is the same access.

This discussion, then, is about trying to look at the complexities and nuances that these numbers and information data streams can often hide. What are the differences in the way in which we access and use the internet technologies? How do we relate to the technologies of information and communication differently? What are our personal, subjective, collective, and social interactions that shape our understanding of who we are and where we belong to? How do we create policies, rules, regulations and mechanisms so that certain kinds of access conditions are regulated and controlled without infringing on the rights of others who use the same technologies for different purposes.

In India, we have experienced this dilemma several times. Whether it be teething trouble or technological naiveté of the government while dealing with issues on the internet, we need to complicate what we mean by an internet user, and nuance, further, the ways in which people use and interact, with and through the internet.

Digital Natives as Internet Users – A Conceptual Framework

Given this need, the Centre for Internet & Society, in collaboration with the Hivos Knowledge Programme (The Netherlands), started a research project titled 'Digital Natives with a Cause?' that tried to make sense of these monolithic and homogeneous identities that are often presumed in our research and policy around the internet. The ambition of the project was to question the way in which the 'young users' are imagined and policies are created to bolster and regulate their relationships with digital and internet technologies. Just as we have seen in the two stories around the banning of blogspot and yahoo groups, as well as in the earlier module around the DPS MMS scandal, there are very different kinds of users and many identities that have emerged in our interaction with the Internet. This conceptual framework around 'Digital Natives' is a way of showing how to complicate the notion of a 'user' of the internet by moving away from preconceived notion of what constitutes a user and what are the actions s/he performs while being online.

We began with a simple question: Who is a Digital Native? Even without explaining it or giving you scholarly references, you already, instinctively know what this might refer to. The easiest definition for a 'Digital Native' was provided by Mark Prensky,[428] to refer to a generation that grew up with the Digital rather than the one that had to transition from the analogue to the

428. Mark Prensky, Digital Natives, Digital Immigrants, *MCB University Press*, Vol. 9, No.5, October 2001, available at http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf , last accessed on February 5, 2014.

digital. According to Prensky, these young user of the digital, thought about the social, cultural and political shapes of information and communication differently. They instinctively take to technology, like 'fish to water',and in the process they are producing dramatic changes in the ways we live and love. Prensky set up an almost arbitrary time-line and suggested that all the people born after the 1980s are Digital Natives – these young people are going to be running the world in the future, and they already are changing it in small and significant ways.

But you can already see that this definition has a lot of problems in it. The Digital Native that is at the heart of Prensky's imagination of the digital technologies is a homogeneous one. Given the standard patterns of user behaviour online, Prensky's Digital Native would most probably be a white teenager, middle-class, English speaking, living in some part of the developed world, with access to education, and affording new digital devices and connectivity. This is often the 'global imagination' of the user of the internet. And we wanted to ask what happens if you do not fulfil any of these categories. What happens if you are young but a woman, living in a country, or belonging to a community or a family that does not allow for women to possess personal computing devices without the permission of her male guardians? You might be young and able to afford cutting edge gadgets, but what happens if you live in a country that has strict policies about what you can and cannot access online, and punishes you for doing what others might take for granted? Are you less of a digital native if you live in a slum in India, or you are a hacker with limited access to the internet because of power black-outs in your city? If you can code, but you are not conversant in English, and do not have the cultural currency to fluently navigate through social networking sites, does that mean that you are not a digital native either? And, the bottom line question is, that if you are not 24-7 connected, if you do not take access and connectivity for granted, if you have a skin colour that is different from Prensky's Digital Native, if you live in a different geography, if you experience technologies differently, does it mean that you are not a Digital Native?

We decided that instead of trying to imagine that the world is divided into people who are digital natives and people who are not, we should perhaps investigate what it means to call somebody a digital native. After all, there is nobody who calls him/herself a digital native without being conscious about it. Most people do not think of themselves as digital natives even when they are power users of the web. For most of us, it is a found name, an identity that makes sense, but not something that we identify with all the time. We do not live our lives as digital natives, but we do perform actions and transactions which sometimes make us feel like digital natives. And if these actions are not prescribed by age or contained by location, then maybe we need to think of digital natives differently.

Beginning with this idea, we started a series of conversations with people who self-identified or responded to the name 'digital native' in different parts of emerging ICT societies – East and South Asia, Sub-Saharan Africa and Latin America, and came up with a new way of thinking about this glorified user of the Internet – the Digital Native. You can find a range of stories, anecdotes, theoretical discussions, academic ideas, case-studies and videos that have emerged from these conversations, but what I want to leave you with is six ways in which we understood a 'Digital Native' differently through these processes.

1. One is Not Born Digital

Seductive as the idea is, that we are 'born digital' (Palfrey & Gasser) or 'growing up digital' (Dan Tapscott), it is clear that nobody is born an android. Questions of access, affordability, development, location, class, gender, sexuality, caste, religion – all the other things that shape the inequities and inequalities of our everyday life, also determine our access and affordability

to the digital. In other words, to be a digital native, to transform ourselves as digital and grow with the digital, are conditions or privilege. This is a privilege that cannot be merely naturalised. Conditions of literacy, e-literacy, education etc. are needed for somebody to get 'online'. Similarly, just being online or having access to technologies does not guarantee that somebody becomes a digital native. Once online, the young people often need help, guidance, protection and guidelines to understand how things might emerge. We must remember that the internet and indeed most of the technologies that we use and ascribe to digital natives, were built by people who transitioned to the digital, and that they understand the logics and logistics of these technologies better than somebody who might be well versed with using social networks but might not have any ownership of knowledge about how the digital works. So we need ongoing education – for those users who are savvy with the interfaces, but don't understand the mechanics of code, for those users who might know the backbone of the digital (maths, physics, electronics) but might not necessarily have the skills to be a part of the Web 2.0 revolutions, and for those users, who need help, education and resources to get themselves acquainted with the new world of the digital. However, if everybody needs help, and everybody has to transform themselves into becoming digital, then there is no such thing as 'Born Digital' – we all have to just find different moments of transformation and eventually become digital.

2. A Digital Native does not have to be young.

There is a 'Peter Pan' syndrome that is a part of the Digital Natives discourse. The Digital Natives grow old like all the rest of us, and yet, when we think of a Digital Native, s/he is always young. Even if we go by Mark Prensky's definition, the oldest digital natives are already in their mid-30s. They have jobs, they work in politics, they teach, they read and write and have families and responsibilities. But no matter how old the digital natives might be, we concentrate only on people in their teens, hoping that they will achieve the spectacular dreams and visions we have created for them and that they will harness the possibilities of the digital that we haven't yet quite done. So we decided that the digital native does not have to be somebody who is young – but is somebody who is able to restructure their lives because of their relationships with the digital. This can be somebody who finds social acceptance because they find an online community, or somebody who mobilises local resources using Twitter to fight against an injustice, or somebody who questions the status quo because of what they learn through the global circuits. The Digital Native does not have to be young – They just need to realise the ways in which they can change their lives because of the possibilities that the distributed and democratic digital technologies can offer.

3. A Digital Native is not a 'natural' state of being.

Presuming that the digital native is a natural user – that a user is just somebody who instinctively responds to the digital, is a huge fallacy. It hides the various and varied complex negotiations and learnings that individuals have to perform in order to find fluency in the registers and the languages of the digital. The idea that the user is just somebody with internet access, as if, all that is stopping the whole world to be digitally native is lack of access, is something that we need to question. Apart from concerns of infrastructure and capital, there are also a variety of negotiations that digital natives have to make, with institutions, with structures of language, with law and regulation, with policy and cultural practice, in order to establish a robust relationship with the digital. So the user cannot be taken for granted. The user is not born. The user has to be made, and that involves massive investment in literacy and capacity development which is often hidden in the idea of 'natural born users'.

4. The Digital Native does not have to be a superstar.

One of the biggest problems of talking about Digital Natives is that they are expected to be exceptional. So the young are either pathologised, painted as pornographers and pirates, hackers and spammers, involved in self-indulgent social networking, and unaware and apathetic to the world around them. Or they are expected to be the saviours of the world, overthrowing governments, fighting for human rights, and counteracting injustice. However, we have to realise that the digital identity that a user has, is only a part of who they are. The Digital Native does not exist only to hack or save the world. The Digital Native does not have to justify its actions only by looking at such exceptional cases. Instead, we need to conceive of an Everyday Digital Native – so that the digital is not a distinct identity, but integral to their everyday practices of life, labour, and language.

5. Digital Natives do not think only about things that are digital.

If we look at the Digital Natives only through their interaction with the digital, we might miss out on the fact that the digital is one of the components of their lives, and that it intertwines with various other roles that they play. A lot of Digital Natives research concentrates on the digital activities of the user – sexting, bullying, sharing, privacy, surveillance, online communities, mobilisation etc. all become the central focus points. However, the Digital Native is not just somebody who spends her time on the internet. Instead the digital native is somebody who straddles multiple systems of online and offline, and transfers the capacities and capabilities learned in one system to negotiation and building in the other. It is important to understand the Digital Native as deeply embedded and working through offline and non-digital concerns that are a part of the structural inequities of our societies.

6. Digital Natives are not all the same.

The biggest concern about the notion of a 'user' is that it presumes that because we use the same technologies, we are the same kind of people. It produces an imagined connectedness which does not recognise the huge imbalance of power and privilege which often is present in our online transactions. Questions of racism, misogyny, hate speech, are often not recognised because the imagination is that all the users on Facebook are the same kind of people. This further produces an idea that these same kind of people also do the same kind of things, and so we search for blue-prints of change or replicable models which can bring about Twitter Revolutions and contain Blackberry Riots around the world. The Digital Natives might often have similar technological choices and platforms that they use, but their independent interactions are shaped by the location, context and intentions, and it would be a mistake to think of them as a homogeneous community doing the same kind of things.

Moving past the findings of what constitutes and who is a digital native, we have to explore praxis in trying to research about and understand digital natives. In 'Digital Alternatives', it was found that "traditional approaches of research and practice fail to capture the nuances, politics and negotiations embedded in 'digital natives' everyday life". The rise of new technologies forces upon the researchers the need to use new methods of understanding and research.

Whether these digital natives can in fact create political or social change is a question that requires these different kinds of lenses. There have been many skeptics about the euphoria around youth and digital activism, Malcolm Gladwell[429] being the most famous of the lot. Some non-skeptics believe that the democratization or the un-institutionalization of the digital model of activism lead to positive collectivization and citizen-driven action bringing the groups

429. Read more at http://www.newyorker.com/reporting/2010/10/04/101004fa_fact_gladwell?currentPage=all

that were perhaps left out in the ’68 model of youth activism into the fray. The Digital Alternatives piece called “To Act” explores the positives and negatives of modern digital natives’ conception of activism. Gladwell’s juxtaposition of the civil right movement of the 60’s to the Arab Spring remains the most germane of comparisons. David Sasaki, while comparing the revolutions in ’68 France and ’11 Middle East says that the external discourse around the revolution now creates a large spectacle while the digital natives themselves have different perspectives on the events. The revolutionary battles of the 60’s were largely anti-corporate in nature and the irony is that the Facebook and Twitter revolutions of today are still fighting power in the corporate or political form. Though it is true that technology lends power and agency to the youth, how successful they are in mobilizing it still isn’t clear. The cry for revolution seems a lot easier than government and institution building after toppling the government.

It therefore becomes important to contextualize digital technology, as Adam Haupt puts it in his essay on “Defying Power Dimensions”, because technology may not have created agency but simply made the preexisting power picture visible.

Conclusion: Use/Abuse

When we talk of the users of the internet, then, we should realise that it is an empty category. It doesn’t really mean anything more than telling us that somebody has the possibility of going online. As we have seen with the digital natives, we need to invest more energy into understanding what kinds of users we are talking about. It is necessary to realise that the ‘user’ is an amalgamation of identities and that the digital can often serve as an anchor point to bring all of them together. Also, the user is not necessarily somebody who is just ‘using’ technologies. In fact, there is a wide range by which technologies, especially the digital, lend themselves to ‘abuse’. We are not talking about abuse as a simplistic pathology or a criminality. Let us think of abuse, instead as a creative force, where the possibilities of manipulating and morphing, remixing and remediating the digital content, allows users to question and transgress the boundaries and limitations that are often artificially put upon the digital objects and processes. This possibility of abusing the original intentions and designs of the digital often has legal and criminal repercussions for the users, who tread the thin line between creative usage and abuse. We also need to consider that apart from the legitimate and recognised users of the digital, there are deep dark spaces on the web, where many undesirable activities take place and factoring them into our understanding of a user, might reveal different approaches and understandings of how to deal with them.

Unit 27: Factors Affecting the Growth of Internet in India – The Digital Divide

The ‘digital divide’ in a simple manner is understood as lack of access to information technology, though at larger level it speaks of a knowledge gap which leads to the exclusion of certain sections of society from the digital eco-system and related discourses as such, and which is influenced by a variety of social, economic and cultural factors. The digital divide been described variously by several people:

The term "digital divide" refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for

a wide variety of activities. The digital divide reflects various differences among and within countries. (OECD Glossary of Statistical Terms).

Kenneth Keniston and Deepak Kumar in 'The Four Digital Divides' (2002) provide a more elaborate definition further saying that "The point is that "the digital divide" is really at least four divides, all closely related. The first is internal, between the digitally empowered rich and the poor. This gap exists in both the North as well as the South, although the baselines differ. The second linguistic-cultural gap is largely between English and other languages, or more generally, between "Anglo-Saxon culture" and other world cultures. The third is the gap exacerbated by disparities in access to information technology between rich and poor nations. Finally, there is the emergent intra-national phenomenon of the "digerati", an affluent elite characterized by skills appropriate to information-based industries and technologies, by growing affluence and influence unrelated to the traditional sources of elite status, and by obsessive focus, especially among young people, on cutting edge technologies, disregard for convention and authority, and indifference to the values of traditional hierarchies."

It is therefore inadequate to understand the digital divide solely as a problem of access; rather we would need to understand and problematise larger systems of knowledge production and dissemination, and the cultural and political factors that affect these, to capture fully the meaning of the term itself.

Although India ranks reasonably well in terms of trained human resources in and access to finance,[430] there are still several other factors that limit internet access and user adoption. Some of these factors are outlined below:

Physical Factors: Limited internet infrastructure with sufficient reliable bandwidth and high cost of access and usage are one of the foremost obstacles to internet adoption on a large scale. Average bandwidth per capita in India is lower than in many other aspiring countries. The penetration of PCs is only 47 per 1,000 people, which is much lower than in Argentina, Mexico, the Philippines, or Vietnam. Internet penetration among India's large rural population is just one-twelfth that of the urban population. Low availability of basic infrastructure, such as reliable electricity supply, is a key bottleneck in rural areas India has one of the highest median costs of broadband access among comparable aspiring countries — more than four times that of China, Brazil and Argentina, and 20 to 30 percent higher than that of Vietnam and Malaysia. (Mckinsey and Company: December 2012).

Social and Cultural Factors: Low PC and digital literacy, and exposure/awareness or lack of adequate knowledge and skills in using the internet is a major constraint in user adoption of technology. The problem is compounded by a low literacy rate in general and other factors such as age, socio-economic class, gender and language. Internet usage on a daily basis is the highest among the 18 - 30 age group (as per the IAMAI study), who also have the ubiquitous reputation of being 'digital natives' and hence have adopted the technology easily. Women, particularly in rural areas seem have lesser access than men, though this trend may be slowly changing. As per the IAMAI study, usage among working women has grown by 43% over the last year, making them account for a tenth of the Active Internet Users in the urban segment. Language is another key factor in determining access, particularly in the Indian context where a large part of the population does not speak English. The lack of software and technology such as Optical Character Recognition software and Unicode standards in regional languages further

430. See Online and upcoming: The Internet's impact on India, Mckinsey and Company, December 2012.

adds to this problem. According to the IAMAI Vernacular report 2012, 45 million users access content in the local language, which is a very small number compared to the total user base of 200 million. Of these 64 per cent of rural Internet users (24.3 million active users out of a total 38 million) use the Internet in the local language. But only 25 per cent of the total 84 million urban users browse the Net in regional languages (20.9 million). (The Hindu, January 11, 2013).

Digital Divide between East to West[431]

Efforts to Bridge the Digital Divide

National Mission on Education through Information & Communication Technology (NME-ICT) - Ministry of Human Resource Development, Government of India

This national initiative, also known as Sakshat was started in February 2009, with the objective of enhancing the Gross Enrolment Ratio, or GER, in Higher Education by 5%, to a total of 16%, a target of the 11th Five Year Plan. A budget allocation of Rs. 502 crores was made in 2008-09 for the initiative. The broad objectives of the NME-ICT are: (a) The development and field testing of knowledge modules having the right content to take care of the aspirations and to address to the personalized needs of the learners; (b) generating research in the field of pedagogy for development of efficient learning modules for disparate groups of learners; (c) standardization and quality assurance of contents to make them world class; (d) building connectivity and knowledge network within institutions of higher learning in the country with a view of achieving critical mass of researchers in any given field; (e) availability of e-knowledge contents, free of cost to Indians; (f) spreading digital literacy for teacher empowerment; (g) experimentation and field trial in the area of performance optimization of low cost access/devices for use of ICT in education; (h) providing support for the creation of virtual technological universities; (i) identification and nurturing of talent; (j) certification of

431. Image source: Asian Influences from East to West available at http://azncybercultures.blogspot.in/, last accessed on February 6, 2014.

competencies of the human resources acquired either through formal or non-formal means and the evolution of a legal framework for it; and (k) developing and maintaining the database with the profiles of human resources.

As of 2011, 419 institutions have been provided the infrastructure to access knowledge resources provided through this programme in the form of a digital repository of resources and online learning platforms, and have participated in field trials for low cost access/devices. Projects on the use of ICT in education at several independent institutions are also being supported by this initiative.

A key factor is the use of a low-cost Android tablet named Akash or Ubislate 7+, which is being promoted by the MHRD to link 25,000 colleges and 400 universities through an e-learning programme. The Aakash comes with a 7-inch touch screen, ARM 11 processor and 256 MB RAM. It has two universal serial bus (USB) ports and delivers high definition (HD) quality video. The tablet accesses applications from an independent market named Getjar instead of the Android market. The device is offered at a subsidized rate of to Rs.1130 for students in the NMEICT programme. (Wikipedia) Through this device, the programme aims to deliver high-quality and high-definition e-content, including video-lectures and resources to both graduate and post-graduate students across the country.

While the NMEICT is seen as one of large-scale efforts made to bridge the digital divide by providing that crucial last mile connectivity, there several problems and challenges that one may foresee. Ashish Rajadhyaksha in his monograph on 'The Last Cultural Mile' effectively summarises this problem, wherein he sees the technology-friendliness of education as driven by the imagination that "technologies are neutral and therefore intrinsically useful". Further, the 'uncritical' manner in which new content is introduced to uninitiated students belonging to diverse social backgrounds would be a point of contention, and concern that should be addressed. On the positive side, the introduction of such technologies and availability of knowledge resources outside the classroom may help to breakdown traditional notions of authority and the teacher –student hierarchy by making students more active stakeholders in the process of knowledge production and dissemination.[432]

In the field of education itself, the role of libraries and digitisation projects has been significant in efforts to bridge the digital divide. Information and Library Network (INFLIBNET) is an Autonomous Inter-University Centre (IUC) of University Grants Commission (UGC) involved in creating infrastructure for sharing of library and information resources and services among Academic and Research Institutions. INFLIBNET works collaboratively with Indian university libraries to shape the future of the academic libraries in the evolving information environment. INFLIBNET is involved in modernizing university libraries in India and connecting them as well as information centres in the country through a nation-wide high speed data network using the state-of-art technologies for the optimum utilisation of information. The primary objectives of the centre are to enable better systems of communication, enable access to materials (serials, theses/dissertations, books, monographs and non-book materials (manuscripts, audio-visuals, computer data, multimedia, etc), and bibliographic information in several languages, develop new methods of archiving and digitization as well as system design and training in the above. Through allied programmes such as the N-LIST, UGC INFONET and INDEST the centre also provides access to a wide range of e-resources across disciplines to universities and

432. See Ashish Rajadhyaksha, "The Last Cultural Mile: An Enquiry into Technology and Governance in India", *Centre for Internet and Society*, p. 158 – 163, available at http://cis-india.org/raw/histories-of-the-internet/last-cultural-mile.pdf, last accessed on January 28, 2014.

government-6,000 Govt./ Govt.-aided colleges in India. Apart from this there are several large scale digitisation projects such as National Mission for Manuscripts,[433] Digital Library of India[434] and National Library of India[435] which are working towards making resources available to a wider cross-section of people in India.

Other than education, there are several projects in other sectors. Some examples from e-governance, public administration and agriculture are: Kisan Call Centre project by the Department of Agriculture and Cooperation,Ministry of Agriculture,[436] Computer Aided Administration of Registration Department (CARD) project in Andhra Pradesh, the BHOOMI project in Karnataka,[437]the Gyandoot Project in Dhar, Maharashtra,[438]Lokamitra Smart Project in Himachal Pradesh etc. Apart from this, the Ministry of Information Technology has also set up several community information centres for rural development. Several private corporations, particularly in the IT industry have also been working in this area. The Microsoft Corporation has several initiatives in Community Affairs, Education and Language Computing, with a focus on local languages to which are aimed at creating a digitally inclusive society.[439]

As illustrated above, there are several efforts being made in various quarters to tackle the problem of the digital divide, though most of them still look at access as the key problem. It is important that like the problem itself, the solutions to need to be multi-dimensional and at several levels. With the advent of the internet and the processes of globalisation, there have emerged immense possibilities for those hitherto unconnected to be part of a single, networked society. However, with inclusion, comes also the challenge of ensuring that systemic forms of inequality that are very much present in the real world are not engendered or further perpetuated in the digital sphere.

Social Media

Social media in India has become an integral part of social socialization in the friendly context.

1. Recent estimates of IMRB International's ICUBE 2013 report, there were 78 million social media users in Urban India.
2. The report estimated that by December 2013, the number would have gone up to 91 million which would show a 17% growth rate.
3. Another recent report showed that Facebook users in India had crossed 92 million by the end of 2013 with another report suggesting that 97% of social media users in India were on Facebook, which vindicates the ICUBE predictions. [440]

This rise in the users of social media can be attributed to an increase in successful internet penetration as a result of smart phones, economical Internet data plans and feature phones. People use social media for a wide variety of reasons as listed in the table below.

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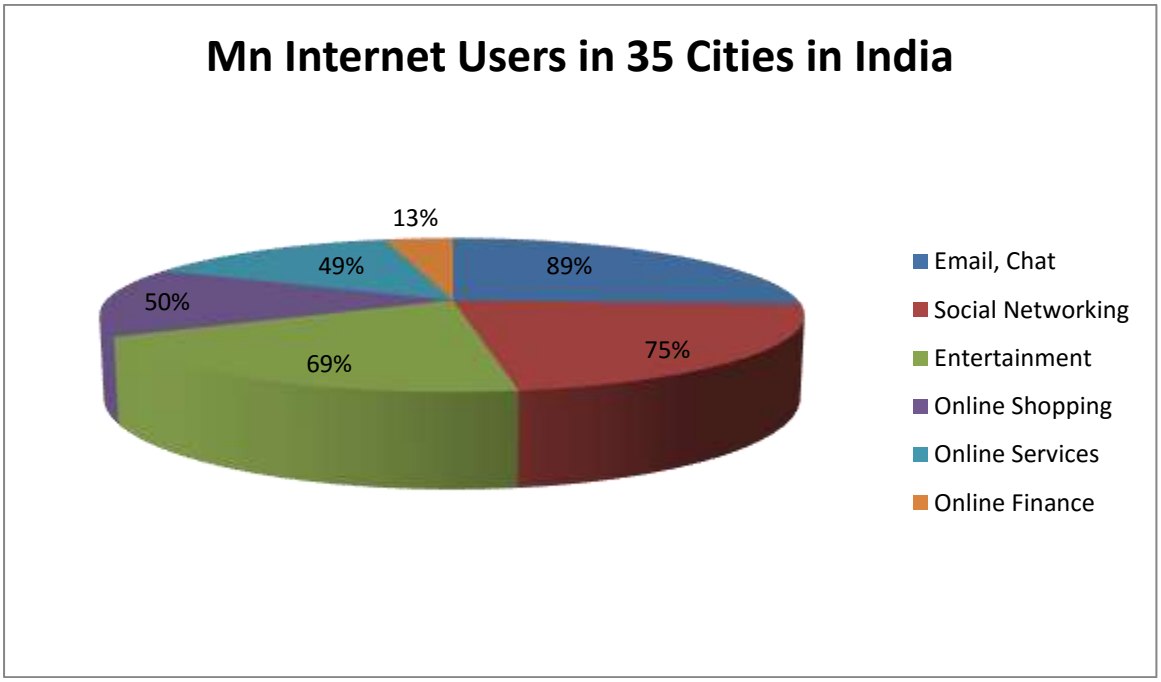
433. National Mission for Manuscripts, http://www.namami.org/ , last accessed on February 5, 2014.
434. Digital Library of India, Indian Institute of Science, Bangalore, http://www.new1.dli.ernet.in/, last accessed on February 5, 2014.
435. National Digital Library, *Department of Electronics & Information Technology, Ministry of Communications & Information Technology, Government of India*, available at http://deity.gov.in/content/national-digital-library, last accessed on February 5, 2014.
436. National Institute of Agricultural Extension Management, Ministry of Agriculture, Government of India, http://www.manage.gov.in/kcc.htm, last accessed on February 5, 2014.
437. Bhoomi, http://www.bhoomi.karnataka.gov.in/landrecordsonweb/ , last accessed on February 5, 2014.
438. Gyandoot, http://gyandoot.nic.in/, last accessed on February 5, 2014.
439. Microsoft, http://www.microsoft.com/india/msindia/msindia_ourmission_digitalinclusion.aspx, last accessed on February 5, 2014.
440. See Shilpa Sree, "Internet Users In India: 97% Of Social Media Users Access Facebook!! [Report]", *dazeinfo*, available at http://www.dazeinfo.com/2013/03/13/internet-users-in-india-97-of-them-use-facebook-report/, last accessed on January 29, 2014.



As discussed previously, however, these numbers tell a different story when looked at specifically in different demographics.

One of the surprising findings was that non-working women emerged as the new emerging demographic with nearly 10% of them currently accessing social media. However, the most important use of social media in the recent past we have seen is in political campaigns. We see this from the use of social media in the Obama presidential campaign, political organization in the Arab Spring and in elections in India as well. Social media is being used by political institutions at a faster rate with 2-5% of election budgets beings spent on social media initiatives.There is a large incentive for politicians to allocate an even larger sum of money as it has been estimated that 3-4% of the vote is achieved amongst social media users in India.[441]

It does so by drawing users to political content or propaganda when they visit the political advertisements, articles or web pages. The people who are influenced by the information then seek out and socialize which casts a wider net than just the digital users. Hence social media could indeed be influencing and by virtue of its political efficacy, be affecting the political lives of a large segment of the population.

Unit 28: Internet Access Points

According to the I-Cube report, the total number of internet users in India will reach 136 million by June of 2014. The potential access points that would assist in the 11% rise were predicted to be:
Home- 71%
Cyber Café- 36%
School/ College-15%
On the Go-15%
Friends'/ Relatives'-12%

441. See "IAMAI- Social Media in India- 2013" report.

Office-9%[442]

The cyber cafes, which enjoyed an unparalleled reign at the top of the list of internet access points has gone through a steady decline because of pervasiveness of mobile internet. The cyber cafés in India continue to survive because they offer other services like printing, scanning and operators help computer illiterates as a part of e-governance schemes.[443]

The common access point of internet has become an obsolete phenomenon in an increasingly private and atomized urban India. Computer literacy in rural India is only 14% and although 38.5% are mobile users, only 2.4% are mobile internet users which make community centers for internet access and any supplementary help germane.[444]The rise in rural internet usage has in fact been an integral factor in the rise in overall internet usage and the story is different there. The projected number of rural internet users is at 56 million by June of 2014.

Community Service Centres (CSCs) have played an important role in facilitating access to the internet in villages. Grameen Gyan Abhiyaan (Rural Knowledge Movement) started a mission in 2007 in order to bridge the digital and hence the knowledge divides that existed between the urban and rural parts of the country. The original plan was to have knowledge centers in all the 600,000 villages in India by the 15th of August, 2007. Some of the organizations working in partnership with the GGA are even developing creative technologies and applications for the ICT-based rural centers.[445] In terms of active internet users, the number of users has gone up by 57% which has corresponded with a 40% increase in CSCs. The closer the CSCs, the more the rural population tends to utilize them which explains the dominance of mobile devices as devices of internet usage. The PC/ laptop still dominates as the device for internet access as it accounts for 91% of internet access in India while mobile phones (54%) and tablets (10%) are the other important devices. This statistic is obviously very different for rural India which contains far fewer computer literates as the following diagram shows. It is therefore paramount that computer literacy education be made a priority in rural India.

Conclusion

Although there has been a meteoric rise in internet usage in India, there is still a long way to go. It has been established at this point, through the social connections, services and information housed in the cyber world, an internet expansion into people's lives is an unmediated good. Often times the main reasons for lack of penetration, especially in India revolved around lack of knowledge of the internet, poor infrastructure and deeply held primitivist convictions about modernity. Therefore, education and investment in infrastructure hold the keys to unlocking potential for access for the millions of non-users and by extension, potential for advancement.

Additional Readings

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442. See citation 1.

443. J Srikant, "E-governance hopes rise as India crosses 1 billion transactions", *The Economic Times*, October 29, 2013, available at http://articles.economictimes.indiatimes.com/2013-10-29/news/43495939_1_e-governance-cyber-cafes-deloitte-touche-tohmatsu-india, last accessed on January 29, 2014.

444. See citation 1.

445 Read more at http://www.mission2007.in/

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12. Renee Ridgway, "Digital Natives", http://www.youtube.com/playlist?list=PLhlVVCVpFbUNGxo8UOxbVZxEL6D5TPvbc