

Comments and Recommendations to the TRAI
Consultation on

Auction of Spectrum in frequency bands identified for IMT/5G

10 January 2022

By **Abhishek Raj**¹, **Steve Song**², **Udbhav Tiwari**³ (in alphabetical order)

Reviewed by **Arindrajit Basu**⁴

A joint submission by the Centre for Internet and Society (CIS), India & Mozilla on the merits of a “use-it-or-share it” approach for spectrum to help bridge the rural connectivity gap.

¹ Researcher at the Centre for Internet and Society. For correspondence, reach out on email: abhishek@cis-india.org

² Policy Advisor at Mozilla. For correspondence, reach out on email: ssong@mozilla.com

³ Policy Advisor at Mozilla. For correspondence, reach out on email: utiwari@mozilla.com

⁴ Research Lead at the Centre for Internet and Society. For correspondence, reach out on email: arindrajit@cis-india.org

Table of Contents

Preliminary	2
Introduction	3
Re-thinking the conventional wisdom of ‘spectrum scarcity’ due to the barriers it creates for smaller operators	4
Responsive spectrum management can help bridge the digital divide	5
Challenge with Coverage Obligations	6
Limitations of unlicensed Wi-Fi spectrum and the need to provide small operators access to wireless broadband spectrum	7
Digital Inclusion through Spectrum Auctions: Need for a Use-or-Share approach	8
Right to Exclusivity vs Right to Protection from Interference	10
Conclusion	11

Preliminary

The Centre for Internet and Society (CIS) is a non-profit organization that undertakes interdisciplinary research on the internet and digital technologies from policy and academic perspectives. Through its diverse initiatives, CIS explores, intervenes in, and advances contemporary discourse and practices around the internet, technology, and society in India, and elsewhere. Over the last decade, CIS has worked extensively on policy issues related to telecom, internet access, and digital inclusion, etc. and has also contributed to various TRAI consultations in the past.

Mozilla is the maker of the open-source Firefox web browser, the Pocket “read-it-later” application and other products and services that collectively are used by hundreds of millions of individuals around the world. Mozilla is also a global community of contributors and developers who work together to keep the internet open and accessible for all. As a mission-driven technology company and a non-profit foundation, we are dedicated to putting people in control of their online experience, and creating an internet that is open and accessible to all. To fulfill this mission, we are constantly investing in the security of our products, the privacy of our users and in advancing the movement to build a healthier internet.

We appreciate the continued efforts of the Telecom Regulatory Authority of India (TRAI) to have consultations on important policy issues. We are grateful for the opportunity to put

forth our views and comments to the consultation paper on "[Auction of Spectrum in frequency bands identified for IMT/5G](#)"

Introduction

The internet has proven to be a necessity for socio-economic development in both developing and developed countries.⁵ Broadband (or, high-speed) internet access is a powerful tool not only for delivering essential services such as education and healthcare but also offering increased opportunities for women empowerment and environmental sustainability, and contributing to enhanced transparency and accountability of government.⁶

The COVID-19 pandemic has only highlighted the need for *meaningful universal connectivity*⁷, i.e. among other things, internet access should be “available, accessible, relevant, and affordable” across the world. The pandemic has made it clear to the policy-makers and communication regulators that inclusion must be a top priority if the Internet is not to become an amplifier of inequality. Communication technology is a natural amplifier of human activity. Those with affordable access to communication move forward while those without are quite literally invisible to the connected. The inescapable conclusion is that inclusiveness, making sure everyone has affordable access to broadband, must be a policy priority.

We hope this joint submission encourages the TRAI to consider “use-it-or-share-it” provisions in the upcoming IMT 5G auctions and spectrum management in general. In particular, our objective is to assist TRAI to formulate a strategy that ensures that spectrum will be available to serve the connectivity needs of rural/remote populations. We believe that including these provisions can have a positive impact to increase digital inclusion in India.

⁵ World Bank. Connecting for Inclusion: Broadband Access for All.

<<https://www.worldbank.org/en/topic/digitaldevelopment/brief/connecting-for-inclusion-broadband-access-for-all> >; Song, S., Moreno, C. R., Esterhuysen, A., Jensen, M., & Navarro, L. (2018). The rise and fall and rise of community networks. *Global Information Society Watch*. p7-12.

<<https://espectro.org.br/sites/default/files/downloads-article/APC%20-%20GisWatch%202018.pdf> >

⁶ World Bank. Connecting for Inclusion: Broadband Access for All.

<<https://www.worldbank.org/en/topic/digitaldevelopment/brief/connecting-for-inclusion-broadband-access-for-all> >

⁷ State of Broadband Report 2019: Broadband as a Foundation for Sustainable Development. Geneva. International Telecommunication Union and United Nations Educational, Scientific and Cultural Organization.

<https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.20-2019-PDF-E.pdf >

Re-thinking the conventional wisdom of ‘spectrum scarcity’ due to the barriers it creates for smaller operators

In conventional principles, spectrum, especially the mid-band spectrum, is visualized as a ‘scarce natural resource’. Spectrum management strategies are naturally centered around this principle. However, the reality is that most government and commercial bands are underutilized.⁸ Scarcity of spectrum as a natural resource is a principle that applies more to urban areas than rural areas; in rural areas, a large amount of spectrum remains unused.

The spectrum licenses, or the *right to use certain specified radio spectrum frequencies*⁹ are typically national or sub-national in scope.¹⁰ As a result, the national mobile operators tend to orient their business models towards investing in more densely populated urban areas. Urban areas have a large customer base and higher income levels. Therefore, operators pin their hope for a higher return on investment (ROI) from such areas. On the contrary, rural and remote areas have a lower population density coupled with lower income levels. As a consequence, operators don’t want to make a large investment in rural areas. The unfortunate result is that the spectrum in many rural and remote areas, even though assigned to an operator, remains unused.¹¹

For the exclusively-licensed spectrum, a property-rights-based approach that guarantees exclusivity to the license holder is the international norm for the IMT frequency bands. Undoubtedly, this model has enabled highly successful investment in national mobile telephony (and now mobile broadband) networks all over the world. However, as demand for spectrum has exceeded its administrative availability, the cost of access to IMT spectrum has risen dramatically. While this may be a boon to governments who see the telecom sector as a critically-needed influx to the treasury, the rise in the cost of spectrum has had the

⁸ Calabrese, M. (2021). Use it or Share It: A New Default Policy for Spectrum Management. Available at SSRN 3762098. <https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3762098_code2826029.pdf?abstractid=3762098&mirid=1>

⁹ See p. 7 of 174, Notice Inviting Application for Auction of Spectrum <https://dot.gov.in/sites/default/files/Notice%20Inviting%20Applications%20%28NIA%29%202021_1.pdf>

¹⁰ In India, a Unified License holder with authorization of access services can submit an application for obtaining the *right to use of spectrum* which is given through auction of spectrum at a sub-national level, called Licensed Service Areas.

¹¹ Song, S., Rey-Moreno, C., & Jensen, M. (2019). Innovations in Spectrum Management: Enabling community networks and small operators to connect the unconnected. *Internet Society*. <<https://www.internetsociety.org/resources/doc/2019/innovations-in-spectrum-management/>>

unintended consequence of establishing an insurmountable barrier¹² to smaller operators who are the likely source of innovation needed to bridge the digital divide.

Recently, the vice-chairperson of a leading telecom operator of India made a statement that very well enlightens the discussion:

“...If the spectrum price remains too high, then quite clearly with lack of funds the operators will have to confine the rollouts to top cities only, which definitely would not be desirable”¹³

Responsive spectrum management can help bridge the digital divide

Telecommunications has evolved from a state-owned public utility sector to a more liberalized and private-dominated sector. There is no denying that liberalization and privatization of the telecommunications market resulted in a massive investment in telecom infrastructure and remarkable spread of telecommunication networks around the world, not to mention the growth of the internet.

However, despite this growth, we still see an existing digital divide between rural and urban areas, poor and rich areas. As per the TRAI's Performance Indicator Report (April-June 2021), the urban teledensity is 140.86 %, but the rural teledensity is only 60.10 %. Similarly, urban internet subscriber density (internet subscribers per 100 population) is 105.06 %, whereas rural internet subscriber density is only 37.74 %. A digital divide is clearly evident between rural and urban India.

The growing value of "being connected" coupled with slowing growth in poor and rural areas suggests that favorable provisions are needed to incentivize and lower the cost of access to the unserved and under-served. Quoting from a Global System for Mobile Communications Association (GSMA) paper, which has summed up this issue very well.

"The lack of coverage in rural areas is the consequence of a basic economic challenge: deploying infrastructure in remote areas can be twice as expensive, while revenue

¹² India may have finally realised it needs to reduce 5G spectrum base price. Disruptive.Asia
<<https://disruptive.asia/india-to-reduce-5g-spectrum-base-price/>>

¹³ Taneja, M. (2021) 5G to remain confined to top cities if spectrum price is high: Akhil Gupta. *ET Telecom*
<<https://telecom.economictimes.indiatimes.com/news/5g-to-remain-confined-to-top-cities-if-spectrum-price-is-high-akhil-gupta/88291735>>

opportunities are as much as ten times lower, a combination that deeply affects the business case for MNOs to deploy infrastructure."¹⁴

Challenge with Coverage Obligations

Coverage obligations or roll-out obligations have been in use in operator and spectrum-licensing frameworks since the 1990s. These obligations are an attempt to ensure the equitable provision of telecommunication services. While little has been documented regarding operator compliance with coverage obligations, it is an 'open secret' that many operators fail to meet their obligations by hoarding spectrum,¹⁵ preferring to either engage in lengthy debate as to whether they have met their obligations or to simply pay a fine rather than undertake investment in less profitable regions in order to meet their obligations.

This is not to say that coverage obligations are altogether a bad idea, or that they don't work at all, or that operators always default on obligations. But rather we want to emphasize that complementary mechanisms (such as spectrum sharing or 'use it or lose it provisions') are needed to mitigate risk. There is a need for a more affirmative, non-punitive (i.e. sharing unused spectrum rather than losing it) approach than use-it-or-lose-it build-out requirements.¹⁶ A more responsive spectrum-management framework, that enables cooperation between large and small players alike, is the need for the hour. This can enable the market to adapt to changing requirements, such rapid increase in demand for connectivity during the COVID-19 pandemic, in rural and underserved regions.

Although the application of universal service funds in some countries has been able to mitigate some of these problems in bridging the connectivity divide by subsidizing the capital costs of rural deployments, the operational costs in many cases still do not match the income levels in rural areas. In India, a sizable portion of Universal Funds has gone into building a state-sponsored optical fibre backbone network through *Bharat Net* with an assumption that the private sector will build access networks at user level in the last mile.¹⁷ But, there have

¹⁴ GSMA (2018). Enabling Rural Coverage: Regulatory and policy recommendations to foster mobile broadband coverage in developing countries.

<https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/02/Enabling_Rural_Coverage_English_February_2018.pdf>

¹⁵ Sandeep Joshi. New policy will force operators to pay for spectrum hoarding. The Hindu.

<<https://www.thehindu.com/news/national/new-policy-will-force-operatorsto-pay-for-spectrum-hoarding/article2604595.ece>>

¹⁶ Calabrese, M. (2021). Use it or Share It: A New Default Policy for Spectrum Management. p.6. Available at SSRN 3762098.

<https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3762098_code2826029.pdf?abstractid=3762098&mirid=1>

¹⁷ Ponappa, S. (2020). Response to TRAI Consultation Paper on Broadband Connectivity and Speed.

<<https://cis-india.org/telecom/cis-trai-consultation-response-broadband>>

been very few takers for the *Bharat Net* infrastructure and rural internet access through this infrastructure has not really happened.

Limitations of unlicensed Wi-Fi spectrum and the need to provide small operators access to wireless broadband spectrum

We are already aware of the economic value that can be unlocked when wireless technologies are made available through a combination of affordability and regulatory accessibility through license-exempt regulation or Wi-Fi. It is estimated that the *baseline*¹⁸ (i.e. 2.4 and 5 GHz Wi-Fi) economic value of Wi-Fi in India alone in 2021 is USD 130 billion, which is forecasted to reach USD 177 billion by 2025.¹⁹ License exempt spectrum represents one of the few avenues through which small operators can enter the wireless broadband market. Small operators have leapt to take advantage of improvements in Wi-Fi technologies as both an access and a backhaul technology.

However, Wi-Fi has distinct limitations, evident especially when it is used to service more sparsely populated regions. The restricted power output of Wi-Fi – which enables its license-exempt status– also has the impact of significantly increasing the number of access points required to cover a given region.²⁰ If we were to compare LTE and Wi-Fi in terms of coverage, what a single LTE base station can cover might actually require dozens or even hundreds of Wi-Fi access points in order to provide the same coverage.

There is a need to empower and create an ecosystem for small operators by providing them access to wireless broadband spectrum beyond certain license-exempt frequencies. We believe this can be achieved through a use or share approach, described in more detail below.

¹⁸ Regulations in India allow license-exempt usage only in 2.4 GHz and 5 GHz band.

¹⁹ Source: The Economic Value of Wi-Fi: A global view (2021-25). Authors: Raúl Katz, Juan Jung, Fernando Callorda. <https://www.wi-fi.org/downloads-public/The_Economic_Value_of_Wi-Fi-A_Global_View_2021-2025_202109.pdf/37346 >

²⁰ Deepak Gupta. 4G vs WiMax vs Satellite, which Internet is better for rural areas. TechUnwrapped. <<https://techunwrapped.com/4g-vs-wimax-vs-satellite-which-internet-is-better-for-rural-areas/>>

Digital Inclusion through Spectrum Auctions: Need for a *Use-or-Share* approach

The National Digital Communication Policy (NDCP) 2018 recognizes *spectrum as a key natural resource for 'public benefit' to achieve India's socio-economic goals.*²¹ Telecom Minister Ashwini Vaisnaw, recently in an interview, remarked about the 'public good' element in spectrum pricing and striking a balance between maximizing revenue and maximizing services to the poor.²² Quoting his statement:

“Earlier, spectrum was seen as a resource that should maximize revenue. Today, there is a balance in thought process between maximizing revenue and providing maximizing service to the poor... somewhere the balance should be struck... that balance is today in a consultation process in the country.”²³

With this backdrop, we suggest that there is an opportunity to bridge the chasm that exists between expensive exclusive spectrum licensing and the license-exempt ecosystem in the auctions by enshrining “use-it-or-share-it” provisions in the spectrum licenses that will be issued to winning bidders. Not to mention, this is also applicable for the upcoming auction of IMT 5G bands. This would effectively alter the rights of the primary spectrum licensee from “right to exclusivity” to “right to protection from interference”.

In concept, ‘use-it-or-share-it’ rules enable the regulator to grant secondary access to licensed or governmental spectrum that is unused or underutilized.²⁴ ‘Use-it-or-share-it’ rules expand the productive use of spectrum without risking harmful interference or undermining

²¹ See 1.8 on p. 16 of 24, National Digital Communication Policy, 2018
<https://dot.gov.in/sites/default/files/2018_10_29%20NDCP%202018.pdf >

²² PTI (Dec 13, 2021) Public good' element in spectrum pricing now widely recognised: Telecom minister Ashwini Vaishnaw. *Zee Business*
<<https://www.zeebiz.com/india/news-public-good-element-in-spectrum-pricing-now-widely-recognised-telecom-minister-ashwini-vaishnaw-173290> >

²³ Balancing service to poor spectrum revenue is key. *The Hindu*
<<https://www.thehindu.com/business/public-good-element-in-spectrum-pricing-now-widely-recognised-telecom-minister/article37944598.ece> >

²⁴ Calabrese, M. (2021). Use it or Share It: A New Default Policy for Spectrum Management. *Available at SSRN* 3762098.
<https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3762098_code2826029.pdf?abstractid=3762098&mirid=1 >

the deployment plans of primary licensees.²⁵ A use-it-or-share-it policy is based on a more *affirmative, non-punitive approach compared to the current “use-it-or-lose-it” build-out requirements.*²⁶

Recognizing that large amounts of the licensed spectrum remain unused, especially in rural areas, regulators around the world have begun to implement shared spectrum regulation that continues to empower spectrum license holders while at the same time unlocking access to spectrum in areas where operators have no strategic interest.

The United States of America (USA): Federal Communications Commission (FCC), communication regulator of the USA, has been a pioneer in implementing opportunistic spectrum sharing. FCC has implemented various measures that are mostly a variation of ‘use-or-share’ provisions. A major instance of use-or-share provisions is in the 3.5 GHz spectrum with Citizen Broadcast Radio Services (CBRS).²⁷ CBRS is a three-tier dynamic sharing framework that contains a three-tier access licensing framework from license-exempt to exclusive use.²⁸

It is encouraging to see that TRAI, in annexure 4.3 of the consultation paper, has also taken the efforts to study spectrum management scenarios in different countries such as the USA, UK, etc. However, the review has been taken keeping in mind only the private networks.

United Kingdom: In the United Kingdom, the regulator (OFCOM) introduced a “Local Access License”²⁹ in 2019 which offers access to spectrum that has already been licensed to existing mobile network operators in locations where they are not using their spectrum.

Canada: Recently, the Canadian Regulator- Innovation, Science and Economic Development Canada (ISED) has issued a public consultation³⁰ to formulate a shared spectrum strategy that supports rural and remote deployments. The proposed strategy, seemingly similar to OFCOM’s

²⁵ Calabrese, M. (2021). Use it or Share It: A New Default Policy for Spectrum Management. Available at SSRN 3762098.

<https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3762098_code2826029.pdf?abstractid=3762098&mirid=1>

²⁶ Calabrese, M. (2021). Use it or Share It: A New Default Policy for Spectrum Management. Available at SSRN 3762098. P.6

<https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3762098_code2826029.pdf?abstractid=3762098&mirid=1>

²⁷ FCC: Citizens Band Radio Service (CBRS). April 13, 2017

<<https://www.fcc.gov/wireless/bureau-divisions/mobility-division/citizens-band-radioservice-cbrs>>

²⁸ FCC: Citizens Band Radio Service (CBRS) . April 13, 2017

<<https://www.fcc.gov/wireless/bureau-divisions/mobility-division/citizens-band-radioservice-cbrs>>

²⁹ OFCOM: Local Access Licence - Guidance document (2019)

<https://www.ofcom.org.uk/_data/assets/pdf_file/0037/157888/localaccess-licence-guidance.pdf>

³⁰ Consultation on New Access Licensing Framework, Changes to Subordinate Licensing and White Space to Support Rural and Remote Deployment. August 2021 <<https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11717.html>>

strategy, includes introduction of a new supplementary licensing process (Access Licensing framework) for licensed but unused spectrum.

South Africa: The Independent Communications Authority of South Africa (ICASA), has recognized the need to act on underutilized spectrum. Quoting from *2nd Information Memorandum*

“to be shared with ECNS licensees in areas that spectrum is not utilised to stimulate competition, promote SMMEs and cooperatives, and ensure that the radio frequency spectrum is used efficiently in accordance with section 2 (f), (p) and (e) of the ECA, respectively.”

The memorandum also provides for the sharing of spectrum licensed to primary spectrum holders in cases where the licensed spectrum is not fully utilised.

“11.6.2 In cases where the spectrum is not fully utilised by the licensee within 5 years of issuance of the Radio Frequency Spectrum Licences, the Authority will initiate the process for the Licensee:

11.6.2.1 to share unused spectrum in all areas to ECNS licensees who may, inter alia, combine licensed spectrum in any innovative combinations in order to address local and rural connectivity in some municipalities including by entrepreneurial SMMEs;

11.6.2.2 to surrender the radio frequency spectrum licence or portion of the unused assigned spectrum in accordance with Radio Frequency Spectrum Regulations, 2015”

While the timeframe of 5 years is problematic, included most likely due to the set time period of 5 years meeting coverage obligations; the ICASA nonetheless recognized the *use-or-share* provisions for spectrum management.

Right to Exclusivity vs Right to Protection from Interference

The key to unlock and open up the access opportunities depends on how we frame IMT spectrum licenses (or, right to use spectrum). Historically, spectrum licenses have provided a guarantee of exclusivity of spectrum access across an entire service area. As such, any decision to share spectrum is then vested in the license holder who may not have significant incentive to share spectrum. However, the buzz for change started with the publication of a presidential report in the USA on Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth.³¹ In this report, it was proposed that the *right to exclusivity* in

³¹ Report to the President on Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth. Executive Office of the President. *President's Council of Advisors on Science and Technology*. July 2012

spectrum licensing be transformed into a *right to protection from interference*. This subtle but profound change enables the regulator to implement spectrum sharing in a manner that preserves all the rights of the primary licensee but unlocks the potential of unused spectrum.

For instance, see clauses in in Section 4.2 of the OFCOM 800MHz and 2600MHz license³² which states:

“4.2 For the avoidance of doubt the Licences will not guarantee exclusive use of the spectrum awarded. In the future we may grant additional authorisations to allow the use of all, or part, of the spectrum, including the spectrum that is the subject of this Award Process. We would develop and consult on the conditions of use under any such additional authorisations in order to manage the risk of harmful interference.”

Yet, another instance can be found in the renewal of the PCS license³³ in Mexico:

"8.6. Services for secondary use. The Institute reserves the right to grant other authorisations for the use, development and exploitation of the frequency bands that are the subject of this Radio Spectrum concession, or portions thereof, for secondary use. In such case, the use of the bands subject to this Radio Spectrum concession shall be protected against harmful interference. "

Clauses such as this extend spectrum sharing beyond generic sharing frameworks as they have in the UK with the Local License framework and in Mexico where the regulator has set aside spectrum for underserved regions.

Clauses such as the above enable a “use-it-or-share-it” approach to spectrum licensing. This contrasts with “use-it-or-lose-it” policies, as mentioned previously, which have proven challenging to implement given the significant sunk costs of the licensees.

Conclusion

In conclusion, we recommend the TRAI to develop—and recommend to the Department of Telecom, “use-it-or-share-it” provisions for spectrum licenses (or, right to use) issued in the

<https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf >

³² OFCOM: The award of 800 MHz and 2.6 GHz spectrum Information Memorandum. July 2012

<https://www.ofcom.org.uk/data/assets/pdf_file/0022/32872/im.pdf >

³³ <https://rpc.ift.org.mx/vrpc//pdfs/68531_190715125729_364.pdf> Original text in Spanish. "8.6. Servicios para uso secundario. El Instituto se reserva el derecho de otorgar otras autorizaciones para el uso, aprovechamiento y explotación de las bandas de frecuencias objeto de la presente concesión de Espectro Radioeléctrico, o porciones de las mismas, para uso secundario. En tal caso, el uso de las bandas materia de esta concesión de Espectro Radioeléctrico contarán con protección contra interferencias perjudiciales."

context of the proposed auctions for the IMT 5G Bands. We believe that license provisions that guarantee the license holder the *right to protection from interference* as opposed to *absolute exclusivity* are better suited to achieve the efficient use of spectrum as well as more affordable access to communications in underserved regions. These provisions which aim for digital inclusion in the spectrum, can be a precursor to an enabling environment for greater digital inclusion in India. We encourage TRAI to follow-up on these provisions with a national consultation on shared access to spectrum in underserved regions.