Exploring Open Hardware in Mass Produced Mobile Phones

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Innovation, Economic Development and IP In India And China
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## Mobile Device Patents and Applications in India, Top Assignees (2015)

<table>
<thead>
<tr>
<th>Assignee</th>
<th>Nationality</th>
<th>Total Published Applications and Issued Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualcomm</td>
<td>USA</td>
<td>5954</td>
</tr>
<tr>
<td>Ericsson</td>
<td>Sweden</td>
<td>1843</td>
</tr>
<tr>
<td>Samsung</td>
<td>Korea</td>
<td>1827</td>
</tr>
<tr>
<td>Nokia</td>
<td>Finland</td>
<td>1744</td>
</tr>
<tr>
<td>Microsoft</td>
<td>USA</td>
<td>1557</td>
</tr>
<tr>
<td>Philips</td>
<td>Netherlands</td>
<td>1460</td>
</tr>
<tr>
<td>Sony</td>
<td>Japan</td>
<td>1235</td>
</tr>
<tr>
<td>Alcatel Lucent</td>
<td>France</td>
<td>971</td>
</tr>
<tr>
<td>Motorola</td>
<td>USA</td>
<td>842</td>
</tr>
<tr>
<td>LG</td>
<td>Korea</td>
<td>791</td>
</tr>
<tr>
<td>RIM/ Blackberry</td>
<td>Canada</td>
<td>782</td>
</tr>
</tbody>
</table>
Life of a mobile phone: The Taiwan story

- Fabless IC companies located in Taiwan or China design chips while consulting the chip fabricators, based on physical and electrical design parameters.
- Fabless IC designing and manufacturing companies expect the assemblers or importers to pay royalties for their chips.
Life of a mobile phone: The China story

- Turnkey solutions: “Buy a turnkey solution, open a factory, take a chassis [case], screw it all together, and sell it. This is what's driven the demand, and that's what created this low cost-market.”
- Have they paid royalties or licensing fees for the patents that apply to the mobile phones they manufacture?
- “Royalties or licensing fees are not explicitly paid by the phone manufacturer [OEM]...”
What if mass-produced mobile devices used as much open hardware as possible?
Open hardware creates products driven by capitalism rather than monopolies, an open environment for sharing information, and a powerful opportunity for companies and individuals to learn from each other. Open source hardware is a growing movement with a lucrative business model.

--Alicia Gibb, Founder, Open Source Hardware Association

In Foreword to Open-Source Lab, Joshua M. Pearce
‘Open’ hardware initiatives for making mobile devices/ parts

- Phonebloks
- Project Ara (cancelled recently)
- Neo900
- Open Moko
- Openphoenix
- Pandaboard
- Puzzlephone

Fairphone (Fairphone 1, with 257.50-euro average selling price, royalties & IP licenses cost 25 euro)
Phonebloks (Wikimedia Commons/ Azusa, Dave Hakkens)
Project Ara Spiral 2 Prototype (Wikimedia Commons/ Maurizio Pesce)
The basic building blocks --- for example, the baseband chip -- are protected by chipset vendors through patents and trade secrets. Given to OEMs under NDAs.
Revenue streams

- Sales
- After-sales services
- Tech support
- Programming/Installation
- Build a community around the product
- Catering to hobbyists and makers
- Customisations

"... those who benefit from an OHL design may not bring lawsuits claiming that design infringes their patents or other intellectual property."

— TAPR Open Hardware License