

## Appendix

### Rollout of 5G and Consequences of Technological Dependence of India on Foreign Monopoly Capital: Two Recent Examples

As discussed in Part IV, both business leaders and policy makers at the highest levels claimed that they have developed ‘in-house’, ‘indigenous’ technology for 5G services, and that they would be in a position to export the technology soon. However, the actual rollout of 5G services in recent months has seen the Indian telecom sector become *even more* dependent on foreign monopoly capital. We provide two examples here and discuss them very briefly to argue our point.

#### 1. Narrowing Options for Acquiring 5G Equipment and Knowhow

We live in the times of monopoly capital, when strategic sector after sector is tightly controlled by a handful of global companies, who do everything to protect their territory, whether through IPRs, branding, or other aspects of their economic might. If none of these works, they use the political pressure (combined with military might) of the governments of some of their ‘home’ countries. Tech sectors such as telecom are particularly tightly controlled by multinational manufacturers of equipment and providers of knowhow.

The most important recent entrants in the global telecom arena have been the two big Chinese companies, Huawei and ZTE. One reason they have been able to capture significant global markets is because they are willing to work at lower prices and on easier terms, for instance, longer payment schedules.<sup>117</sup> (Note that monopoly capital firms are price makers,

---

117 An Oxford Economics study commissioned by Huawei estimated that banning Huawei from India’s 5G equipment market would raise costs by 8-29 per cent. See Economic Consulting Team, Oxford Economics, “The Economic Impact of Restricting Competition in 5G Network Equipment,” December 17, 2019, <https://www.oxfordeconomics.com/resource/economic-impact-of-restricting-competition-in-5g-network-equipment/>. In earlier generations of equipment, Huawei prices were reported to be up to 40 per cent lower, see: Regina Mihindukulasuriya, “Many countries have blocked Huawei, but India can’t afford to ban it from its telecom story”, *The Print*, December 27, 2018. <https://theprint.in/>

i.e., they dictate prices, as has been amply demonstrated in this article.) In India, Huawei and ZTE have been the most active suppliers of equipment and knowhow for various telecom companies over the last two decades.

Meanwhile, strategic tensions between China and the US have escalated, because the US increasingly looks at China as a serious economic, political and strategic rival. India too has been drawn progressively into these tensions on the US side, and there have been growing clashes between Chinese and Indian forces on the line of control between the two countries. So as companies like Huawei are being boycotted and blocked by the Western nations, there is also pressure on India to follow suit. Thus India too has blocked Huawei and ZTE. But there is one big difference between India and the West: the West might have its own indigenous tech suppliers, whereas we have *none*. The consequence has been that, as Airtel and Jio rollout 5G services, the same three equipment companies, Ericsson, Nokia and Samsung are reported to be supplying equipment to *both* of them in multi-year, multi-billion dollar contracts. (While Samsung is not reported to be involved in Jio's 5G services, it has been the main supplier for its 4G services.) Thus *two* telecom service providers are to serve the vast Indian 5G market and just three global corporations are to supply complementary equipment to *both* of the service providers: Such is the state of the free market, competition and indigenous in-house technology in India.

It is true that, in recent years, large Indian corporate houses such as Reliance and the Tatas have acquired small tech companies working in specific niches of telecom. Putting together a large, complex and sophisticated telecom network not only needs switching and radio equipment, but also various kinds of software and network that can 'talk' to one another at multiple levels: from phones to the network, transmission through the network and even from the company's network to the networks of other companies within the country and beyond. Thus, besides global telecom companies, there are many smaller technology suppliers operating in niche markets of telecom. A couple of such niche firms engaged in software development for telecom, such as Radisys of the US and Tejas Networks based in India, have been acquired in recent years by Reliance and the Tatas.<sup>118</sup> Note that

---

[economy/many-countries-have-blocked-huawei-but-india-cant-afford-to-ban-it-from-its-telecom-story/169813/](https://www.bbc.com/news/economy/many-countries-have-blocked-huawei-but-india-cant-afford-to-ban-it-from-its-telecom-story/169813/) accessed on 21/03/2023.

118 'How ready is India...' *op. cit.*

even these tech companies have been only *acquired*; nothing therefore was developed in-house by the likes of Reliance. It is quite a stretch to say on this basis that 5G network is being indigenously developed by them.

It cannot be ruled out that the US firms Google and Qualcomm, who have invested in Jio, might be helping Jio develop 5G technology in-house, but as yet no evidence for this has come to light. Historically virtually every large global company has been present in India, but that has not resulted in the development of indigenous technological capabilities.<sup>119</sup>

## 2. Strange Case of Vanishing ‘i’ in the 5Gi Standards<sup>120</sup>

An even starker example of dependence is India’s very first attempt to set up an indigenous telecom standard, called 5Gi (‘i’ here stands for India). It captured the media headlines suddenly, but then as quickly disappeared from all public discussion. As telecom has become a mass consumer service in this vast, densely populated and very poor country, extending sophisticated, cutting edge, telecom services comes with its own challenges. Imported technologies generally have been developed elsewhere for specific needs and contexts (mostly of the developed Western economies), and come coupled with their own limitations. But no nation today can say that it would or can develop everything by itself. Hence, to that extent, one terrain of battle concerns the setting up of the global standards that are to be followed. Because, depending upon the standards followed, certain

---

119 Another domain where a lot is being said for a while about ‘indigenous technology’ is the military supplies, and despite all the rhetoric, India remains the largest importer of military hardware in the world. For underlying structural reasons for this gap, see: Rahul Varman, “Rising Corporate Military Complex in India: A Critical Appraisal,” *Aspects of India’s Economy*, No. 61, June 2015. <https://rupe-india.org/61/rising.html> accessed on 15/03/2023.

120 For some details on the developments around 5Gi, see: Alan Weissberger, “Nokia Executive: India to Have Fastest 5G Rollout in the World; 5Gi/LMLC Missing!,” *IEEE ComSoc Technology Blog*, November 27, 2022. <https://techblog.comsoc.org/2022/11/27/nokia-executive-india-to-have-fastest-5g-rollout-in-the-world-5gi-lmlc-missing-in-action/> accessed on 15/03/2023. For the telecom firms’ point of view, see Arjun Gargeyas, “What Should India Hope to Get Out of its 5Gi Standard Experiment?,” *The Wire*, August 15, 2021. <https://thewire.in/tech/what-should-india-hope-to-get-out-of-its-5gi-standard-experiment> accessed on 15/03/2023. For further details, see the references provided in the two articles.

technologies would get locked in, conferring an advantage to certain corporate players and disadvantage to certain others.<sup>121</sup>

The Indian government announced with much fanfare in 2020 that its proposed standard ‘5Gi’ had been accepted by the International Telecommunication Union (ITU), a UN body, for the purpose of setting up 5G services. The standard had been developed by a consortium of researchers across public institutions, and funded primarily by the Government over several years. The idea was to develop technology that specifically catered to Indian needs of reaching the vast countryside at a reasonable price. Using the standard and its technological protocols, it was claimed that the technology could reach out to far-flung villages at lower costs.<sup>122</sup> The Telecom Standards Development Society of India (TSDSI) got the 5Gi standard approved by the ITU through a three-year process, reported to be rigorous. It was the first such standard devised by India that was granted any such approval by the UN body.

But since India, as we have discussed in this article, is so dependent on foreign know-how and equipment suppliers, any such new standard can be implemented only if the Government can enforce it on both the equipment suppliers and the buyers, that is, the Indian telecom companies. Immediately after the announcement of the new standard with much fanfare, the pushback by both the Indian telecom companies as well as their global suppliers began – that this will mean more costs and more time, that it is impractical, that its enforcement should be ‘voluntary’, etc. Finally, when the Prime Minister inaugurated India’s 5G services in October 2022 with much fanfare, the ‘i’ in the 5Gi had already gone missing in action. In the intervening two years it was reported that the 5Gi standard had been ‘merged’ with 5G, with little disclosure of the content of this ‘merger’, or

---

121 A good example of this battle in India is the rivalry between GSM and CDMA standards and mobile technology in the 1990s. While the early entrants followed the European standards of GSM, later entrants like (undivided Reliance and Tata) tried to set a parallel course through American standards of CDMA. In the process later players lost out, and had to undertake a course correction. In spite of being backed by India’s largest business houses, one reason both of them had to close shop was that they bet on the ‘wrong’ set of technologies and standards.

122 While 5G standards specify that the networks shall provide satisfactory service to users travelling at speeds of 120-500 km/hour, 5Gi standards proposed to provide satisfactory service for users travelling at speeds of 3-30 km/hour. The latter was deemed adequate for the Indian context.

discussion of its larger implications. The ground reality is that global 5G suppliers are cutting deals worth billions of dollars with Indian companies at present as if no 5Gi had happened in the intervening period.

It would be naïve to think that the development of any new technology, including the establishment of new standards, can happen overnight, that too in a cutting edge area like 5G telecom. It would require a willingness to take risks, invest in long-term projects, look for returns over time, and face opposition from entrenched domestic and foreign interests. But as we have seen in this long account of three decades of telecom in India, in spite of the skills and talent of India's people and the continental size of this most populous nation in the world, the Indian State and India's own peculiar form of monopoly capital lack the will to overcome technological dependence. Thus the missing 'i' in 5G is a glaring example of the yawning gap between the pretensions of our establishment and the reality. The end result: *far from providing indigenous 5G technology to the world (as the Finance Minister claimed), India is not even providing it to its own people.*