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Can India Live Up to its 6G Ambitions?

September 26, 2022

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CATEGORY: Exclusives

TAGS: 6G, india, DoT, Jio, Made in India, Counterpoint

With the second-largest telecoms sector in the world in terms of numbers of subscribers, India has witnessed massive growth in mobile network adoption in recent years thanks to wider service availability, a more conducive regulatory environment, affordable tariffs and changing consumption habits. As the world's second most populous country with an average age of just 28, mobile penetration is only set to rise here, as will the need for super low-latency networks that can cater to the 70% of the population that lives in rural areas. Despite ongoing delays with the implementation of 5G, Prime Minister Narendra Modi recently predicted that India will not only adopt 6G by the end of the decade but also play a role in setting global standards. But how likely are the 6G ambitions of this still-developing nation to come to fruition?

Before 5G

In the era of 2G and 3G, India was a mere adopter of international telecommunications standards and the transition between the two networks was slow and incremental. Progress from 3G to 4G was rapid and smooth, greatly thanks to the work of the Telecom Regulatory Authority of India (TRAI), which helped the industry evolve from a government-owned monopoly under the Department of Telecommunications (DoT) to a system of private services working within a regulatory framework. TRAI's mission was to create conditions for the growth of the sector at a pace that would allow the country to play a leading role in the emerging global information society. By the end of 2016, 4G penetration in India stood at just 12%. Four years later, it had shot up to 77%, making it one of the fastest 4G adoption rates in the world.

5G

Despite proving a little bumpy, India's road to 5G massively changed the country's standing on the global telecommunications stage. First slated to arrive this year, it has suffered delays due to the Covid-19 pandemic and is still not quite off the ground. A 5G test bed project was completed in December 2021 and India's spectrum auction finished in August, with Indian multinational Adani Group and the country's three mobile network operators — Reliance Jio, Bharti Airtel and Vodafone Idea — bidding a total of 1.5 trillion rupees (US$18.99 billion).

Reliance Jio, which was the top spectrum bidder, has broken new ground by developing its own 5G network equipment and software, but the biggest achievement for India came with the release of an indigenous 5G standard, dubbed 5Gi. Despite initial pushback from domestic operators and equipment vendors who opposed its mandatory adoption due to interoperability and cost issues, a compromise was reached to merge 5Gi with the global 5G standard. This, of course, had to be approved by 3GPP (the standards organisation that develops protocols for global mobile telecommunication), demonstrating India's ability to contribute to global standard setting. "3GPP rarely approves competing standards, so this was a win for India," Tarun Pathak, Research Director of mobile

devices and ecosystems at the Counterpoint technology research company told 6GWorld. “It’s also a testimony to India’s ambitions on a global stage. It has never happened in any other tech transition.”

The new 5G network, which is expected in the coming months, will first be rolled out in the 13 major cities where trials have taken place. The government predicts the new network will add US$450 billion to the Indian economy and has promised to push it out to the rest of the country as quickly as possible to spur greater growth in agriculture, education, healthcare, infrastructure and logistics.

6G Ambitions

India is already talking big on 6G. Speaking at TRAI’s silver jubilee celebrations in May, Modi said Indians could expect to see the as-yet undefined network by the end of the decade. Devusinh Chauhan, the Minister of State for Communications, also affirmed in February that India wants to take a leadership position and contribute to global standards. It is thought such ambitions are being driven by Modi’s broader initiatives of “Aatmanirbhar Bharat” (self-reliant India), “Make in India” and “Digital India,” all of which aim to indigenise key technologies.

The government is also busy forming partnerships and alliances with other friendly nations. In August, for example, Australia’s high commissioner to India, Barry O’Farrell, said the two countries should work together on an ethical framework for 6G. “The big thing is the government has openly acknowledged that when 6G comes into the picture, we are going to be very aggressive,” says Pathak.

6G Actions

So what’s actually being done to turn these lofty ambitions into reality? In November 2021, the DoT announced the formation of a 22-member task force that is solely focused on developing domestic 6G technology. Shortly afterwards, Ashwini Vaishnaw, India’s Minister of Communications, confirmed that the work had started. “We will have designed-in-India telecom software for running the networks, manufactured-in-India telecom equipment, served-in-India telecom networks, which can go global,” he said in a webinar.

The government is setting up innovation centers at the best engineering institutes in India, which are set to launch 6G use cases relevant to local markets. Close to US$30 million has been invested to develop an indigenous test bank, according to Pathak, who says he expects to see a mutual approach between industry, academia and the government. “We’re focusing on education, funding R&D and making sure local companies are getting proper policy leverage,” he says.

Meanwhile, India is doing more than just talking with its powerful friends. At a meeting in Tokyo in May, Modi and US President Joe Biden launched iCET, an initiative on Critical and Emerging Technologies that promises to forge closer links between the two nations in areas including 5G/6G, semiconductors, AI and quantum computing.

6G Impact

The impact of 6G on India is likely to be huge. While Modi has promised that the network would create jobs and boost economic progress, Pradeep Mehta, Secretary General of India's Consumer Unity Trust Society, said the emerging technology will be crucial for bolstering the country's participation in AI, IoT, blockchain and other advanced technologies. As smartphone penetration increases, India, with its 22 official languages, hundreds of dialects and wildly diverse communities, will also become a huge data source and a utopia for case studies in an economy of scale. Such technologies could bring real benefits to some of the most vulnerable in Indian society. 6G could pave the way for remote healthcare in a country with just five hospital beds per 10,000 people, for example, or help predict and remedy some of the natural disasters that plague the country every year.

And if India does manage to position itself at the forefront of 6G technology and standard setting, it'll no doubt bring the country untold benefits in the form of future international investment, partnerships and business. The success of 5Gi and the country's bullish 6G ambitions have already brought intangible benefits, according to Pathak. "We're very neck-and-neck at the moment, and the moment you're neck-and-neck, you have a certain kind of leverage," he says. "We are one of the most powerful emerging nations in the world and other countries are realizing the advantages of working with us."

What Chance Indian 6G?

Although IP doesn't guarantee success in a particular technology, India must seriously ramp up its efforts in this area if it hopes to be a competitor. As it stands, the country of 1.3 billion didn't even feature in a 2021 study by the Tokyo-based research company Cyber Creative of 6G patent applications by country. Quality IP requires investment, which is currently lacking in India when compared to other major economies. According to India's Economic Survey 2021-2022, Modi's government spent just 0.7% of its GDP on R&D in 2020, compared to 2.4% in China and 2.3% in the EU.

Although India produces 1.5 million engineering graduates each year, 48% remain unemployed, leading to the highest rate of economic migration in the world, reports the 2022 UN World Migration Report. India must find a way to

provide better domestic opportunity and plug brain drain leaks if it has any chance of making a serious play in the 6G arena.

But it's not impossible. India is already punching above its weight for a developing country when it comes to getting huge technological feats off the ground at minimal cost. Its space program, for example, is a great success, bringing together public and private research institutions to facilitate impactful R&D. If the government wants to do the same with 6G, it'll have to translate its techno-nationalist vision into workable regulations and investments that allow the country's research institutions and telecoms companies to form similarly productive partnerships. And it'll have to do it fast. "The academy of 6G needs to be trained today if we want to reap benefits down the line," says Pathak. "But we have a young workforce, and more investment means more time for innovation. You never know what will be coming from India in the future."



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Crystal Wilde is a journalist and content marketer with more than 13 years professional experience in Asia, writing and editing across a wide range of topics.

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