



ILLUSTRATION: SHYAM KUMAR PRASAD

every other type of phone technology out of the water. It revolutionised the way the world communicates—5G offers a similar potential to leap into an exciting new world of advanced digital communications.

This is why the Department of Telecom founded a formidable cross-functional body of 5G expertise, the '5G high-level forum', and submitted a report on the investment, infrastructure, policies, and more required to implement 5G. The Digital Communications Commission is deliberating the next steps to a 5G rollout and related spectrum pricing.

Another important reason for 5G trials is security. With 5G, devices around the globe will be empowered to collect, transmit, process, and store large amounts of real-time data. Though this connectivity is essential for the world's digital future, it poses potential security risks that need to be addressed prior to full-scale deployment. While the noise surrounding 5G is impossible to ignore, a relatively under-appreciated technology is the enhanced 4G LTE, or 4.5G. One of the main benefits that 5G technology touts is the reduction in latency speeds (delays in transmission of data across the network) to less than one millisecond! While this is indeed fantastic, few are aware that 4.5G offers a latency speed as low as five milliseconds—much superior to existing levels, and rich in benefits. This is a great time to boost 4.5G adoption in India.

While we have made many admirable strides in the field of Telecom, we are ranked 109th, in a list of 124 countries, for internet speeds—even lower than neighbouring Pakistan, Sri Lanka, and Myanmar. Mobile internet download speeds in India are about 10.7 Mbps, less than half the global average of ~27 Mbps. Sure, 5G can offer unfathomable speeds of more than 10 Gbps, but with 4.5G LTE, we can achieve download speeds as high as 3Gbps—an incredible improvement on existing technology that will greatly benefit our country. One advantage is that Indian operators are already invested in 4G technology, and can ramp up their efforts around the country.

Meanwhile, India will have to invest, and actively participate in 6G research efforts. Why bother when it might take about ten years to be developed? Elizabeth Warren's quote explains it best: "If you don't have a seat at the table, you're probably on the menu". Countries involved in early-stage research get a leg up in capitalising on manufacturing the technology. India will get to have a say in how testing is conducted, standards are set, costs are estimated, and infrastructure is developed.

Indian manufacturing will get a much-needed shot in the arm. By aligning ourselves with 6G research, India can ensure our challenges and issues are addressed, and the technology is developed with India and its citizens in mind, instead of retrofitting the technology ten years down the road.

Earlier this year, 250 researchers from across the world met in Finland to begin 6G-related discussions, including the very basics, such as what it is, and

if we need it. The 6G program is set to run for the next eight to ten years, and is funded through both public and private partnerships. Initial thoughts are to shoot for internet speeds of 1 Terabyte/second! At this stage, our brains might not even compute the significance and advantages of this speed, but the 6G forum will research, and map this over the next few years, and set 6G standards. Samsung has set up a 6G research center in Seoul, intending to incorporate satellite communication for enhanced global coverage and faster speeds.

It is a great point in time for Indian entrepreneurs, researchers, and policy makers to play the tri-pronged approach for taking India to global leadership in the Digital Society of 5G and 6G.

Research inputs by Chandana Bala.

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● GLOBAL DIGITAL LEADERSHIP

A trifecta for India: 4G, 5G & 6G

India must establish its own use-cases prior to its 5G rollout along with tapping into the potential of 4.5G, and engaging in 6G research to secure its future digital economy

5G is poised to overhaul the way the world operates. It opens the door to mind-boggling broadband speeds, an all-pervasive IoT environment, self-driving cars, remote surgery, smart hospitals, remarkable manufacturing and agricultural efficiencies, and other incredible possibilities for the future. 5G is not an incremental innovation like 3G, or 4G, but the next level of digital disruption, revolutionising diverse industry verticals, like healthcare, manufacturing, agriculture, and entertainment. As a result, countries around the world have begun 5G rollout with unbridled enthusiasm, resulting in an estimated 31 launches by Q2FY19.

Given the game-changing nature of the technology, it is no surprise that pundits state it will take a few years before these countries overcome their teething difficulties, and determine how to achieve reasonable returns for their huge investments in 5G. This is good news since India can use this buffer time to learn from others' experiences, and establish India-centric use-cases prior to our own 5G rollout. Meanwhile, several benefits that 5G is expected to offer, like lower latencies, can be realised to a significant extent through the as-yet-untapped, advanced 4G version termed LTE A Pro (4.5G, as it is commonly known). Concurrently, India could begin influencing standards, and use-cases for

6G research. This three-pronged approach is critical to securing India's economic future.

There is a dangerous sense of urgency worldwide to be amongst the first to implement 5G. However, for India, the winning strategy could be to wait and do it right, and in our own time. History is on our side. When the rest of the world rushed to implement 2G, we waited and introduced GSM 'digital 2G', and leapfrogged over the analog 2G of our neighbours. The late-entrant Indian telecom quickly surpassed other countries, becoming the second largest in the world, and a source of "neighbours' envy, owner's pride." Reputed international bodies, such as ITU and GSMA, sound several cautionary notes about rushing headlong into 5G implementation. ITU advises that "until the case for 5G networks can be clearly made, policymakers can consider enhancing the availability of and boosting the quality of 4G networks," warns about the "danger of [an] increasing digital divide," especially in the early years of 5G adoption, and offers "16 key issues for policymakers to consider," which will be instrumental to our success.

Clearly, there are a few challenges to address before implementing a 5G rollout. ITU, the global apex telecom standards body, estimates that the cost to deploy a small cell-ready 5G network for a small city to be \$6.8 million (nearly ₹50 crore), and \$55.5 million (approximately ₹400 crore) for larger cities. With India's incredibly dense cities, the investment required will be higher. These would be additional to the huge investments for fibre backhaul and backbone. The overall cost of 5G networks for India would run into a few lakh crores.

Another limiting factor for Telecom Service Providers is the prohibitively high 5G spectrum cost. Currently, while already burdened with heavy debt, there is little incentive for TSPs to switch to 5G—and, rightly so. We need to expand 5G tests, and establish clear use-cases that work for the Indian environment while the industry improves its financial health.

Why are 5G trial use-cases important? It is vital to demonstrate the business viability across the different applications on which 5G can have significant impact. The difference between 5G and 2G, or 3G, is akin to how the invention of the smartphone blew

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