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# Explained | Why is India taking 6G seriously?

PREMIUM

Even as 5G rolls out with unprecedented mobile internet speeds, the government is making 6G a priority, stung by delays in past generations of telecommunications

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**The story so far:** On March 22, Prime Minister Narendra Modi unveiled the Bharat 6G Vision Document, a starting point for policymakers and the industry to gear up for the

next generation of telecommunications. This is happening even as over 45,000 villages lack 4G connectivity, and 5G networks are still being built out. So why is the government moving in the direction of 6G now?

## Why did the government put out a 6G vision document?

The Government has indicated that it wants to accelerate India's wireless data consumption lead and assume leadership in setting the standards for 6G in the coming years. This may involve everything from encouraging local manufacturing of telecom gear to supporting Indian companies and engineers in international discussions around standardisation. Influence in the latter is key, as telecommunications standards are usually adopted globally.

Another key motivation is the delay in previous generations of telecommunications technology rolling out in India — 5G started rolling out here years after countries like South Korea and the United States had already blanketed their major urban areas with high-speed wireless connectivity. India does not want a repeat of that; the government even says in the 6G vision document that it wants to make sure it grabs 6G “from the oven”.

Yet another reason is pure physics: frequencies generally increase in newer generations of networks, but the lower the frequency, the longer a cell signal can travel. With increasing data usage, lower frequencies in 4G networks may not physically be able to keep up with the demand for traffic.

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The government says so in plain terms: “Right now, the spectrum is congested, particularly in the low and mid-bands where the propagation characteristics are favourable,” the vision document says. More data can travel in higher frequencies, which is the basis for 5G architectures where base stations with low coverage took the place of a single larger cell tower.

## What plans does the government have for 6G?

Beyond encouraging greater participation in standardisation discussions, the vision document says the government will financially support “research pathways” where breakthroughs are most likely to advance connectivity goals, leveraging talent in academia and companies. The government said an “apex body” will be set up to shepherd these groups through roadblocks.

Some indicative goals are to guarantee every citizen a minimum bandwidth of 100Mbps; ensure every gram panchayat has half a terabit per second of connectivity; and blanket the country with over 50 million internet hotspots, with thirteen per square kilometre.

## How will 6G be different from 5G?

For consumers, websites will load faster, videos will look better, and files will download faster, as has been the case with every new generation of technology. But we may be hitting the ceiling on how noticeable these improvements can get. Latency, which is the time taken for a data packet to move from one place to another (as opposed to speed, which is the number of such packets that can travel on a connection each second), is not far off from the speed of light itself on existing networks.

Businesses and governments are still on the verge of how best to leverage 5G to reap the benefits of high-precision low-latency applications with these new connections.

Holograms and robotic surgery are already riding on 5G networks. So how much better will 6G be? Like 5G, it will depend largely on how different groups plan to use the spectrum.

According to the vision document, satellite constellations will join telecom towers and base stations, integrating networks and extending them to rural areas.

Some of the innovations that the government envisions as 6G-powered connectivity boosters are solutions that already exist in other forms. For instance, satellite internet in remote areas is a solution that the government can instantly approve by granting firms like Elon Musk’s SpaceX and Bharti Airtel-backed OneWeb the administrative clearance to begin offering their services. Like DTH satellite dishes, setup is minimal as the satellites are already in the sky. But administrative clearances lag behind.

At least two parts of India have already relied on satellite internet for decades. The Andaman & Nicobar Islands relied on 1Gbps link to connect to the outside world, which is

comparable to a single expensive home connection in many Indian cities today. The situation improved vastly after the islands were connected to Chennai by an undersea cable in 2020.

While satellite internet speeds have improved, thanks to innovations like constellations, connectivity goals have as much to do with satellites hundreds of kilometres overhead as they do with the cables beneath the ground and on the seabed.

## How are other countries approaching 6G?

As early as July 2021, South Korea **planned** ₩220 billion (almost Rs 1,400 crore) in investments into “super performance, hyperspace, and super precision standards,” according to the country’s Ministry of Science and Information Technology.

“As this year marks the beginning of 6G technology development, the focus will be on laying the ground for key original technologies and domestic production of core equipment and components, for example, by identifying technical requirements for key areas of 6G network[s] and designing elementary technologies,” the ministry said that year.

Countries have already started working together too, with Japan and Germany planning a workshop in April to work on everything from “**fundamental technologies to demonstrations**”.

The Indian 6G Vision paper cites Europe’s equivalent of the document, saying that “The overarching Vision is to ensure leadership in strategic areas and establish secure and trusted access to key technologies making Europe a sovereign, independent, and reliable source for 6G public and private network solutions and services.”