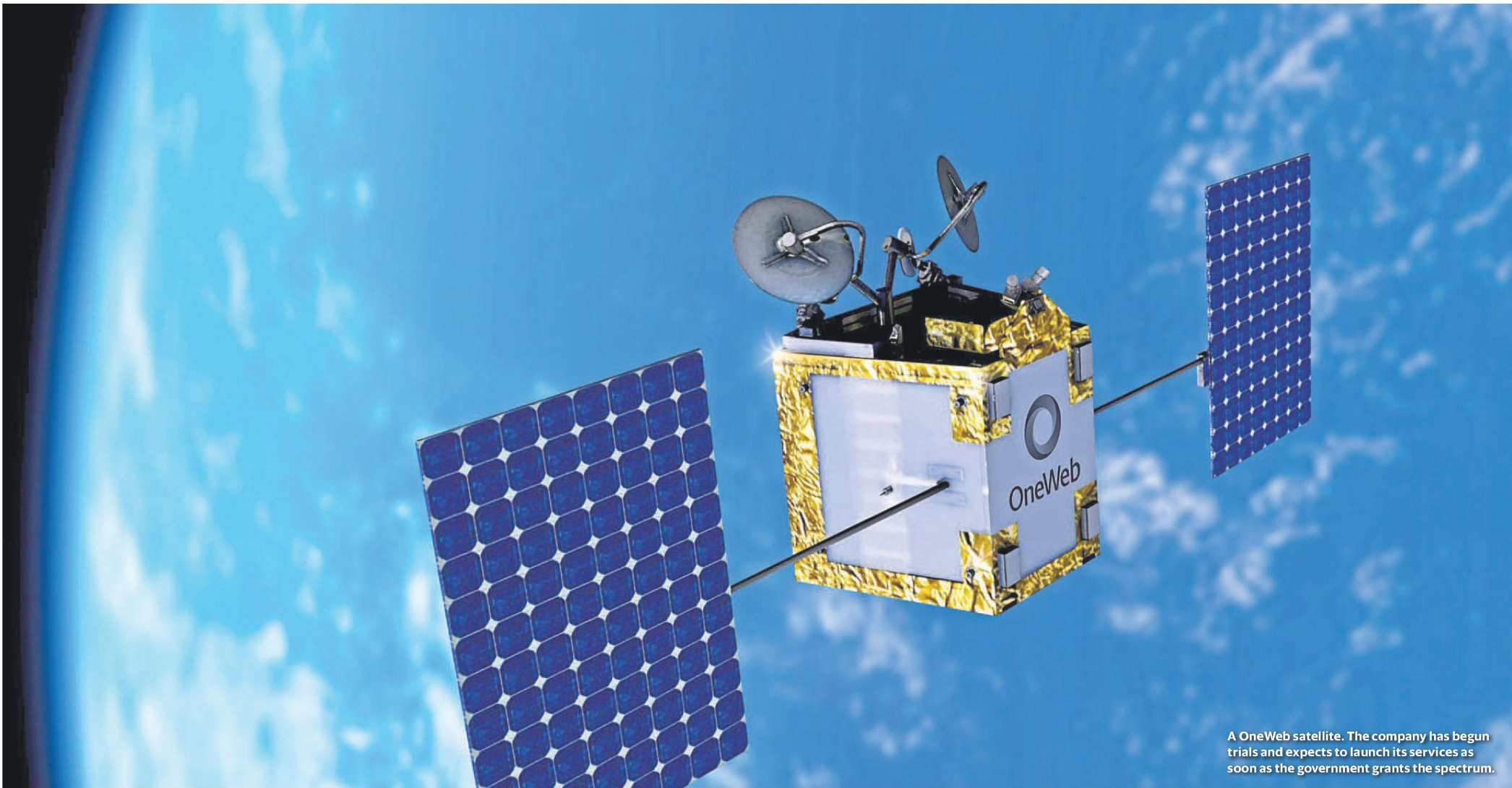


# COMING SOON: BROADBAND FROM THE STARS

Elon Musk's Starlink has blazed a path in satellite broadband services. Others are set to follow



A OneWeb satellite. The company has begun trials and expects to launch its services as soon as the government grants the spectrum.

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Hours before Russia launched its invasion of Ukraine on 24 February 2022, its hackers unleashed malware on routers linked to American satellite and internet communications provider Viasat, crippling the Ukrainian military's communications. In desperation, two days after the invasion began, Mykhailo Fedorov, deputy prime minister of Ukraine, appealed to SpaceX chief Elon Musk on X, formerly Twitter. "At Elon Musk, while you try to colonize Mars—Russia try to occupy Ukraine! While your rockets successfully land from space—Russian rockets attack Ukrainian civil people! We ask you to provide Ukraine with Starlink stations..." he posted. A few hours later, Musk replied: "Starlink service is now active in Ukraine..." In the two years since then, while the war has raged on, the satellite internet service has kept Ukraine's military and citizens online.

Starlink is a 'constellation' of thousands of low earth orbit (LEO) satellites launched into space over the last five years by its parent, SpaceX. It delivers high-speed internet services to individuals and enterprises "all over the world". As the company's website explains, "Starlink is the world's first and largest satellite constellation using a low earth orbit to deliver broadband internet capable of supporting streaming, online gaming, video calls and more." Users on the ground connect to the satellites through small dish-like antennae called terminals. Starlink has blazed a path in satellite broadband services that others are set to follow. And India, like countries around the world, is scrambling to get on the bus. Last year, on 18 December, the Indian government decided to award spectrum or airwaves for satellite broadband services in the country without following the usual process of holding an auction. It did so by bringing the communication category within the ambit of a new legislation for the telecom sector, the Telecommunications Bill 2023, and put these services under a segment exempted from auctions. By doing so, it cleared a giant hurdle for satellite broadband providers such as Bharti Group-backed OneWeb, Reliance's Jio Satellite Communications, Musk's Starlink and Amazon's Kuiper.

"There is clarity in law now. Auctions are the primary mode of giving out spectrum, but there are certain cases like law enforcement, public interest functions like airlines, and other areas like satellite services in

which the same spectrum is to be used by multiple entities like OneWeb, Starlink, etc., where an auction is not feasible technically or economically," a senior government official explained.

## THE INDIA PICTURE

OneWeb is expected to begin offering services as soon as the government grants the spectrum, Sunil Mittal, co-chairman of Eutelsat Group, said in a recent interaction with *Mint*. Eutelsat and OneWeb merged in September 2023. "We're ready; the Mehsana (Gujarat) satellite network portal (the first base station that will serve as a signal and data downlink and uplink terminal on the ground) is ready. We've done some trials, and everything functions very well. Now, the spectrum assignment has to be done," he said. Mittal added that OneWeb's focus will be on B2B opportunities in military, oil and gas enterprise, warehousing, industrial applications and cellular backhaul segments. The company has begun trials using demo spectrum, said a person aware of the development, putting it ahead of the competition.

"OneWeb's two gateways in Gujarat and Tamil Nadu will be operational within the next few months. With Hughes as its distribution partner, it will be serving the market right from day one of operations," said Shivaji Chatterjee, president and managing director, Hughes Communications India, which will distribute the services in India and in global markets. Mukesh Ambani's Jio Satellite Communications has formed a joint venture with global major SES, which, executives said, is preparing to launch more satellites into orbit. "We're fully ready. Our earth station in Kadapa, Andhra Pradesh, is operational. JioSpace Fiber is being piloted across four locations and the company plans to launch it commercially next year. Services will be launched as soon as the government allocates spectrum," a senior executive said, asking not to be named.

Amazon's Kuiper meanwhile is preparing to apply for government approval. "Project Kuiper will bring fast, affordable broadband to unserved and under-served communities around the world, including rural and remote places in India. This is a long-term initiative for Amazon, and we look forward to working with the Indian government and local partners to connect customers and communities across the country," an Amazon spokesperson said.

## WHY SATCOM?

The government's decision not to hold an auction put to rest a debate that had

been raging for more than three years over the right way for India to permit satellite broadband communications. But what is it about satellite broadband that made the government change its stance on spectrum allocation, and why are global majors willing to bet billions on it? For the private sector, the revenue potential will be huge in the long run, with India having opened up the market for foreign direct investment, say industry executives and market experts.

India's space economy was valued at \$8.5 billion in 2023, as per estimates by consultancy EY, and is expected to be worth \$44 billion in 10 years, at a compound annual growth rate (CAGR) of 16%. Satellite communication accounted for 49% of the space economy, at \$4.2 billion in 2023, and is projected to touch \$14.8 billion in the next 10 years at a CAGR of 12%.

"The government of India is expected to treat satellite broadband as a telecom service. This implies that new-age Leo satcom players will be eligible for 100% foreign direct investment (FDI) through the automatic route (in 2021, the government permitted 100% FDI in the telecom sector via the automatic route). It would open up investment in India's space sector. Further, the nascent opportunity in satellite-based broadband services is prompting global players to invest in India," said Prashant Singhal, global leader of technology, media and telecom for emerging markets at EY.

According to Deloitte, India's satellite broadband service market is expected to be worth \$1.9 billion by 2030, at a CAGR of 36%. In 2020, the global market itself was valued at \$3 billion, with India contributing about 3%. Primarily the services offered in India today are business-to-business applications for rural connectivity, disaster relief and machine-to-machine connectivity for enterprises.

"The Indian satellite communications market is projected to grow in double digits over the next few years, and it should serve as a key enabler to provide ubiquitous connectivity throughout the country. It should also open up new use cases in the agriculture, automotive, aviation, and insurance industries," said Sandeep Arora, industry platform leader for telecom, India, at IT services multinational Capgemini.

He added that satellite technology had advanced to a level where it can support increased data capacity at a competitive price point, which is crucial in a value-conscious market such as India.

## THE OPPORTUNITY

In the Indian market, commercial applications of satellite broadband fall in three core areas. The first is remote sensing or earth observation, which has found critical application in areas such as crop

## mint SHORT STORY

### WHAT

Of India's 1.4 billion people, close to 40%, mostly living in rural areas, do not have internet access. Satellite broadband can be a game changer for them, if costs drop.

### WHY

Satellite broadband internet can provide services where there is no mobile or data connectivity, such as offshore areas, or where the terrain is extremely difficult to set up terrestrial networks.

### AND

The technology has use cases across the healthcare, logistics, aviation, education, financial services, transport, e-commerce and public infrastructure sectors as well as in military applications.

insurance, yield monitoring, disaster management, biodiversity conservation, natural resource mining and urban development. Second is positioning, navigation, and timing, or PNT (in India's case this is exemplified by the Navigation with Indian Constellation or NavIC system), which can assume a pivotal role in transportation, communication, and defence.

Third is satellite communications itself, where Satcom-as-a-service can create multiple applications in areas such as in-flight and remote-area connectivity, direct-to-home broadcasting, and healthcare, the last through telehealth and tele-education services. India's satellite communication (satcom) user base could reach 1.5-2 million by 2025 and generate revenue of ₹5,000-6,000 crore annually, provided the operating environment is favourable, ratings agency Icrs said in 2021. Out of nearly 1.4 billion people in India, close to 40%, mostly in rural areas, do not have internet access, says the EY study issued in June 2023. "The cost per MHz, per month is high for satellite communication as compared to terrestrial communication. Moreover, there is good penetration of 2G/4G services, which cover almost all places in India. Satellite-based communication services have a lot of relevance in remote/far-off areas. In places where there is no terrestrial net-

work, satellite communication is the only option," said EY's Singhal.

The senior government official cited earlier concurred, saying, "Satellite broadband is for areas where there is no mobile or data connectivity. Like offshore or where terrain is extremely difficult to set up terrestrial networks."

Besides connecting the unconnected, satellite broadband internet has a plethora of use cases across the healthcare, logistics, education, financial services, transport, e-commerce and smart public infrastructure sectors as well as military applications. In addition, there is high demand for instant communication between government and healthcare institutions, which became the need of the hour during the covid-19 pandemic and has remained constant, said analysts at EY.

A senior industry executive said that the benefit of satellite broadband was not lost on the government, which wants to ensure that every citizen has data connectivity—and through it, the benefits of government schemes.

"The immediate opportunity lies in consumer broadband, provided costs come down, there is scalability, and certainty in policy. The imminent launch of satellite-based broadband services through Leo constellations is expected to add much-needed capacity in the Indian space ecosystem and help bring down cost of delivery," said Singhal.

## TECHNOLOGICAL ADVANCEMENTS

Leos are small satellites, and are cheaper to make. They are deployed anywhere between 160 km to 2,000 km above the earth's surface, allowing for very low latency (data travels from terminals on the ground to the satellites and back quickly). These satellites cover a smaller circular area on the earth, so hundreds are needed for full earth coverage. They can move faster, operate at lower altitudes, and provide good connectivity with low power. Starlink and OneWeb use a constellation of Leos to provide their services. Project Kuiper also intends to use Leos.

Next are medium earth orbit or Meo satellites. They're larger than Leos, and cost more to make and set up, but only a few are needed—about six—for full-earth coverage since they are deployed 2,000-35,786 km above earth. Meos have historically been used for GPS and other navigation applications. They can offer Gigabit, fibre-like services from space. Jio Satellite Communications intends to use a combination of Meos and geostationary earth orbit satellites (Geos).

Geos move in tandem with the earth's rotation, and so remain above the same point on the ground. They're deployed 36,000 km above earth and only three are needed to cover the entire planet. Geos were the only satellites in the early years of broadcast television and have hence traditionally been delivering services such as weather data and broadcast TV. Over the past few years, Geos have been enhanced by high throughput satellites (HTS), which are purpose-built for data. Global players such as SES and Viasat use this type of satellite to provide data connectivity.

## STARLINK: THE FIRST MOVER

The ability to provide access where no telecom service provider can allows operators to charge a huge premium. That's why Starlink's plans begin at \$99 a month, with an initial upfront cost of \$499 for speeds between 50 Mbps and 200 Mbps. The total cost, which includes the antennae, can go up to \$1,900-2,000 (₹158,000) a year, which is more than 10 times higher than plans offered by Airtel and Jio for speeds ranging between 100-200 Mbps, according to a report by EY. Airtel's plans begin at ₹799 a month and Jio's at ₹901 a month.

Starlink has the first-mover advantage globally, with operations in 50 countries and nearly 4,000 satellites in orbit over earth. It has over 2.6 million subscribers, making it the largest player in the global internet satellite market. The US Federal Communications Commission (FCC) has already given Starlink the green light for 12,000 satellites offering satellite internet services to trucks, planes and boats. It has also partnered with leading global telecom companies, including T-Mobile in the US, Canada's Rogers, Australia's Optus, New Zealand's One NZ and Japan's KDDI, to provide direct-to-mobile satellite communication sometime this year. SpaceX and T-Mobile will be testing the service in the US over the coming months.

In India, SpaceX is awaiting regulatory approval to offer Starlink's services. The telecom department has internally agreed to give the company the go-ahead. SpaceX had started to accept bookings in 2022, even before it got any approvals, and ended up having to refund about 5,000 of them after the government intervened.

Starlink is clearly champing at the bit as it waits to roll out operations. Not surprisingly, other companies in this domain have taken a leaf out of its book and drawn up their own plans to provide connectivity worldwide. For India, that is very good news.