

Satellite Connection: The Starlink Project

Imagine a world in which all of humanity has access to fast and reliable internet, allowing informed, educated, and connected people, regardless of their socioeconomic background. Remote areas in which it was previously unfeasible to lay traditional internet cables would no longer have to remain isolated from the digital world. Satellite connection through [Starlink](#) has the potential to make this vision a reality. This ambitious project, led by [SpaceX](#), aims to provide truly global internet coverage. It will bridge the digital divide and ensure that no location remains cut off from the digital world.

Damien's story*

Today, SpaceX successfully launched multiple Starlink internet satellites aboard a Falcon 9 rocket, marking the second attempt after an initial abort. These communication satellites will provide users with dependable internet at high speeds.

A radio news report.

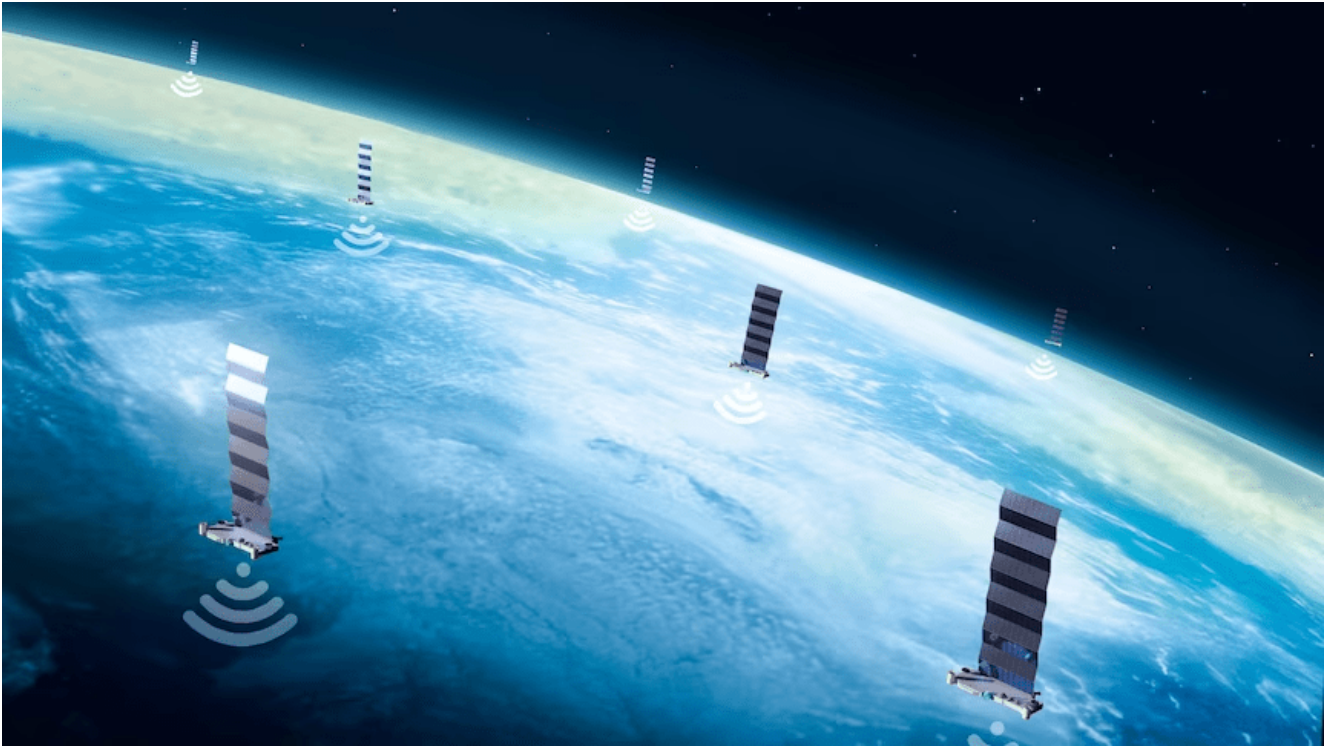
Damien stood up, walked to the radio and turned it off, returning to sit back down at his desk. He pounded the keys on his laptop. Perspiration beaded across his forehead, dripping onto his [thawb](#). His sweat soaked into the cotton. Scrolling through his files, he uploaded his resume to the website.

Hitting submit, he tilted backwards on his chair. The blue bar at the top of the web page edged across the screen with agonising slowness. It stopped, stuck, a few millimetres from the end.

A blank page appeared displaying the words "Network error. You are not connected to the internet."

To be continued...

**Damien's story is a work of fiction, including characters, circumstances, and location.*



Low-earth orbit satellite connection could soon provide internet coverage to even the most remote corners of the world.

Source: [ABC News](#).

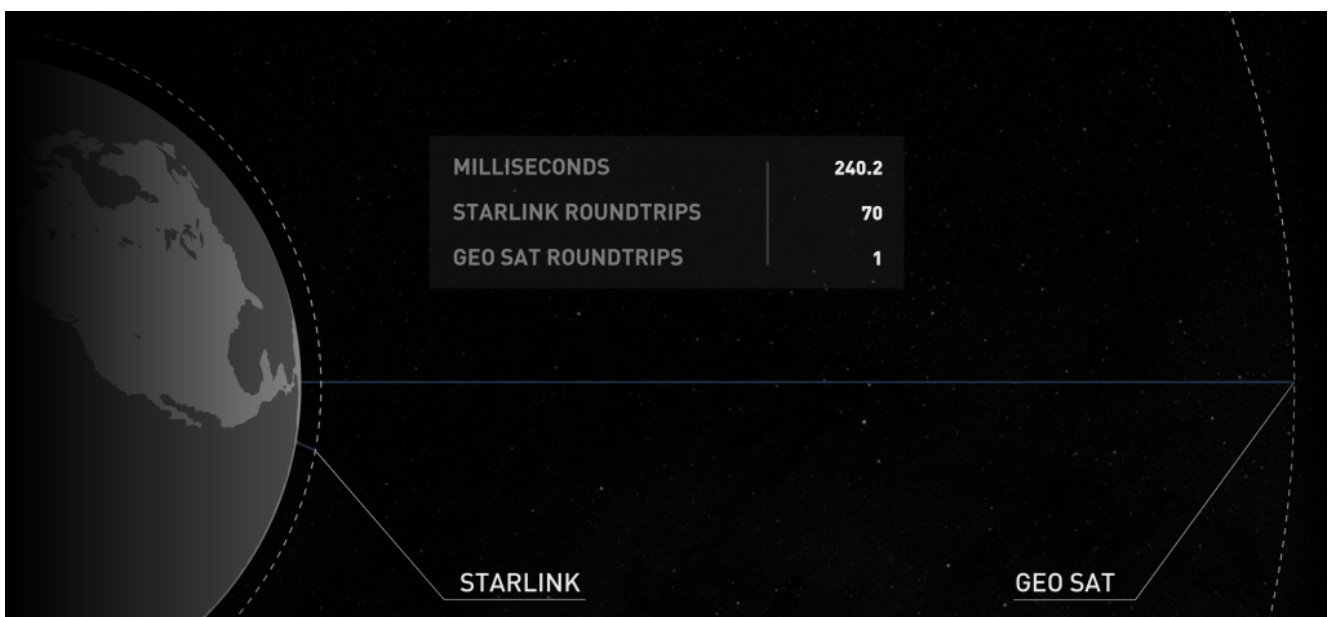
What Is The Starlink Project?

Starlink, a division within SpaceX, is a growing constellation of orbital satellites. The development of this network began in 2015, with the first operational satellites launched into [orbit in 2019](#). The satellite connection project aims to establish a grid of satellites around the whole of the Earth. This grid of satellites is capable of sending communications between themselves as well as back to Earth [via laser signals](#). This far-reaching spread of satellites allows for fast and reliable internet to reach even the most remote parts of the globe. Starlink was originally only available in the USA but has since expanded its services to [over 60 countries](#), with plans for ongoing expansion.

Starlink launches its satellites into space using [SpaceX rockets](#). SpaceX is using the Falcon 9 rocket in [recent launches](#). This is a semi-reusable rocket that is capable of landing its 'first stage' back on earth after launch, allowing it to be re-used. The most recent launch on October 21st carried 21 new Starlink satellites up into orbit and marked the 75th orbital launch by SpaceX this year. The company is aiming to reach 100 successful launches by the end of the year.

How Does Satellite Connection Work?

The majority of internet service providers (ISPs) provide internet through [underground cabling](#) (e.g., DSL, Cable, Fibre Optic). However, there are also some ISPs that provide wireless internet services through satellite connection. Traditionally, these wireless connections have been known to have higher latencies (the round trip time between user and satellite) and run [significantly slower](#) than traditional wired methods. This lacklustre performance is a result of the positioning of geostationary satellites, which usually orbit the Earth at almost [36,000 km](#). Starlink is revamping satellite connection as its satellites orbit much closer to our planet, at a low-Earth orbit (LEO) of [550km](#). Additionally, they cover the entire globe. The expected latency from Starlink internet services is around 25 milliseconds (ms) as opposed to an average of 600 ms from conventional satellite internet.



Comparison of the roundtrip signal return time between user and satellite (latency) for a Starlink satellite vs a geostationary satellite.

Source: [Starlink](#).

Along with the benefit of Starlink satellites being within close proximity of the Earth, they are also numerous in number. This setup makes it much easier for satellite connections to provide internet services to rural or remote parts of the world. Locations where conventional cabling methods are impractical and/or internet terminals aren't strong. Besides its benefits for the Earth, Starlink also serves as a dry run for '[Marslink](#)' (Think Starlink for Mars). Starlink founder [Elon Musk](#) hopes to use this technology to one day establish a constellation of

internet satellites for humans on the red planet.

The current state of Starlink

As of late October 2023, there are [4988 Starlink satellites in orbit](#), about 99.4% of which are operational. This data comes from Astronomer Jonathan McDowell who tracks the mega-constellation on his [website](#). These satellites currently offer service [across all 7 continents](#). The current generation of Starlink satellites (V1.5) can provide around [20 Gbps of bandwidth](#) per satellite. Starlink has begun rolling out their [Gen2 mini satellites](#), a precursor to the larger Gen2 satellites. The Gen2 mini satellite can provide around [80 Gbps of bandwidth](#) per satellite. The more powerful Gen2 satellites are planned to lift off sometime this year or next. Performance stats for the full Gen2 satellites have not yet been revealed.

How Can Satellite Connection Benefit Humanity?

Primarily, Starlink is revolutionising internet access in [developing countries](#). It is doing this by providing cheap and reliable internet service to underserved areas. These areas lack basic internet connection due to cost or infrastructure issues. Providing these underdeveloped nations cheap and reliable internet access brings an array of benefits.



In developing countries, 65% of people do not currently have access to the internet – satellite connection will improve this.

Source: [Borgen Project](#).

Better Access To Education

With global internet access, students and teachers in underdeveloped nations can tap into vast educational resources, take online courses, and connect with educators worldwide. These online educational courses may offer a higher quality of education than what is [readily available at schools](#). On top of this, online courses can be used to instruct children and adults in modern agricultural and fishing methods. Providing [direct positive benefits](#) for the families and communities in these developing nations.

Better Access To Healthcare

By offering a reliable connection with low latency to distant and isolated regions, Starlink is also revolutionising healthcare delivery for individuals residing in remote and hard-to-access areas. The high-speed connection offered by satellite connection allows doctors to offer [telemedicine services](#) to patients who would previously not have had access to specialist healthcare. Utilising Starlink, healthcare providers may now offer consultation and treatment advice to those in remote areas who would otherwise need to travel for hours to reach the closest medical facility.

Better Economic Growth

Starlink could also spur [economic growth](#) within developing nations by opening up new avenues for business and commerce. Access to reliable internet allows for e-commerce and the promotion of local businesses. Additionally, it can provide locals with opportunities for online and freelance work. These benefits could aid in balancing the scales between developed and developing countries, enabling individuals in the latter to fully harness their potential.

The true potential of Starlink's global internet coverage is just starting to emerge, yet its influence on the developing world could be even more profound. By offering dependable and cost-effective digital access, it could pave the way for economic and social advancement, aiding in narrowing the digital gap.

The Future Of Satellite Connectivity

Competing in this space are OneWeb, Kuiper Systems, and Telesat alongside [several others](#). However, SpaceX's Starlink is currently the largest and most widespread LEO internet satellite system. [Kuiper Systems](#), run by Amazon, is aiming to compete with Starlink by progressively launching some 3000+ satellites into LEO and establishing a mega-internet constellation of their own. The first of the production satellites are expected to launch in [early 2024](#).

There are a number of concerns associated with Starlink and similar large-scale projects such as Kuiper Systems. Primarily, adding thousands of objects into LEO is drastically increasing the amount of space debris orbiting the Earth. This leads to a [greater chance of collision](#) between orbiting satellites. Additionally, there are [environmental concerns](#) over the number of rocket launches required to get all of these satellites into space. This is because the combustion of rocket fuel, currently being used, releases carbon dioxide, a greenhouse gas.

Starlink are attempting to address these concerns by adding [collision avoidance systems](#) to their satellites and vowing to ['deorbit' satellites](#) at the end of their lifetime. Additionally, SpaceX has been improving the [re-usability of their rockets](#), and research is ongoing into [cleaner rocket fuels](#).

Moving Forward And Lifting Off

Damien's story

...continuing.

Starlink successfully brought several developing nations online today, completing global coverage.

A radio news report.

Damien uploaded his cover letter and resume to the website. He hit the submit button. Before his finger had relaxed from his mouse button the response "submission confirmed" appeared on his screen.



A SpaceX Falcon 9 Rocket lifts off from the Kennedy Space Centre carrying Starlink satellites.

Source: [Kennedy Space Centre](https://www.kennedyspacecentre.com/).

achieving the United Nations Sustainable Development Goals (SDGs) and how they link to Satellite Connection?

The Starlink project links to a number of the United Nations (UNs) [Sustainable Development Goals](#). Primarily, [SDG 9](#); “Building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation”. Starlink aims to build a reliable, sustainable, and resilient internet infrastructure by providing connectivity around the globe. This will foster innovation and allow for more easily accessible information, especially in underserved areas. The Starlink project will also help us achieve [SDG 4](#); “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. By bridging the digital divide, Starlink holds the potential to provide better educational resources to remote and rural communities. Satellite connection can assist us with SDG 4, 9, and [SDG 8](#): “Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”. This will ensure a future in which all humans can [thrive](#).

A Thrivable Framework

The [THRIVE Project](#) is an international research, advocacy and education organisation that explores current issues and challenges to help transform society towards ‘[thrivability](#)’ – a concept beyond [sustainability](#). A future characterised by thrivability is one in which all life on earth can live sustainably, while still thriving. Using [sustainable business models](#), humanity can move towards this thrivable future.

The THRIVE Platform, which comes from the [THRIVE Framework](#), evaluates the sustainability metrics of companies or entities, highlighting the most sustainable path forward. This platform allows users to measure what matters using predictive analyses. This, in turn, provides valuable insights to researchers, businesses, governments, and policymakers, aiding in fostering positive social and environmental changes. If you would like to learn more about [thrivability](#) or hear more from the THRIVE project you can subscribe to our [free newsletter](#), check out our informative [podcast series](#), watch some of our educational [YouTube content](#), or come along to our [webinar events](#).

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