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Low Earth Orbit (LEO) Satellites for Internet Access



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About the Internet Society

We are a global nonprofit organization connecting and empowering communities to protect the Internet since 1992.



Community members of Pu'uhonua O Waimanalo work together with the Internet Society to learn how to use and install the Internet during a training session.

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The Internet is for everyone.

We work toward this vision by building, promoting, and defending a **bigger** and **stronger** Internet.



The Internet Society Community: A Global Network of People

83

Organization members

130

Chapters and special
interest groups

118,924

4

Individual members

We Grow the Internet

We work on the ground to reduce barriers to access, make the Internet faster and cheaper, and advocate for the right policies so it can grow.



Giorgi Matchavariani checking the lightning rod on a tower near Koklata in Tusheti, a beautiful but very remote region of the Greater Caucasus Mountains in the Republic of Georgia. He was part of a team that was building a solar-powered wireless network to bring broadband Internet access to Tusheti.
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How Do We Connect the Unconnected?



A 3D rendering of Earth surrounded by a dense cloud of colorful spheres representing Low Earth Orbit (LEO) satellites. The text "LEOs?" is overlaid in the center.

LEOs?

Why the Interest in LEOs?

- Traditional satellite Internet access provides connectivity, offering many services that are not latency sensitive in land, air and sea.

("GEO"/"GSO" – geosynchronous orbits)

- LEOs offer low-latency, high-speed connections that support real-time communication (ex. video calls), gaming, e-sports, virtual worlds / metaverse

("NGSO"/"Non-GSO" – non-geosynchronous orbits – LEO or MEO)




The LEO industry is only just
beginning!

Many questions...



Download “Perspectives on LEOs”

Perspectives on LEO Satellites
Using Low Earth Orbit Satellites for Internet Access
November 2022



Executive Summary

There's a space race happening right now to connect the world to the Internet. Companies such as SpaceX, OneWeb, Amazon, and Telesat, are racing to launch large constellations of low Earth orbit (LEO) satellites to provide Internet access. They could help bridge the digital divide, particularly in rural regions, but they could also introduce new security and privacy concerns. Will these LEO satellite systems help us connect the unconnected and build an open, globally connected, secure, and trustworthy Internet for everyone?

At the Internet Society, we see considerable potential in the use of low Earth orbit (LEO) satellites for Internet access for unserved or under-served communities, especially where other ways of delivering Internet access are not viable. We also see potential for Internet access to communities affected by natural or human disaster, and to increase the overall resilience of Internet connectivity. But as of late 2022, most LEO constellations are in early stages of deployment and there are still many unknowns.

As the LEO-based industry matures over the next few years, there is an opportunity to guide the discussion and shape the future of this new form of Internet access.

This document identifies some of the opportunities and the issues that need to be addressed and is intended to start conversations that lead to sensible decisions that advance Internet access for everyone, whether ground-based or space-based or both.


The document begins with some background about satellite Internet access in general, and some of the terminology and components of satellite Internet systems. It then explores the many opportunities for individuals, communities, organizations, and governments.

Next, we outline some issues to be considered, such as the affordability, spectrum allocations, space debris, interoperability, security, privacy, and the use of open standards. We follow that with some of the questions we just cannot know, yet we think need to be thought about, including the overall market, sustainability of business models, and environmental concerns.

Finally, we provide some recommendations we see as necessary so that LEO-based systems can help achieve our vision to bring the Internet to everyone, everywhere.

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LEO Opportunities

- **Individual users**
Remote, rural, underserved, mobile
- **Community centers**
Libraries, schools
- **Complementary access solutions (i.e Community Networks)**
“Backhaul”
- **High availability / resilience / disaster response**
Island connectivity, natural disasters
- **Airplanes, ships, mobile users**



Some LEO Challenges

Business

- Affordability
- Capacity
- Competition

Policy

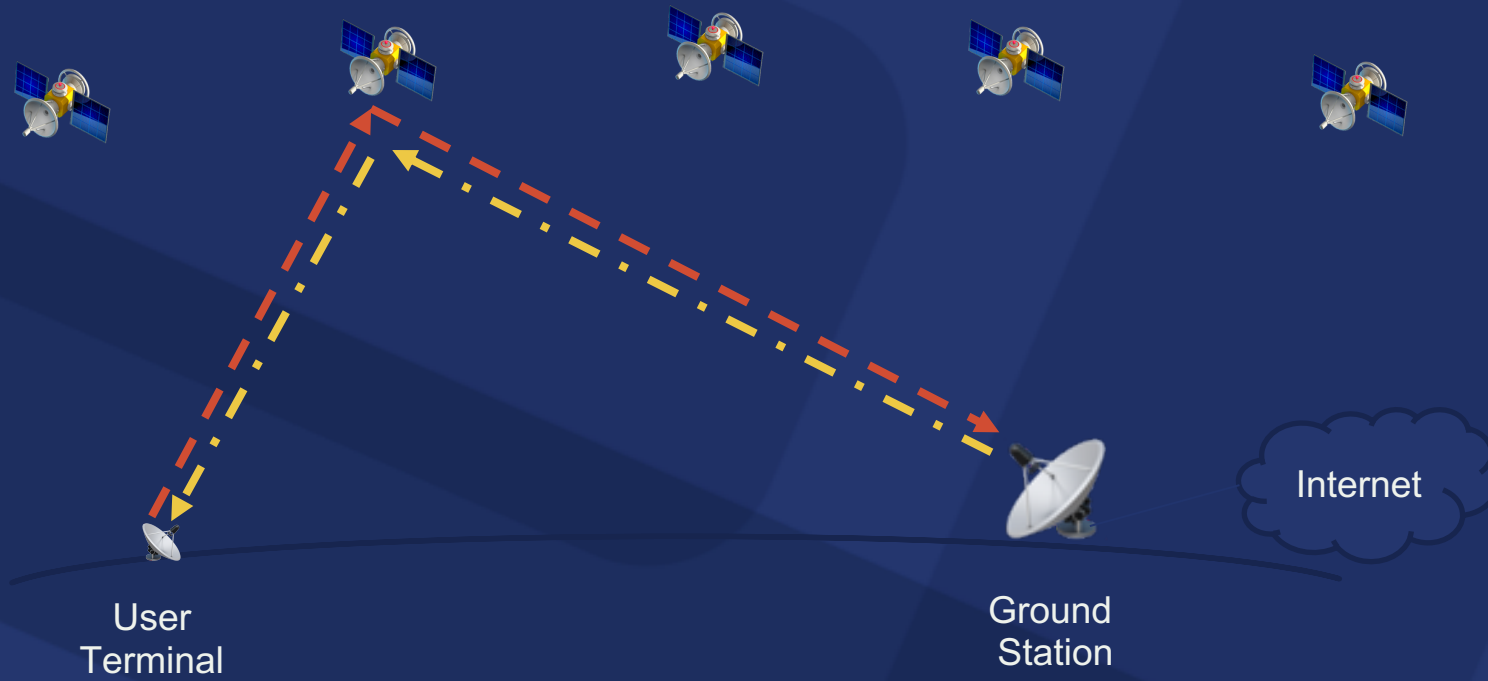
- Spectrum allocation
- Interference
- Allocation of orbits
- Approval process

Technology

- Security
- Privacy
- Open Standards
- Interoperability
- Space debris



Success Stories



Building More Affordable and Reliable Internet Access in the Arctic – Technical Solution



The technical solution involved using a LEO connection as backhaul for the network, which was then distributed throughout the community over a mobile network. This solution is just a starting point for open access to fast, affordable, and reliable Internet, and it can keep getting better with new sources of access to complement the resiliency and speed of the network. More information [here](#)



First Community Networks in Panama– Technical Solution



In this case also the technical solution involves using a LEO connection as backhaul for the network, supporting the connectivity of 200 indigenous people in the regions of Tusipono and Parará Puru. More information [here](#)



LEOs for school connectivity across The Dominican Republic – Policy Solution



Universal Service Provision: Under the conditions of License concession for a LEO provider, INDOTEL, Dominica Republic Telecommunications Regulator have agreed to support connectivity to schools in rural and remote areas. This is a positive milestone, where Licensing frameworks can have a "cashless" component, to support connecting un-served and underserved communities. More information [here](#)



Thank you.

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