Broad overview of global ground network development for LEO systems

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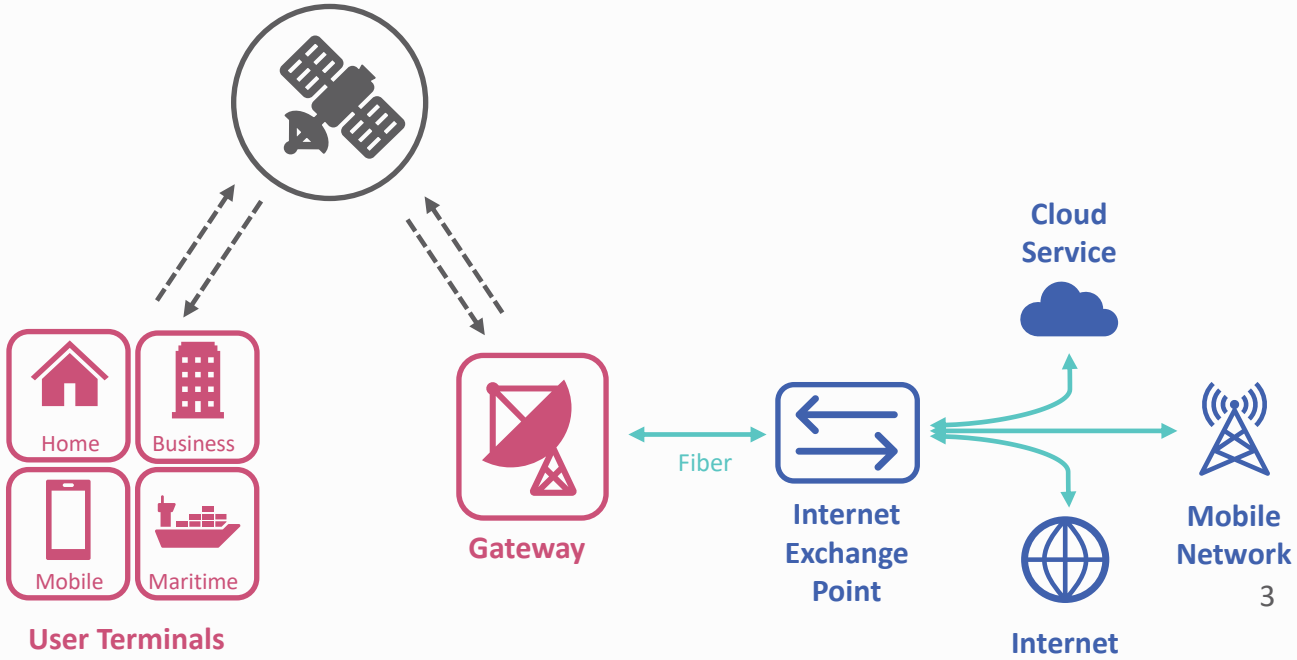
Contents

Satellite system overview

Satellite systems, including LEO constellations, consist of satellites as well as ground components: gateways and end-user terminals

LEO ground components



LEO systems: User terminals and gateways

User terminals

- Enable connectivity at residences or businesses, maritime and aeronautical vessels, as well as devices such as IoT sensors and now mobile devices
- Can be connected to or integrated with Wi-Fi routers to distribute connection

Spectrum
LEO user terminals primarily operate in:
- Ku band (10.7-12.7 GHz downlink, 13.75-14.5 GHz uplink)
- Ka band (17.7-20.2 GHz downlink, 27.5-30 GHz uplink)

Gateways

- Connection between satellite/constellation and terrestrial backbone
- Direct traffic to IXP and then to partner networks/public internet/cloud/data center infrastructure

Spectrum
LEO gateways primarily operate in:
- Ka-band (17.7-20.2 GHz downlink, 27.5-30 GHz uplink),
- Some E band (71-76 GHz downlink, 81-86 GHz uplink)
- Some Q/V band (37.45-42 GHz downlink, 47.2-50.2 GHz and 50.4-51.4 GHz uplink)

Regulatory considerations and updates

Ground components - Gateways

- All satellite services – GEO and LEO – must work within applicable national legal and regulatory frameworks.
- Considerations related to gateways:

Gateway siting licensing and approvals

Fees

Interconnection

Spectrum access and availability

Interference considerations (with satellite systems and terr. services)

Localization requirements

Regulatory considerations and updates (cont'd)

Ground Components – User Terminals

Considerations for user terminals include:

Terminal / Earth Station license

- **Mobile/nomadic terminal use**
- **Large number of terminals**

- **Shift to blanket authorizations**

Fees

Spectrum access

Type approval

Harmonization Efforts to Update Satellite Regulatory Frameworks

Regional actions to harmonize satellite regulations and policies, including for NGSOs

APT: Report on NGSO requirements, challenges, and impacts; surveys to member states

ATU: Proposed model frameworks and held consultations to harmonize satellite services, including NGSOs (e.g., blanket licensing, type approval)

CEPT: ECC Decisions and Report regarding terminal licensing, spectrum sharing and coexistence.

CITEL: Recommendation on blanket licensing for FSS earth stations, including ESIMs

Conclusions

- LEO constellations are reshaping satellite service delivery, with new demands on how gateways and user terminals are licensed, deployed, and integrated into national networks.
- Ground components are now strategic infrastructure, essential to achieving the full potential of constellations — especially for low-latency, high-capacity connectivity.
- Regulators play a key role and many have already begun adapting frameworks to support new deployment models while safeguarding spectrum and national interests.
- Harmonization and scalable approaches will be key to ensuring that regulatory models evolve alongside technological innovation — without fragmenting global service delivery.

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