Wideband Technology

Interoperability for Near-Earth Services

NASAfacts

Commercialization of Satellite Relay Services

As NASA enters a new era of space exploration, the agency is adopting commercial satellite communications (SATCOM) services for future near-Earth missions. The Space Communications and Navigation program is actively working with industry to develop and demonstrate space-based relay services that satisfy mission needs, with plans to deliver these services to the Near Space Network by 2031.

Wideband Polylingual Terminals

Cellphone providers adopted roaming technology long ago, allowing devices to jump from network to network without interrupting services. Wideband polylingual terminals, also known as multilingual terminals, aim to enable similar roaming capabilities in space by empowering spacecraft to "roam" between government and commercial network providers through the use of software defined radios.

Software defined radios have been on satellites for over a decade. The innovative tool, developed by NASA, enables software and waveform updates in space for active missions. Wideband terminals take the next step in utilizing this technology, with the goal of allowing missions to adopt new and evolving commercial services as they become available over the next decade.

The first Ka-band terminal flight demonstration of wideband technology, known as the Polylingual Experimental Terminal, is set to launch in April 2025. Additional interoperable terminals are currently under development by NASA and industry partners to support a variety of user needs.

Polylingual Experimental Terminal (PExT) Flight Demonstration

NASA is collaborating with the Johns Hopkins Applied Physics Laboratory to test a prototype Polylingual Experimental Terminal, known as PExT. The body-mounted, 0.6-meter antenna will be integrated on a York Space Systems S-CLASS bus and launched on a SpaceX Falcon 9 for a six-month flight demonstration.

PExT is the first flight demonstration of roaming across government and commercial networks from a single terminal. During the six-month testing period, the terminal will attempt to demonstrate various mission scenarios while roaming between NASA's Tracking and Data Relay Satellite system and three commercial relay networks, including:

- Self-pointing capabilities
- Long-term schedule execution
- Intra-/inter-network link handoff
- Waveform adaptation and reloading
- Command stack protection (crypto)
- Link fault recovery
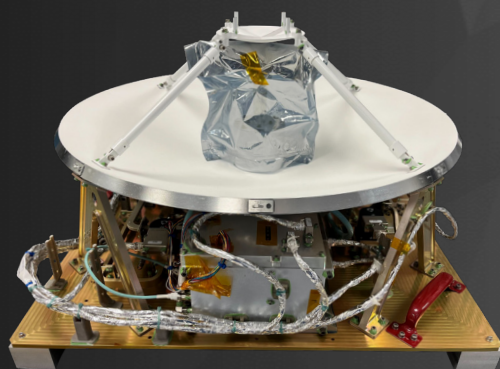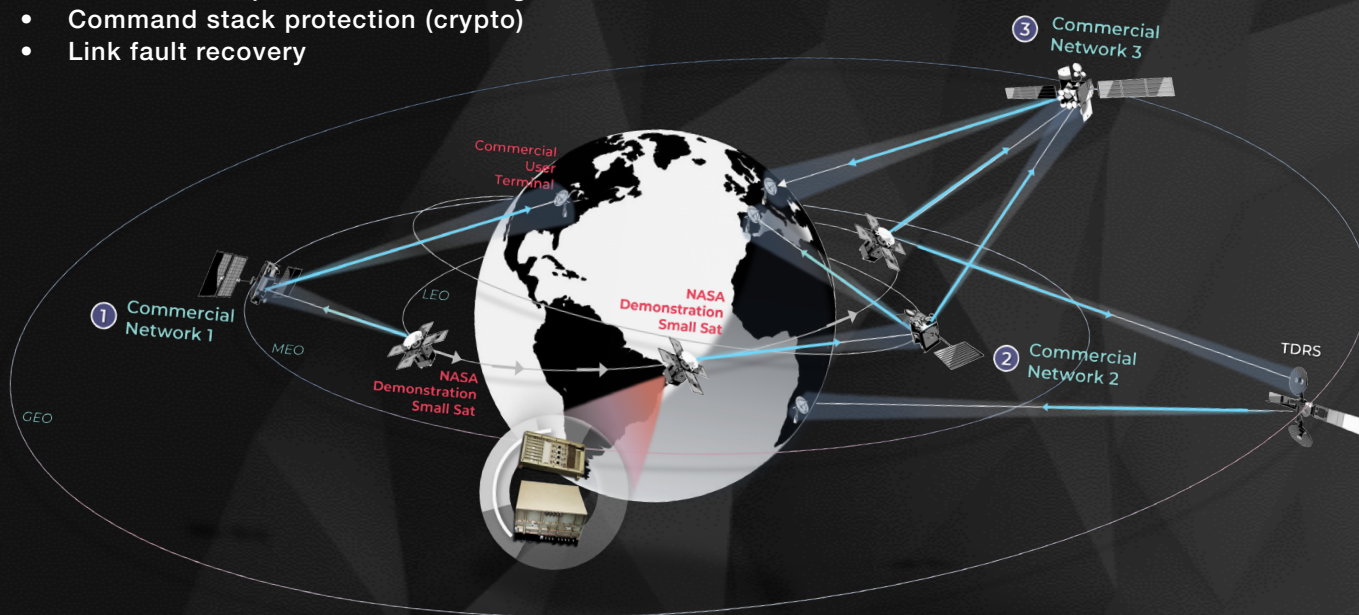
Terminal Details

- SWAP: 24 x 24 x 17 inches, ~23kg weight, peak power 200 watts
- Operational Frequency Coverage: 17.7 GHz-23.55 (Forward) and 27 GHz-31 GHz (Return)
- EIRP: 46.21 dBW (Minimum)
- G/T: ~6dB/K
- Waveforms: DVB-S2, CCSDS TDRSS
- Data Rates: up to 90 Mbps (Forward) and up to 375 Mbps (Return)
- Future Data Rates: up to 490 Mbps (Forward) and 1 Gbps (Return)

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