Wideband Technology

Interoperability for Near-Earth Services

National Aeronautics and Space Administration

NASAfacts

Commercialization Objectives

As NASA's satellite system approaches retirement, partnerships with commercial industry will play a critical role in the development of future space communications and navigation architecture. Over the next decade, NASA missions will transition towards adopting commercial space-based relay services to fulfil their near-Earth communications needs. The Space Communications and Navigation (SCaN) Program will assist missions in making this transition, leveraging existing partnerships and ongoing demonstrations, as well as a future full and open competition for services.

Wideband Polylingual Terminals

Wideband polylingual terminals, also known as multilingual terminals, could serve as a key enabling technology for NASA missions during the transition to commercialization. Cellphone providers adopted roaming technology long ago, allowing devices to jump from network to network without interrupting services. Wideband terminals aim to empower similar roaming capabilities for spacecraft, by providing interoperability between government and commercial network providers through the use of software defined radios (SDR).

SDRs have been in use on satellites for over a decade, enabling changes to the radio post launch. This innovative tool, developed by NASA, enables software and waveform updates for active missions. Wideband terminals seek to take the next step in utilizing SDR technology, allowing spaceflight 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 no earlier than July 2024. 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

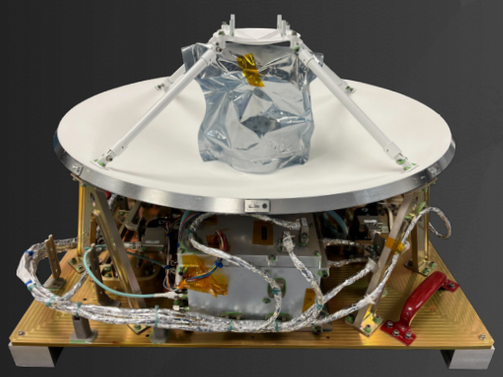
NASA is collaborating with the John Hopkins University Applied Physics Laboratory to test a prototype Polylingual Experimental Terminal, known as PExT. The body mounted 0.6-meter antenna will be integrated on a York Space Systems S-class Bus and launched on a SpaceX Falcon 9 Transporter-11 for a six-month flight demonstration.

The PExT wideband terminal will be the first flight demonstration of roaming across government and commercial networks from a single terminal. During its six-month testing period, the terminal will attempt to demonstrate various mission scenarios while roaming between NASA's Tracking and Data Relay Satellite (TDRS) 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**



NASA's wideband team is currently providing opportunities for the mission user community to take part in extended operation experiments using wideband technology. To learn more, contact project lead Marie Piasecki, marie.t.piasecki@nasa.gov.



PExT 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)**

Scan to learn more about wideband technology.

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