



Space Communications and Navigation
Science & Exploration, *enabled.*

National Aeronautics and
Space Administration



SCaN Update

Presented To:

Astro Probes Phase A Kickoff Meeting

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National Aeronautics and Space Administration

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Science and Exploration Enabled:

SCaN is the essential connection to our human explorers, our science missions, and our partners

Space Communications and Navigation (SCaN) Serves as the enterprise responsible for all of NASA's space communications activities.
24/7 Global Near Earth and Deep Space Communications and Navigation Services
100+ Missions currently enabled by SCaN

Focal Points for Change: Strategic Evolution

Engage
as One Team,
One Mission,
One Network

Execute
with Sound Technical
and Programmatic
Fundamentals

Evolve
the Network to
Satisfy Mission
Customer Needs of
the Future

Empower
Our Science and
Exploration
Partners

SCaN Network Architecture is Evolving to Meet Stakeholder Needs



Important Updates

There have been a number of significant changes in both the NASA/SCaN organization as well as with the commercial communications providers from the Astro Probes Pre-Proposers conference in August 2023.

If there are any concerns or questions, proposers are encouraged to reach out the SCaN Mission Commitment group for assistance.

Becoming One Team: The SCaN North Stars

Putting Our Team in Alignment

Provide reliable, robust, and resilient space communications and navigation capabilities to enable safe execution of NASA missions.

Architect, develop, and partner to deliver the space communications and navigation capabilities of the future

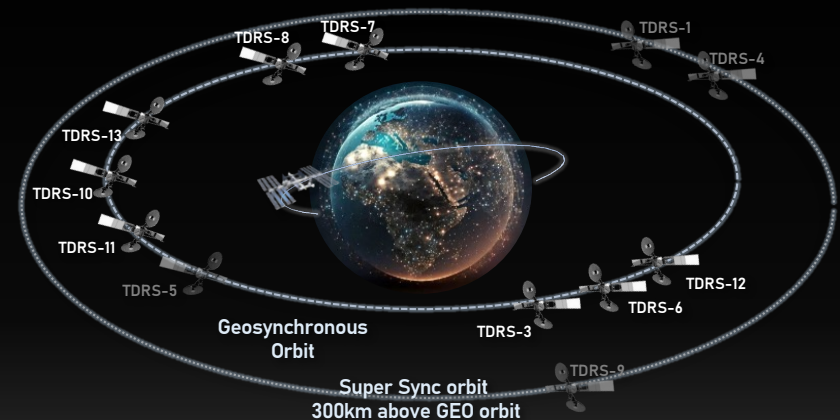
Demonstrate world-class leadership through responsive engagement with communications and navigation stakeholders inside and outside the agency

Space Relay Continuity: Phasing out TDRS

- The NASA Tracking and Data Relay Satellite (TDRS) system is in decline
- To preserve capacity for existing users and avoid introducing new risks, NASA has decided to stop accepting new users on the TDRS network
- O&M of the remaining TDRS fleet will be focused on retaining global coverage into the 2040s for current users (e.g., ISS, HST, GDC, etc.)

NASA Decision

- Effective November 8, 2024, NASA will no longer accept new mission commitments for TDRS support.



Important Updates. On-Demand Services

SCaN has 6 vendors under funded Space Act Agreements performing demonstrations of their capabilities on various use cases (including space-based relay). There are at least two that could provide an RF space-based relay service like TDRS MA., while others are emphasizing optical relays.

One of the vendors (Viasat) is already offering such a service to customers, and should science requirements need such a service, a project is invited to discuss their needs with that vendor directly.

Note that there is no requirement for a project to use SCaN services, only that SCaN be informed, in order to understand mission needs in case of contingency.

Space Relay Continuity: Momentum is Building

- As a cohort, CSP providers are on schedule and 50% through their milestones
- SES's Ka-band ground testing with mPOWER successfully conducted with Planet's LEO flight-representative terminal
- Amazon Kuiper launched two prototype satellites and conducted extensive testing of its end-to-end optical communications payload and network architecture
- SpaceX successfully demonstrated optical connectivity between Starlink and a crewed Dragon spacecraft during the Polaris Dawn mission.
- Viasat/Immarsat and Rocket Lab partnered to demonstrate data relay services for LEO satellites
- Kepler has joined the cadre demonstrating both optical and S-band on orbit relays.
- The SCan-funded Polylingual Experimental Terminal (PEXT) will launch in early 2025 and be compatible with multiple commercial services

Optical Demonstration

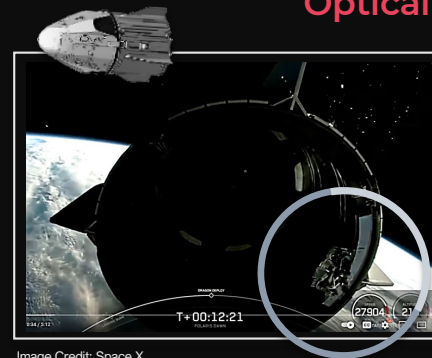


Image Credit: Space X

Polaris Dawn and Starlink Plug and Plaser



Image Credit: Space X

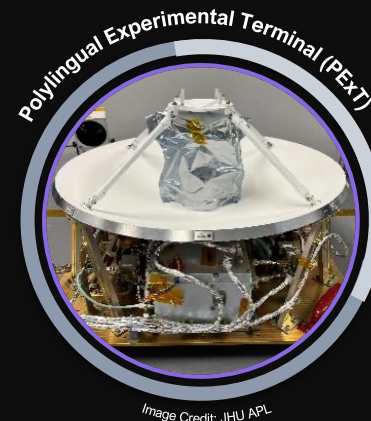


Image Credit: JHU APL



Image Credit: Amazon

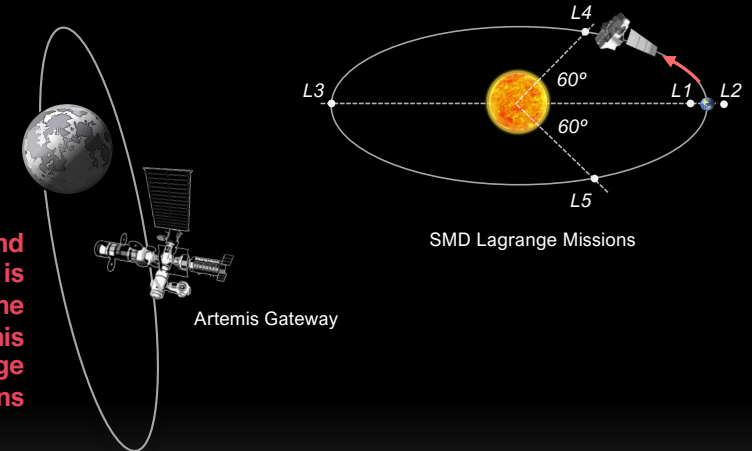
A new NSN Capability Lunar Exploration Ground Segment

Lunar Exploration Ground Segment (LEGS) will provide NSN capacity for users out to L1/L2, alleviating DSN demand

NASA is building “18-m class” LEGS antennas at sites #1-3 in US, Australia and South Africa to be government owned and commercial operated

- LEGS 1-3 will ensure 24x7 service for Gateway; all three are planned to be operational in time for the Artemis IV launch
- LEGS 1 in White Sands, NM
- Agreement with SANSA for LEGS 2 site in Matjiesfontein, South Africa signed in September 2024
- LEGS 3 site finalized for Dongara, Australia in October 2024

Additional ground station capacity is critical to support the demands of Artemis and SMD Lagrange Missions



Spectrum Considerations and Cost

NTIA issues spectrum licenses for government-run missions; FCC issues spectrum licenses for commercial-run missions

Spectrum managers based at individual NASA centers help missions navigate interagency process, and eventual submission of spectrum assignments to the International Telecommunications Union (ITU)

Spectrum costs are considerable; discussions on how to best allocate those costs are ongoing

- This issue is being looked into at the SMD Division/SCaN level
- There are specific license costs relevant to GSFC



Important Updates Spectrum considerations

The Spectrum regulatory landscape is changing very rapidly, and users are strongly urged to contact the NASA National Spectrum Manager -- Bryan Rhodes (bryan.a.rhodes@nasa.gov) to discuss their needs.

Additionally, the commercial ecosystem of providers is also rapidly evolving, with new vendors, consolidations, and alternate / new assets coming on-line. Proposers should be very wary of baselining specific assets for their CONOPS, as these could change as commercial business cases react to economic drivers.

Synopsis

- **NASA is no longer accepting new mission commitments for TDRS;** due to degradation, the network must be prioritized for existing users.
- **CSP awarded FSAs totaling \$278.5 million to six providers in 2022;** they have already achieved 50% of their milestones and are conducting demo missions.
- **CSP will deliver services through the NSN by 2031;** in advance of that time, SCaN will assist users who intend to work directly with relay providers.

Follow-on question are welcome!

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Together