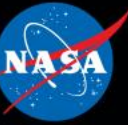




COMMERCIALIZATION,
INNOVATION, AND SYNERGIES OFFICE

National Aeronautics and
Space Administration



Opportunities for SmallSat Missions with the New Near Space Network

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Outline



- Overview Near Space Network (NSN)
 - Our Domain
 - What We Do
 - Goals of CIS
- SmallSat/CubeSat Support
 - NSN SmallSat/CubeSat Strategy
- NSN Mission Onboarding Process and Support
 - Mission Engagement Activities
 - Industry Engagement Activities
 - Mission On-boarding Process
- Why Choose NSN



Functional Statement

The Near Space Network (NSN) project provides the project management leadership and subject matter expertise required to formulate, implement, operate and maintain a data system capable of connecting national and international data link providers with NASA users and partners via a virtual network management capability and routinely synchronizing systems, processes, and techniques with those of the U.S. private sector in order to provide NASA, other government agencies and partners optimal communications and navigation mission services.

The entry point for users and missions to the NSN is through the CIS Office

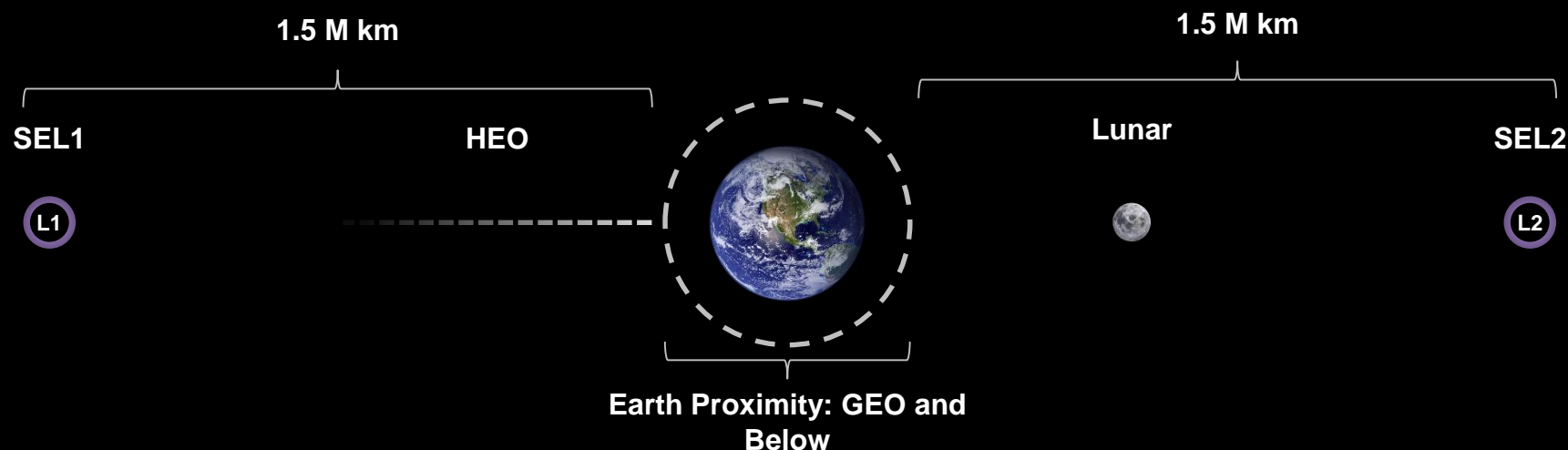


Near Space: the volume of space from the Earth's surface to 2,000,000 km

Earth Proximity: a subset of near space; the volume of space from Earth's surface to geosynchronous orbit (36,000 km) and the initial focus of service commercialization

Deep Space: the volume of space starting at 2,000,000 km from Earth's surface and proceeding out into the solar system and beyond. This volume is supported by the Deep Space Network

	FY20	FY25 Projections
Number of Near Space Missions	53 missions	74 missions
Frequency Bands	S, X, Ku, Ka	S, X, Ku, Ka, Optical (Infrared)
Data Rates (DTE, Earth Relay, Lunar Relay)	Up to 3.5 Gbps	Up to 3.5 Gbps

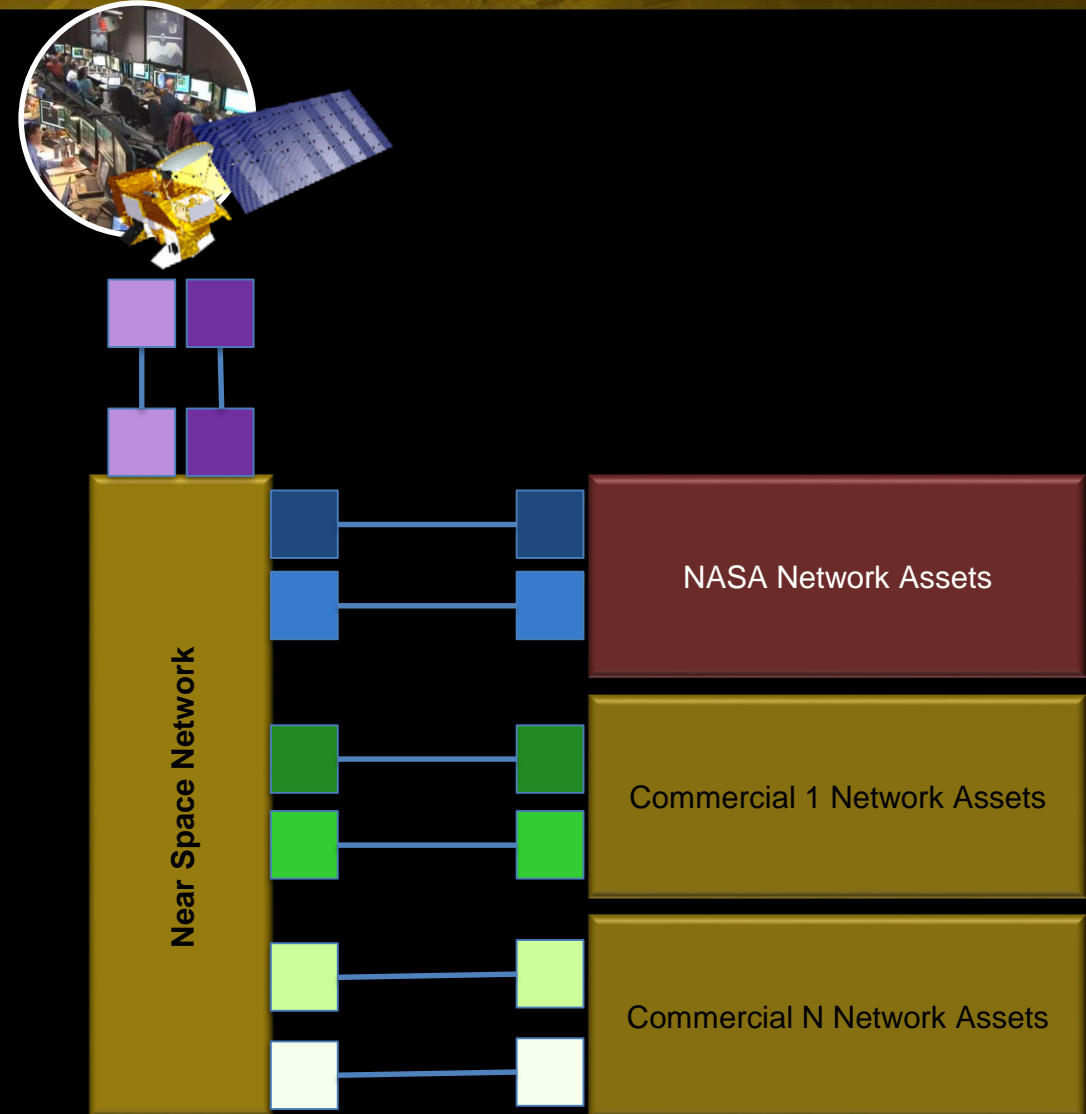


The Near Space Network empowers diverse missions communications and navigation services.

- We connect customer missions to essential communications and navigation services.
- We alleviate the need for users to do in-depth background research on which services or service providers best fit their mission.

We provide trusted and time-tested expertise to missions as they formulate, design, launch, and operate their missions.

- We utilize government and commercial assets to achieve user goals through the entire mission lifecycle.



Current Network Infrastructure



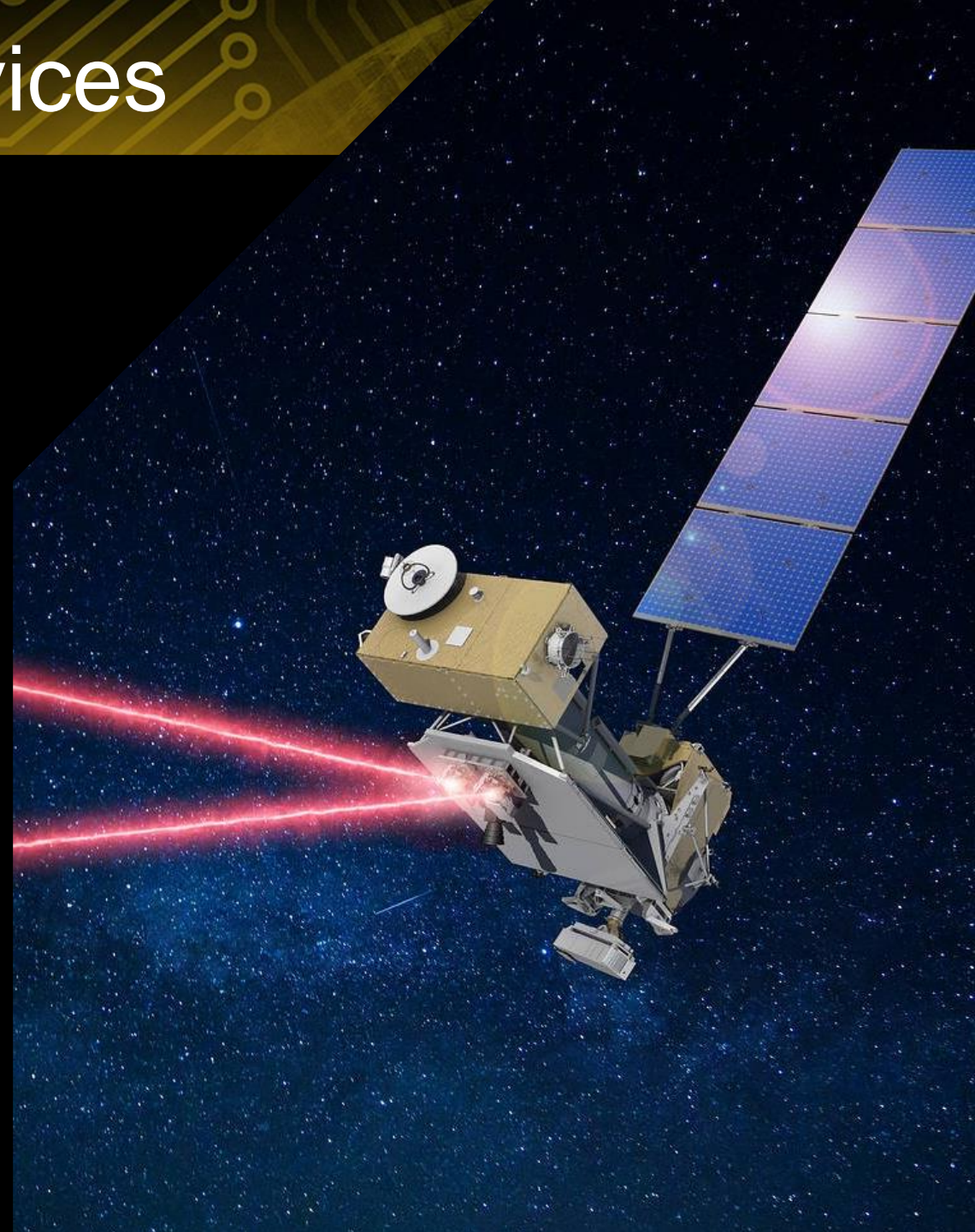


New and Innovative Services

The Near Space Network now provides high-data-rate, DTE Ka-band services through the ACCESS project.

The network is also integrating optical communications capabilities into its portfolio. These technologies use infrared lasers to provide high-data-rate communications to missions while reducing size, weight, and power requirements.

The network also works with experts realizing future innovations like quantum networking, Delay/Disruption Tolerant Networking (DTN), and other technologies, assuring the network stays at the cutting-edge.





Goals of the CIS Office



Identify opportunities, nurture diverse relationships, and implement collaborative solutions to enable and enhance needed capabilities and technologies in support of exploration and space communications by:

- ✓ Fostering a more robust and interoperable space communications marketplace
- ✓ Facilitating and increasing the industrial base
- ✓ Enhancing the collaboration between industry and government



SmallSat Support

In addition to larger science missions, the Near Space Network supports the crucial research performed by CubeSats and other small satellites.

The network has a proven track record of success in small satellite support during all phases of the mission lifecycle.





- The NSN CubeSat strategy consists of multiple initiatives that are aligned with the Small Satellite Coordination Group (SSCG) objectives and decisions

Initiative #1: Emerging Commercial Services (CS) Providers

- Continue to identify and evaluate additional viable emerging Commercial Service providers
- Use of emerging CS providers to provide cost effective alternative for SmallSats while achieving commercialization goals

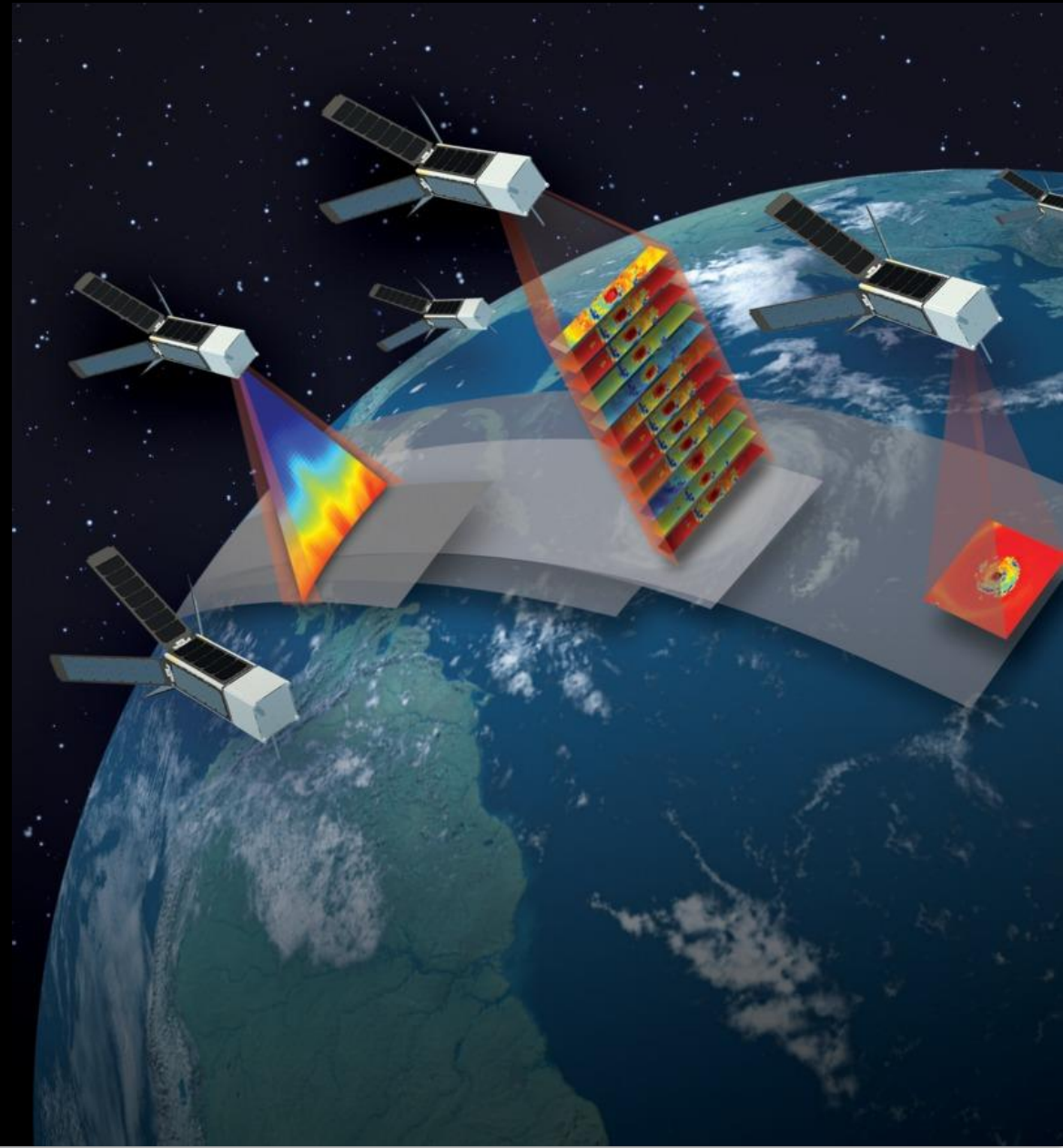


SmallSat Support



Initiative #2: Streamlining the NSN Mission Planning and Integration (MP&I) Function

- Continue to implement efficiencies in NSN mission on-boarding activities
- CubeSats and SmallSats can be on-boarded in a cost effective streamlined process than the legacy flagship missions
- Simplifying the documentation/testing to make NSN services more in-line with the CubeSat needs





SmallSat Support



Initiative #3: Support CubeSat Transition to NSN Frequencies, Higher Data Rates, and Efficient Modulation/Coding Techniques

- Supports CubeSats with objectives to demo new techniques
- Provides pathway to traditional missions using new and innovative technology



Mission Engagement Activities

Advertise

Engage

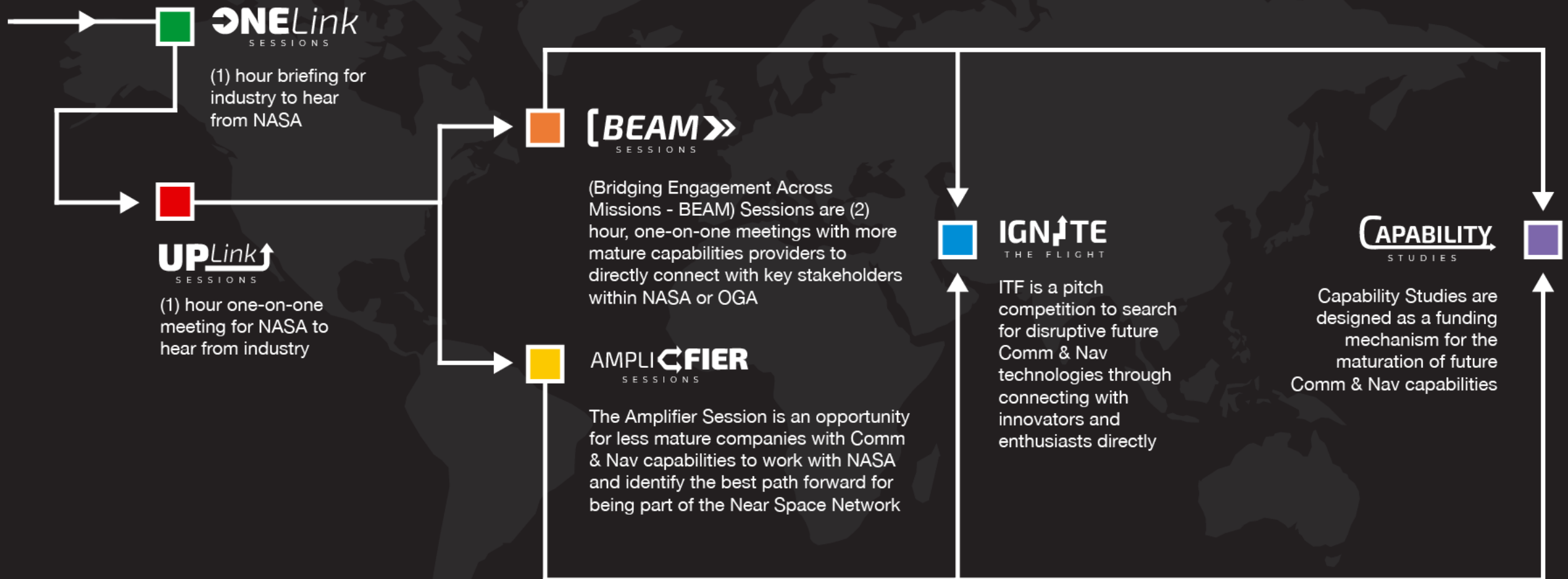
Support

- **Directorate and Potential User Outreach**
- **Workshops/ Forums**
- **Roadshows**
- **Internal Newsletters**

- **Civil and Defense Space Partnerships: OGA and DoD consortiums**
- **Industry Engagement: corporations, small business and academia**
- **Decadal Survey Participation**

- **Opportunity & Solicitation Developments**
- **Proposal Support to New Missions**

Industry Engagement Activities





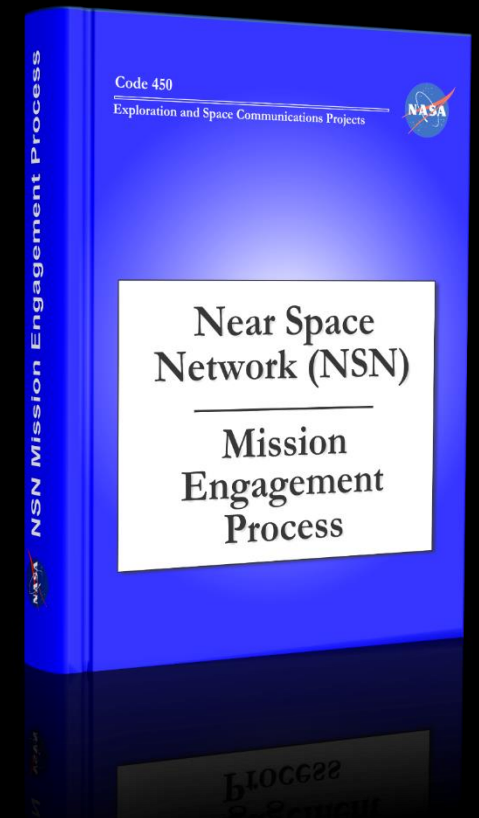
CIS & NSN Mission Engagement Process



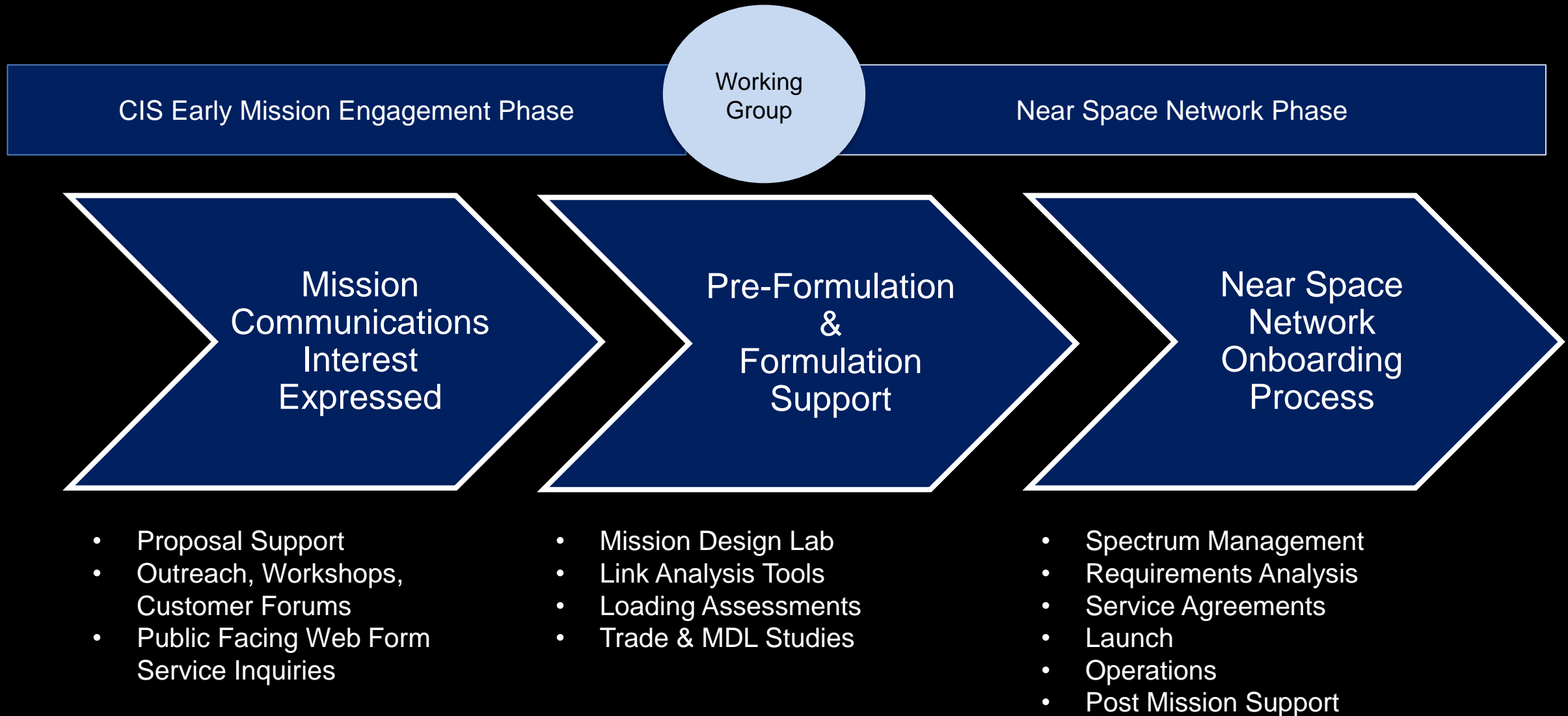
Provides a single contact for near space users and missions

- Defines inter- and intra-organizational roles and responsibilities, centered on providing mission communication and navigation solutions from concept to implementation and acceptance.
 - Supports new missions to meet mission objectives, reduce costs, and make directed missions and new business proposals more responsive and competitive
 - Supports directed missions in Phase A and beyond
- Services all users and missions by defining processes, communicating with the customer, securing agreements, and incorporating flexibility.
- NSN ultimately fulfills solutions to guarantee mission communication and navigation needs are met.

Mission Engagement Manager: Tom Gitlin, thomas.a.gitlin@nasa.gov



Customer Engagement Flow





Closer Look: Mission Support, Viability & On-Boarding



CIS

CIS Outreach

- Workshops
- Forums
- Seminars
- Other Interactions

Mission Interest

Expressed verbally or formally, via web form, or via email distribution list, email, phone, etc.

Mission
Engagement
Working Group
Discussion

NSN

Mission Viability Assessment

Assessment Factors: Orbit Analysis [Geometry, Dynamics, etc.], Latency Needs, PNT needs, timing needs, RF bands, IF needs, coding schemes, Optical Compatibility, Costs, Network Loading, command/telemetry/tracking interfaces, scheduling needs, NASA permitted sponsoring agency/government

Not Viable

Determined by team assessing mission factors – notify mission of reason(s)

Viable

NSN assigns Mission Integration Manager and begins detailed on-boarding process

Customer Relationship Management Tracking

Customer Journey

Studies (Analysis of Alternatives)

Pre-Phase A: Concept Studies

Phase A: Concept & Tech Dev

Phase B: Prelim Design & Tech Completion

Phase C: Final Design & Fab

Phase D: Sys I&T Checkout

Phase E: O&M

Phase F: Closeout

Formulation

Implementation

450.1 / CIS Office

- Outreach/Awareness
- Missions/Providers Engagement
- Future Missions and Capabilities Analyses (Incl. MDL)
- Enabling and Enhancing Opportunity Assessment
- Viability Assessment
- Prelim. Comm & Nav Trades

457 / NSN Project

- Onboarding Providers
 - Procurement / Acq.
 - Monitor Svc. Contracts
- Onboarding Missions
 - Mission Planning, Integration, Ops Readiness
 - Missions/Providers Tech Pairing
 - Final I&T/V&V
 - Agreements/ICD
- Operations
 - LEOP / Critical Ops
 - Orchestrated Govt. and Commercial Services Ops
 - Virtual Network Management
 - Mission Planning and Scheduling
 - Data Transport Mgmt., Monitor, Control
- Dev/Upgrades
 - NSOCC
 - Data services

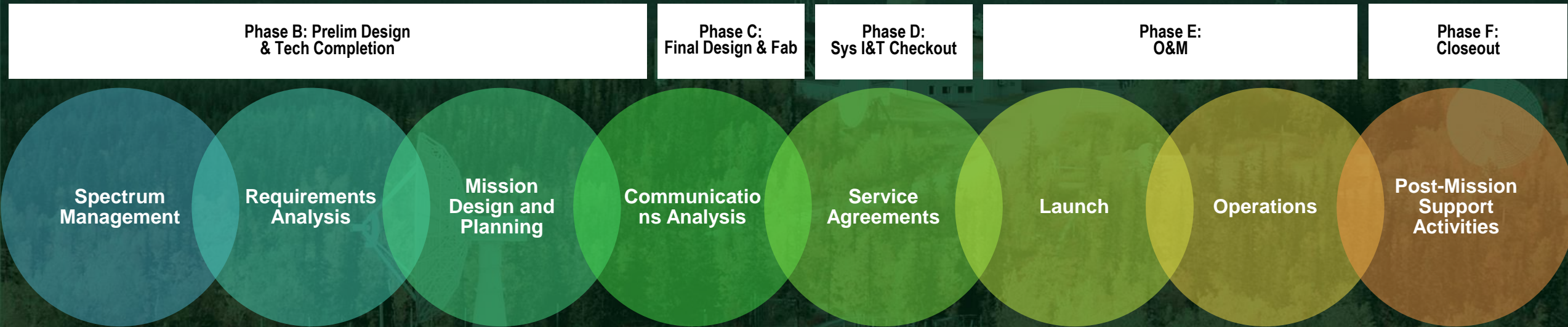
459 / ACCESS Project*

- Manage Operations & Maintenance & Sustainment of GOCO assets
- Technology Infusion
- Development of commercially unavailable capabilities
- Special / Exempt Missions

Commercial Service Providers

- Manage Operations & Maintenance & Sustainment of Commercial Assets
- Technology Infusion / Capability Enhancements

Services Provided



Comm & Nav Support for the Entire Mission Lifecycle



WHY CHOOSE NSN?

We're connected.

- ✓ We are progressing direct-to-Earth commercialization efforts.
- ✓ We are connecting experts from industry, academia, and government and international agencies to create a community of innovators.
- ✓ We have a proven record of success with a variety of missions and service providers.
- ✓ We provide a single-entry point for all Near Space Network missions.



WHY CHOOSE NSN?

We're experienced.

- ✓ We have decades of experience from mission concept definition through mission completion.
 - *Set the standard in communication link analysis*
 - *Provide spectrum guidance*
 - *Utilize predictive network capacity analytical tools*
 - *Employ engineers experienced in latest flight hardware designs and capabilities*
 - *Engage in-house subject matter experts*
- ✓ We provide reasonable mission lifecycle costs.
 - *Avoids the risk and expense of setting up a custom communications team for each mission*
 - *Scaling improves lifecycle costs*

A large, complex satellite dish antenna structure is shown against a clear blue sky. The structure is made of dark blue metal and features a large, multi-segmented parabolic reflector. The dish is mounted on a tall, cylindrical support structure. The perspective is from below, looking up at the dish, which is angled towards the upper right. The overall tone is professional and technological.

WHY CHOOSE NSN?

We're capable.

- ✓ We are the trusted NASA services provider.
- ✓ We are well-positioned to support LEO, MEO, GEO, HEO, LaGrange and Lunar missions.
- ✓ We are creating paths for exploring new capabilities to expand services.
- ✓ We establish processes to maintain and evolve the network with industry standardization and interoperability.
- ✓ We have comprehensive end-to-end data security measures and are compliant with the National Institute of Standards and Technology.



For more information about Mission Engagement, contact:

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New Missions

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