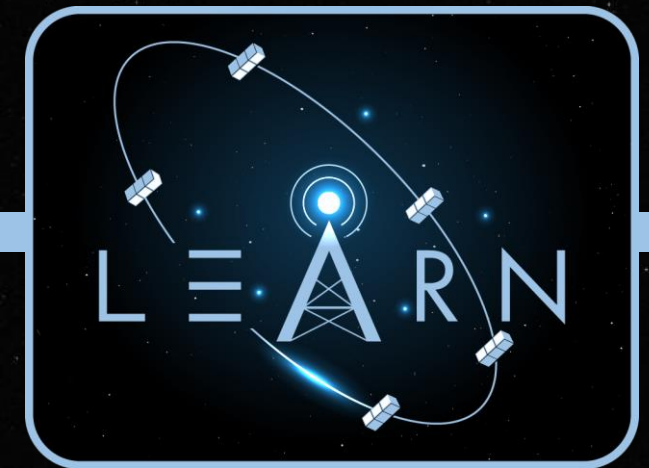


NASA's Integration With the Commercial Communication Landscape

Marie T. Piasecki

Wideband Technology Lead
Commercial Communications Services Division (CCSD)
Space Communications and Navigation (SCaN)
Space Operations Mission Directorate, NASA HQ

National Aeronautics and Space Administration Small Satellite Learning from Experience, Achievements and Resolution Navigation Forum



Enabling Human Space Exploration and Science

1

Develop, operate and manage all NASA space communications capabilities



2

Develop technologies to enable and enhance future mission experience



3

Manage NASA spectrum; represent NASA on national and international spectrum management forums



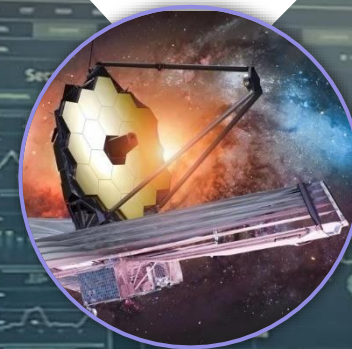
4

Develop space communication standards as well as positioning, navigation, and timing policies



5

Represent and negotiate on behalf of NASA on all matters related to space communications and navigation



Space Communications and Navigation (SCaN) serves as the Program Office for all of NASA's space communications activities

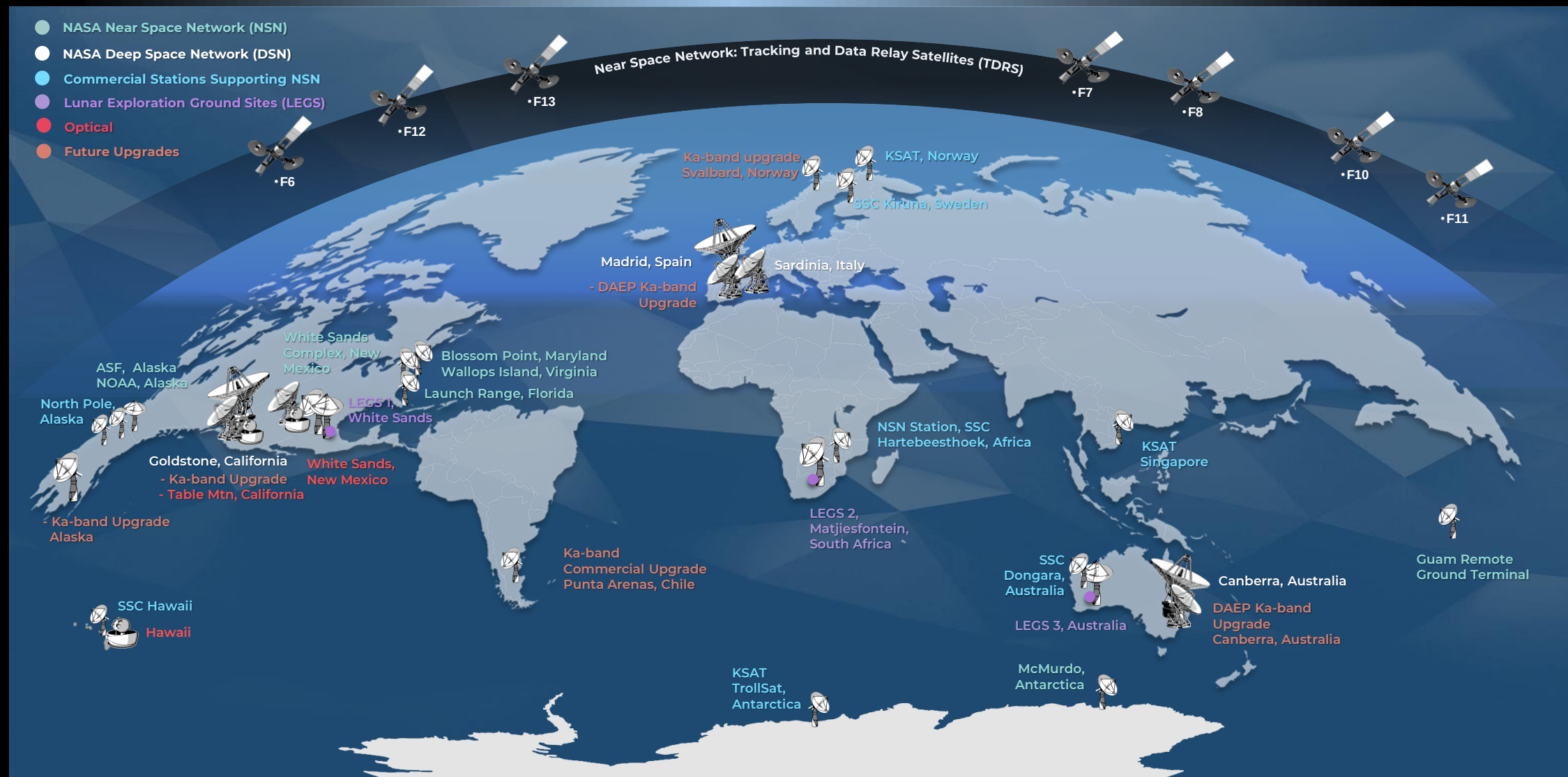
24/7

Global Near Earth and Deep Space Communications and Navigation Services

100+

Missions currently supported by SCaN

NASA's Communication Networks





Growth in Commercial DTE Services

- Kongsberg Satellite Services (KSAT) has provided the NEN with TT&C services support from its Svalbard, TrollSat, and Singapore sites
- NASA has a long history of procuring services from the Swedish Space Corporation (SSC), beginning with support from the Universal Space Network (USN) in the early 2000's



- **1997-1998**
Svalbard Satellite Station Opened. NASA installed SG1 antenna to support EOS.
SG1 Government Owned / Contractor Operated.
SG2 Commercially owned / operated

- **2000**
NASA begins to receive support from the USN Hawaii and Australia stations for missions including GOES, FAST, FUSE, GLAST...

- **2003-2006**
SG3 added to the network - is Commercially owned / operated.
SG4 installed- is Partner owned / operated



- **2009**
SSC purchases the USN. NASA obtains LRO support from SSC/USN

As of 2012, the NASA no longer owned or operated any antennas at commercial locations

- **2012**
New KSAT owned SG1 antenna declared operational for NEN support. Aqua and Aura first missions supported

- **2015**
Support through SSC grows to include THEMIS, MMS, and launch support

As of 2022, **63%** of all DTE Services to NASA missions are commercially provided

NASA tapping into a growing market of commercial DTE comms vendors



RFP Released in 2023 with goal to expand level of commercial services to near 100%

1990's

2000-2010

2010's

2020's

History Events

**Companies listed are illustrative of market activity, not indicative of NASA preference or commitments*



Near Earth Relay: NASA Must Phase Out TDRSS

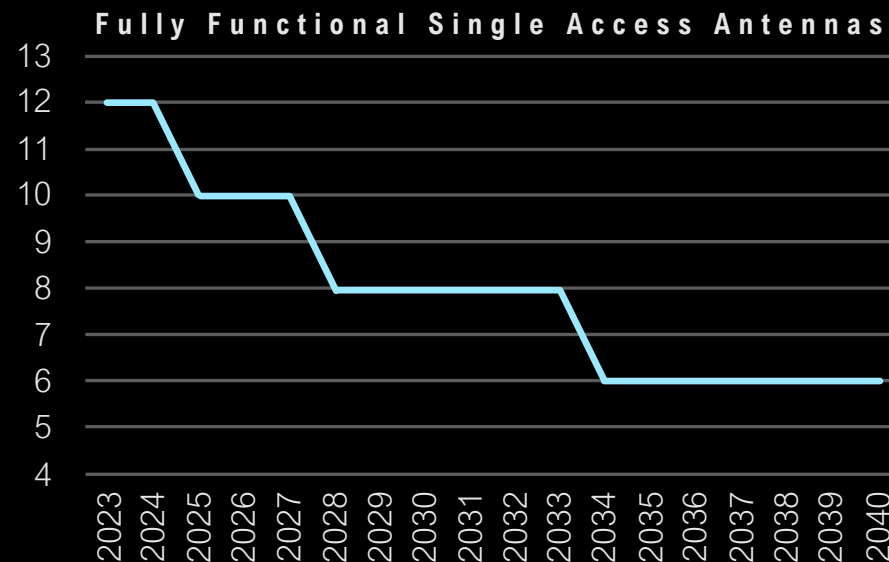


NASA does not have the dollars (~\$1.8B) to unilaterally launch replacement satellites for the Tracking and Data Relay Satellite System (TDRSS), nor the political or policy support

- Option for final 3rd generation spacecraft (TDRS-N) was rejected by the Office of Management and Budget (OMB) and Congress
- OMB has communicated that NASA should transition away from TDRSS and towards commercial, aligning with National Space Policy

NASA expects to operate TDRSS into the 2040's

- The last TDRS was launched in 2017, and seven are operational
- SCaN will maintain and fly out the constellation **to support existing missions** based on spacecraft health
- TDRS 11, 12, and 13 are projected to last into the 2040s





Progress in Near Earth Commercial Relay



Pioneering the Future of NASA's Near-Earth Space Communications

- GEO **Ka-band** relay network
- Routine launch and mission support
- High and low-rate communications services

Viasat

- **Optical** LEO network
- Supporting routine, contingency, and early operations
- High and low-rate services

amazon | project kuiper

- GEO network with **C-band and Ka-band**
- Supporting routine, contingency, launch and ascent, and early operations
- High and low-rate services

SES
GOVERNMENT SOLUTIONS

- **Optical** LEO network
- Routine, contingency, launch and ascent, and early operations support
- High and low-rate services

SPACEX

- RF relay networks offering **C-band and Ka-band** services for high and low-rate communications
- Support to routine missions

TELESAT

- Commercial GRO **L-band** relay network
- Support to routine missions, contingency operations, launch, ascent, and early operations
- Low-rate SATCOM services

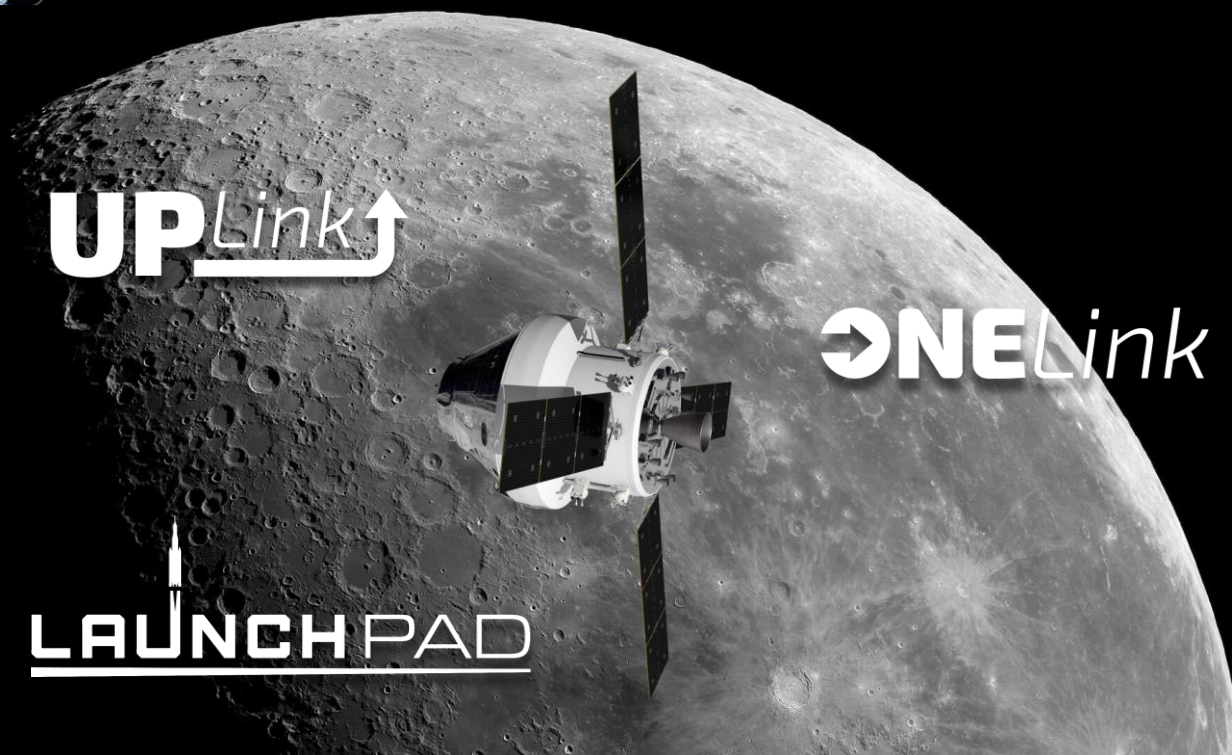
inmarsat

NASA announced on April 20, 2022 that the Communications Services Project (CSP) awarded contracts totaling **\$278.5 million**

to test how commercial satellites from LEO to GEO could support NASA missions.

FSAA is funding vendor demos, seeding a market for commercial SATCOM that will supplant use of TDRSS for future NASA missions.

Six providers are matching / exceeding the awards with their own funds. Estimated total investment of **\$1.5 billion** over five years.



CIS's Near Earth Approach

- SCaN formed the Commercial Innovation and Synergies (CIS) Office to foster industry dialogue
- CIS engages with vendors to shape RFPs, track capabilities and promote space service market
- Outreach via RFIs, one-on-one "Uplink Sessions," open "OneLink Sessions" and "CIS Launch Pad" briefings

Industry Engagement for the Moon

- Artemis I Doppler Tracking RFI received 20 responses—10 participated just months later
- LunaNet Interoperability Specification and draft service requirements for Lunar relay capability have been released publicly
- SCaN efforts are consistent with the Agency's drive for wider industry engagement on Moon-to-Mars Objectives



Artemis 1 One-way partner tracking data was combined with DSN two-way events and assessed against JSC telemetry

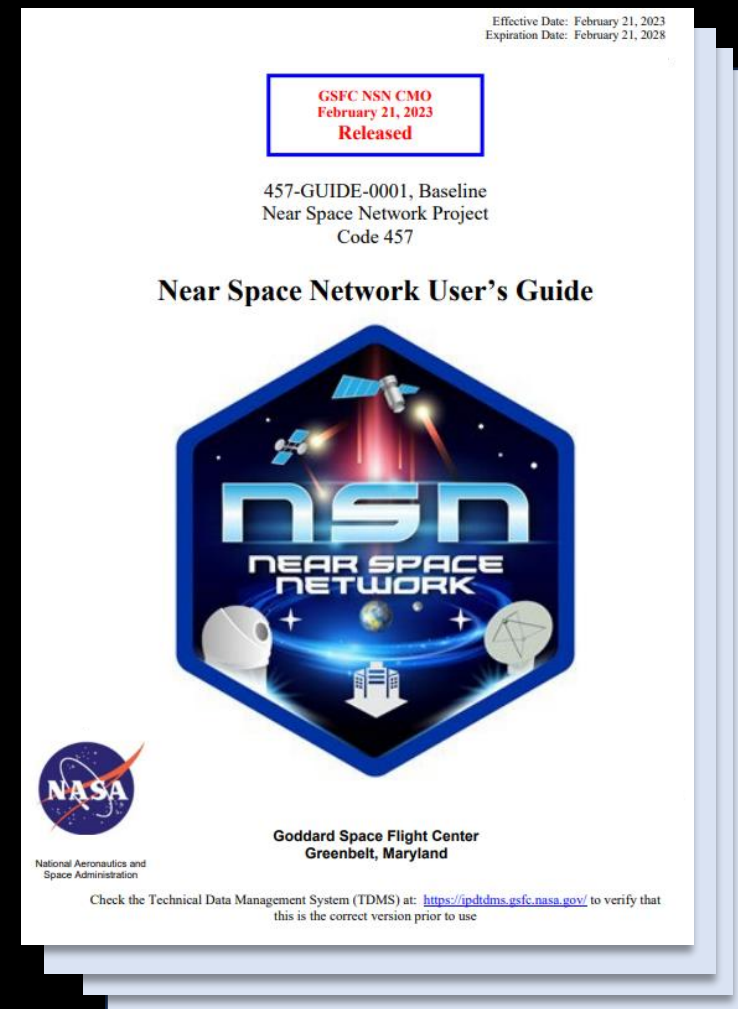
SCaN provides documentation of available services and costs to support Proposers

Proposers should be aware of new requirements in AO language, as well as best practices for network stewardship.

Examples:

- Minimize contact time
- Use greater mission autonomy to lower reliance on networks
- Implement capabilities that more efficiently use network resources
- Note: new missions will not be allowed use of the TDRSS network

Due to the rapidly evolving commercial landscape, Proposers are strongly urged to contact the SCaN Mission Commitment Office early in the process of developing of their concepts





Guidance to Missions: Spectrum Considerations



NASA-controlled missions using RF spectrum must be certified/authorized by NTIA, even if using commercial services

- This is a lengthy process that begins in Phase B, with a first submission no later than 60 days before PDR

Proposers are encouraged to contact their center spectrum manager early to discuss spectrum operations concepts and frequency options

- NASA lists center [Spectrum Points of Contact](#) on their website
- Any project with no clear NASA Center lead may contact NASA National Spectrum Manager: Bryan Rhodes (NASA/GRC): bryan.a.rhodes@nasa.gov.

Learn more with the SATERN “Spectrum 101 for Users and Missions” training





Conclusion

- Commercial services are the future—and we have a unique opportunity to shape the options they provide
- We need the NASA SmallSat community to engage with SCaN and let us know what you want to see from commercial service providers
- NASA's Communications Services Project (CSP) hosts periodic Commercial Services User Group (CSUG) forums that provide more detailed information – contact me for info on the next one!





National Aeronautics and
Space Administration

SCaN

Space Communications and Navigation



Exploration, Enabled.

Marie T. Piasecki – Wideband Technology Lead

-Space Communications and Navigation (SCaN) organization

Space Operations Mission Directorate – NASA HQ

Email: marie.t.piasecki@nasa.gov

Follow us at: <https://www.nasa.gov/scan>