

NASA Step-2 program

Sean C Casey

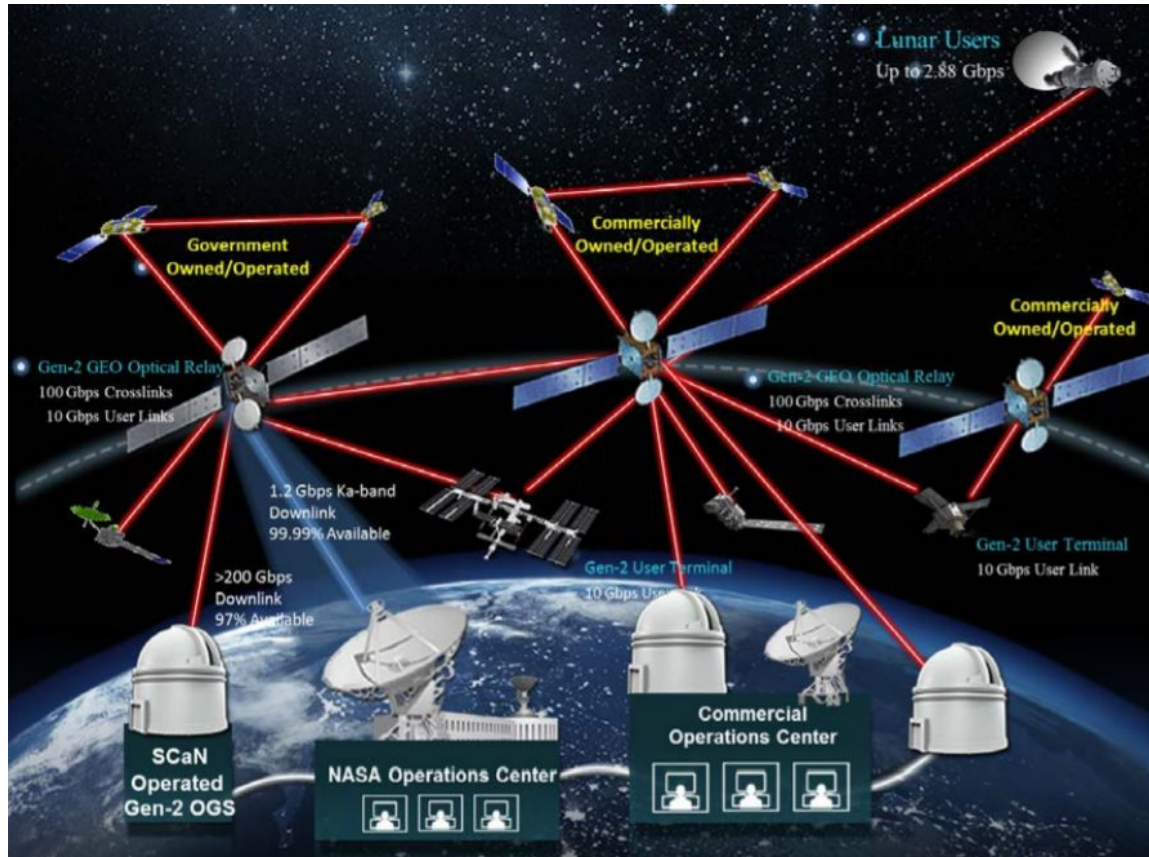
VP Commercial Business Development





Martian sunset viewed by the *Spirit* rover (May 2005)

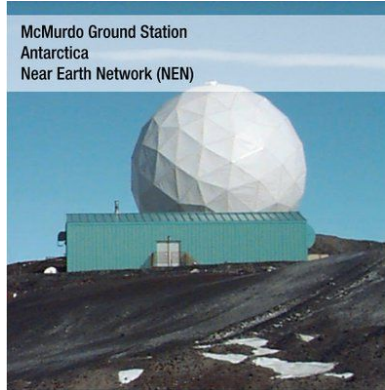
Melding Commercial and Governmental Assets



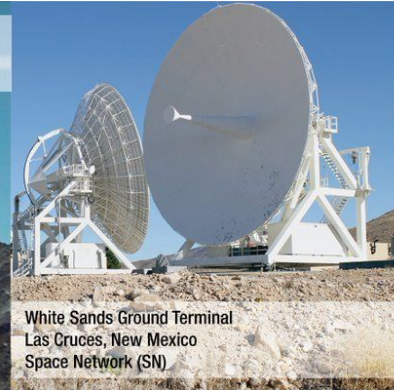
- Develop public/private partnerships for shared costs/risks
- Foster US market & optical communications expertise
- Enable:
 - Sustainability
 - Flexibility
 - Secure/open architecture
 - Interoperability
 - Demand/supply
- Transitions from PPP -> commercial space and navigation services

SCaN - Space Communications and Navigations

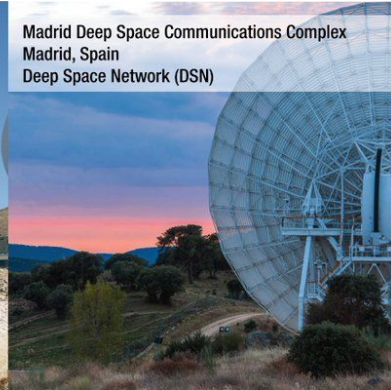
- Created in 2006 and now under NASA HEOMD
 - Near-Earth Network (NEN)
 - Space Network (SN)
 - Deep Space Network (DSN)



McMurdo Ground Station
Antarctica
Near Earth Network (NEN)



White Sands Ground Terminal
Las Cruces, New Mexico
Space Network (SN)



Madrid Deep Space Communications Complex
Madrid, Spain
Deep Space Network (DSN)

- Evolve services consistent with NASA mission requirements
 - Protect EM Spectrum, evolve standards, establish R&D program
- Single SCaN architecture:
 - Define evolving & minimal standards for missions



SCaN - Driving requirements

- Unified network for scientific and human space exploration
- Networked communications and navigation infrastructure
- Highest data rates for robotic and human exploration
- Interoperable international protocols
- Infrastructure for lunar and mars surface
- Enable human activities on lunar and mars surface
- Meet commitments for existing and planned missions



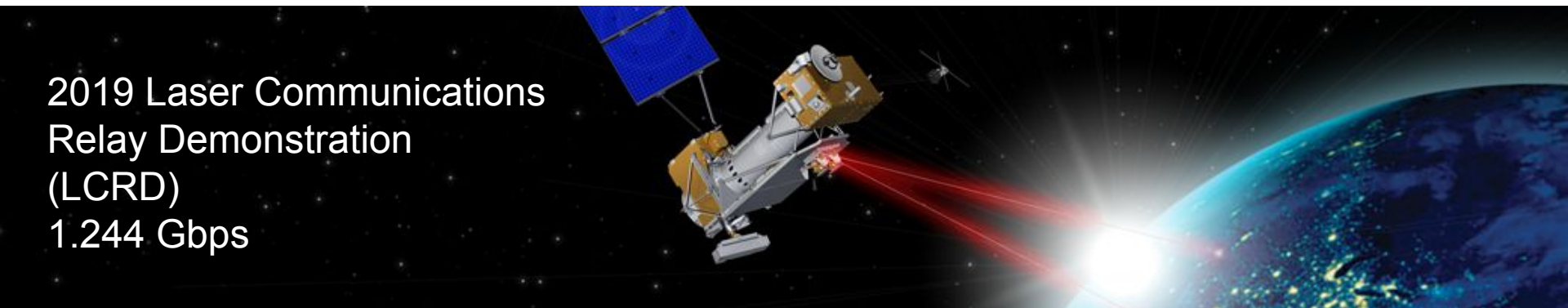
Decade of Light

- **Inclusion of optical and enhance RF capabilities**

SCan - R&D Successes (GSFC/JPL/MIT)



2013 Lunar Laser
Communication
Demonstration
(LLCD)
622 Mbps



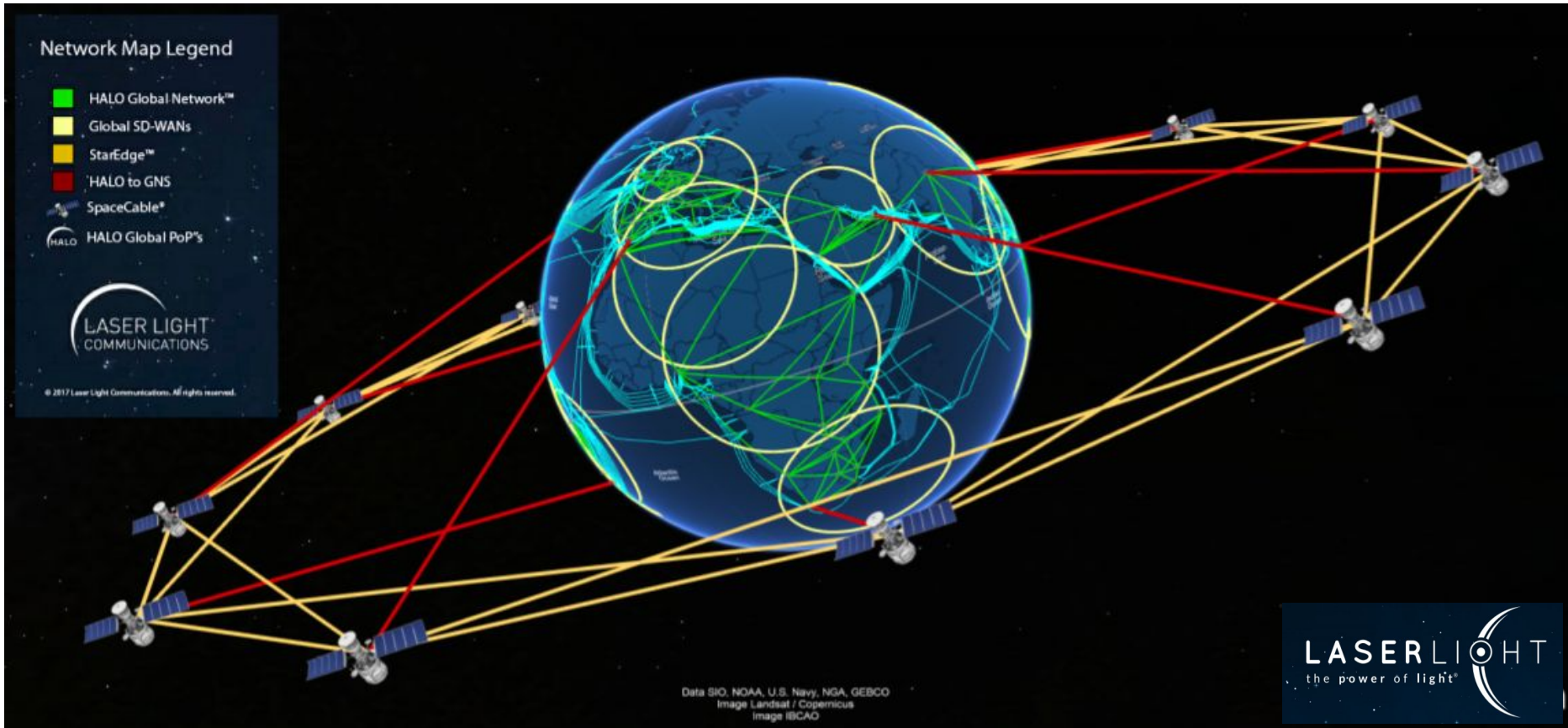
2019 Laser Communications
Relay Demonstration
(LCRD)
1.244 Gbps

NASA NextStep-2 Study Topics

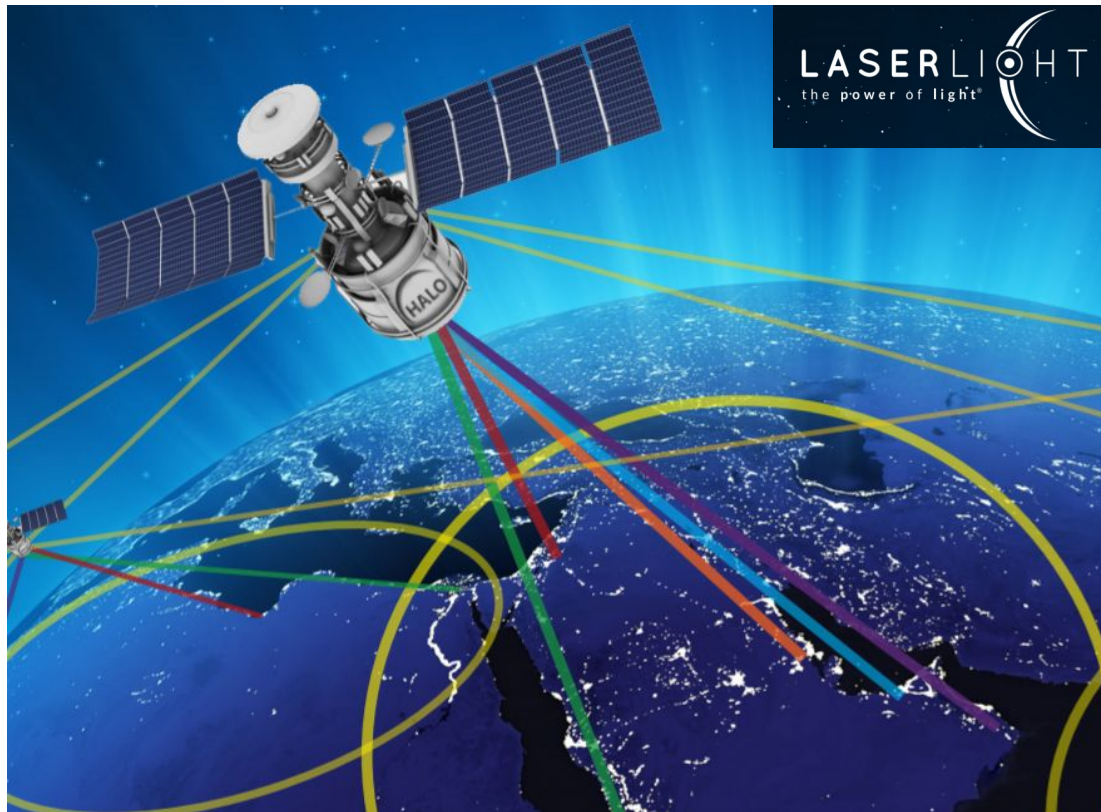
- Evaluation of NASA roadmap
 - Gap analysis of government & commercial
- Accommodating LCRD payload & terminals
 - Hardware & software issue
- Optical and RF services
 - Government requirements vs. commercial capabilities
- Interoperability & internetworking among providers
 - Plays well together
- Business partnership and markets
 - Works well together
- Service Concept of operations
 - Industry transition plans & timelines
- Secure data processing
 - Cyber-security



HALO (High Articulation Laser Optics) Constellation

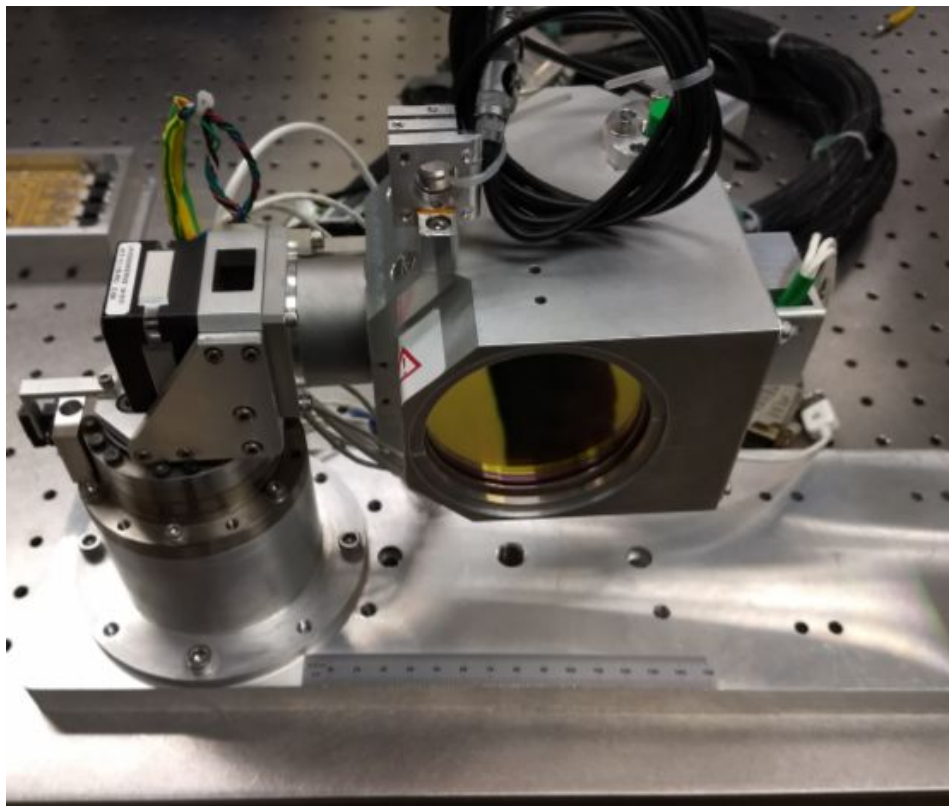


HALO - Specifications



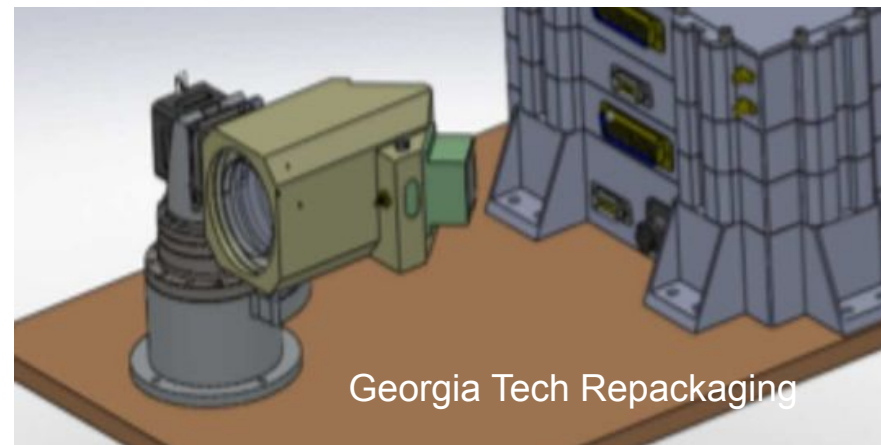
- All Optical constellation
 - Baker's dozen
- Bi-directional links
- Inter-satellite ~ 33 Tbps
- Customer ~ 200 Gbps
- Wavelength (196.5 THz):
 - 1.525 - 1.565 μm
- Partners:
 - ATLAS
 - Ball/L3

Xen-hub transceiver



JPL Technology licensed to Xenesis:

- 5 cm telescope
- 2-axis gimbal
- Thermal control/power conditioning
- Four 2.5-Gbs channels
- Forward error correction
- C-band (1530 - 1560 nm)



ATLAS Global Antenna Network



Operational &
Landbanked Sites
2019/2020
Freq: UHF, S-, X-,
and Ku/Ka-band



The ATLAS Solution



ATLAS Eliminates the Data Bottleneck

- ATLAS antenna technology provides for multiple satellites to simultaneously connect.
- ATLAS software-centric cloud based network is fully automated.

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