Systems Architecture Products

Capturing SCaN Legacy Networks in Architecture Diagrams and Documents

Constellation Orion-to-ISS Mission

NASA Lunar Mission and Communication Networks

SCaN Future Architecture

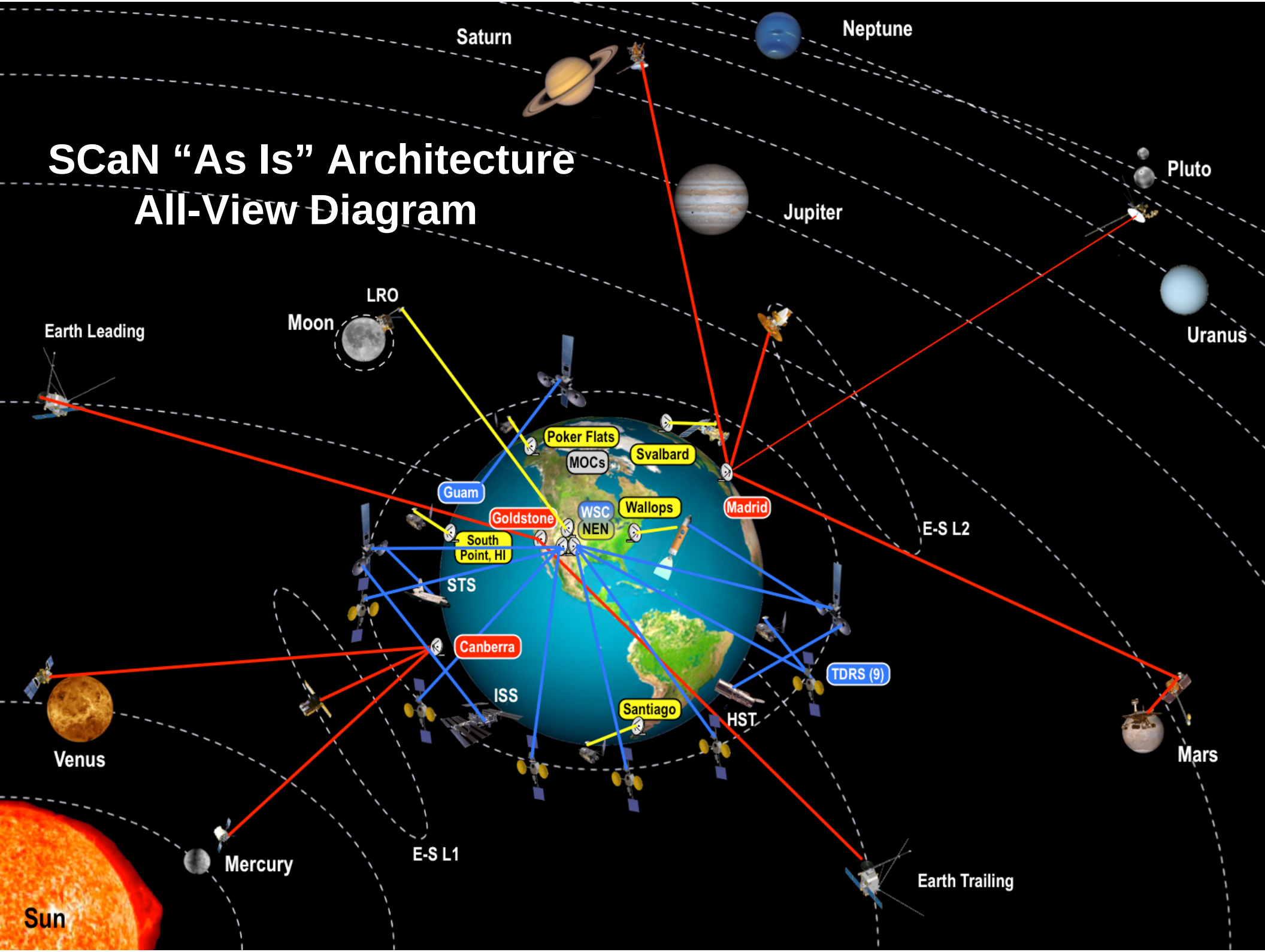
"Architecture is a creative art, even if it is based on an existing legacy system. It is not only for engineering or construction guidance, but it also has to provide insight, intent, and vision, so that it can guide the system in moving forward through continual evolution."

Dr. Yan Zhao; CGI Federal

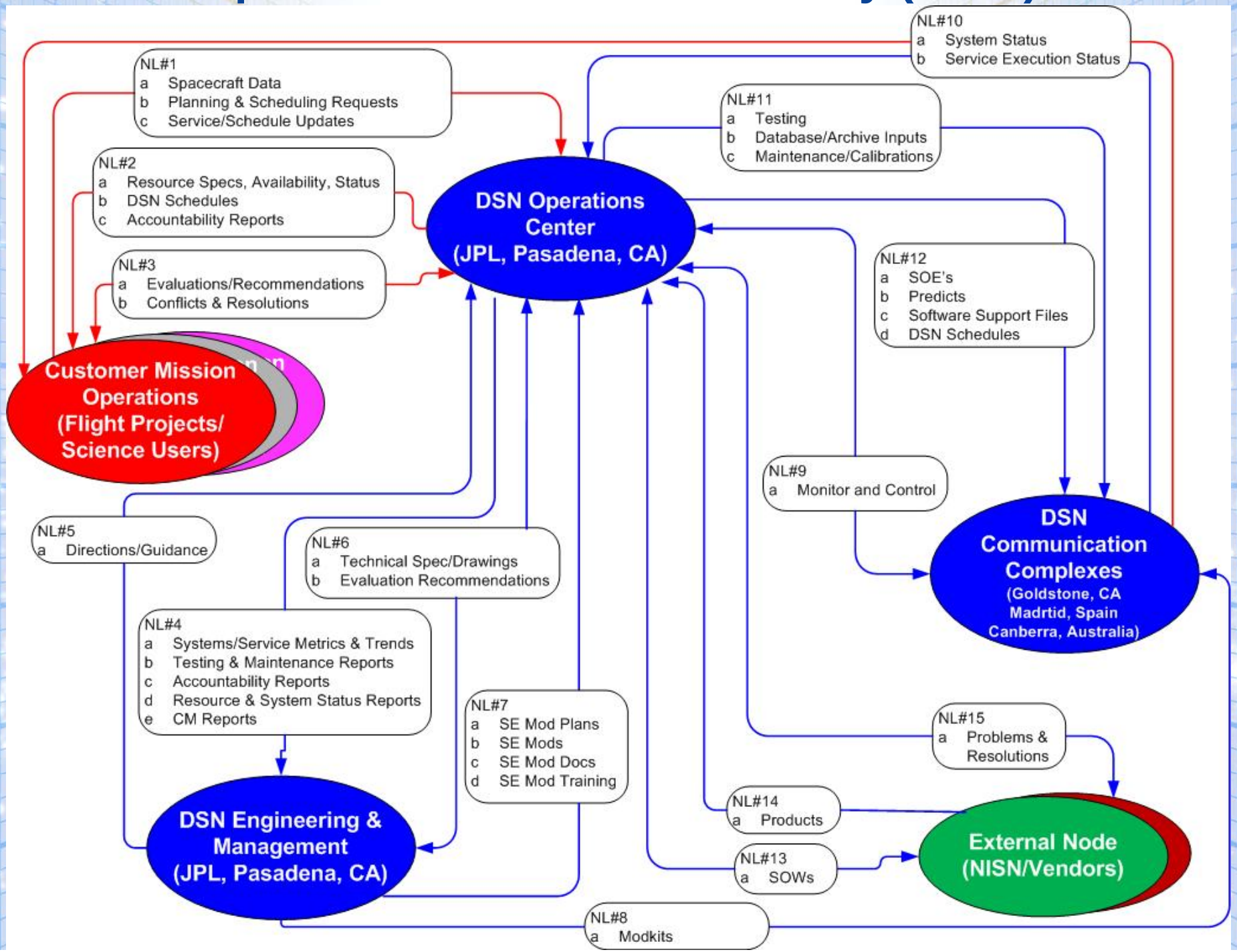
Director for Enterprise and Solutions Architecture

Capturing SCaN Legacy Networks in Architecture Diagrams and Documents

SCaN "As Is" Architecture All-View Diagram



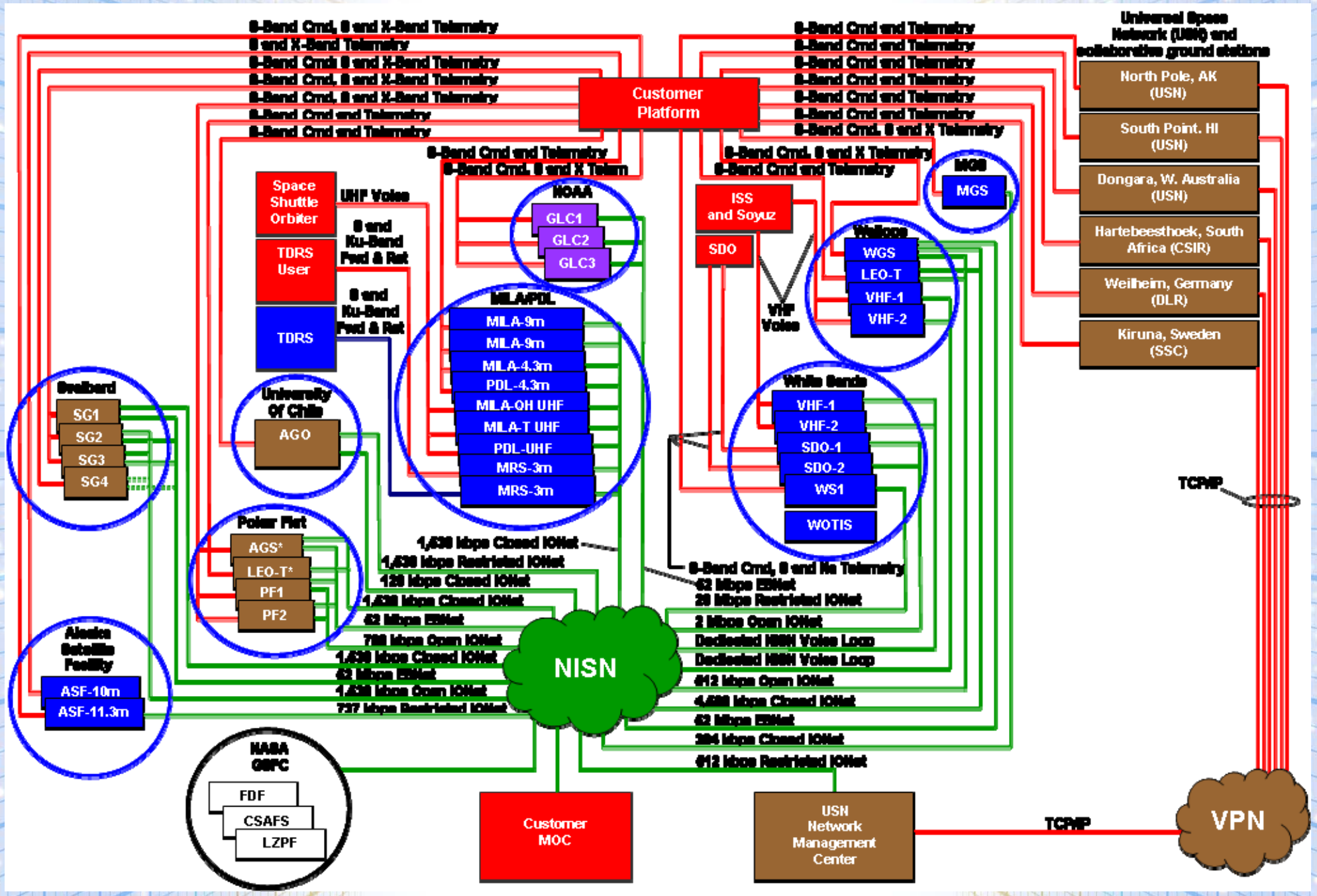
Deep Space Network (DSN)
Operational Node Connectivity (OV-2)



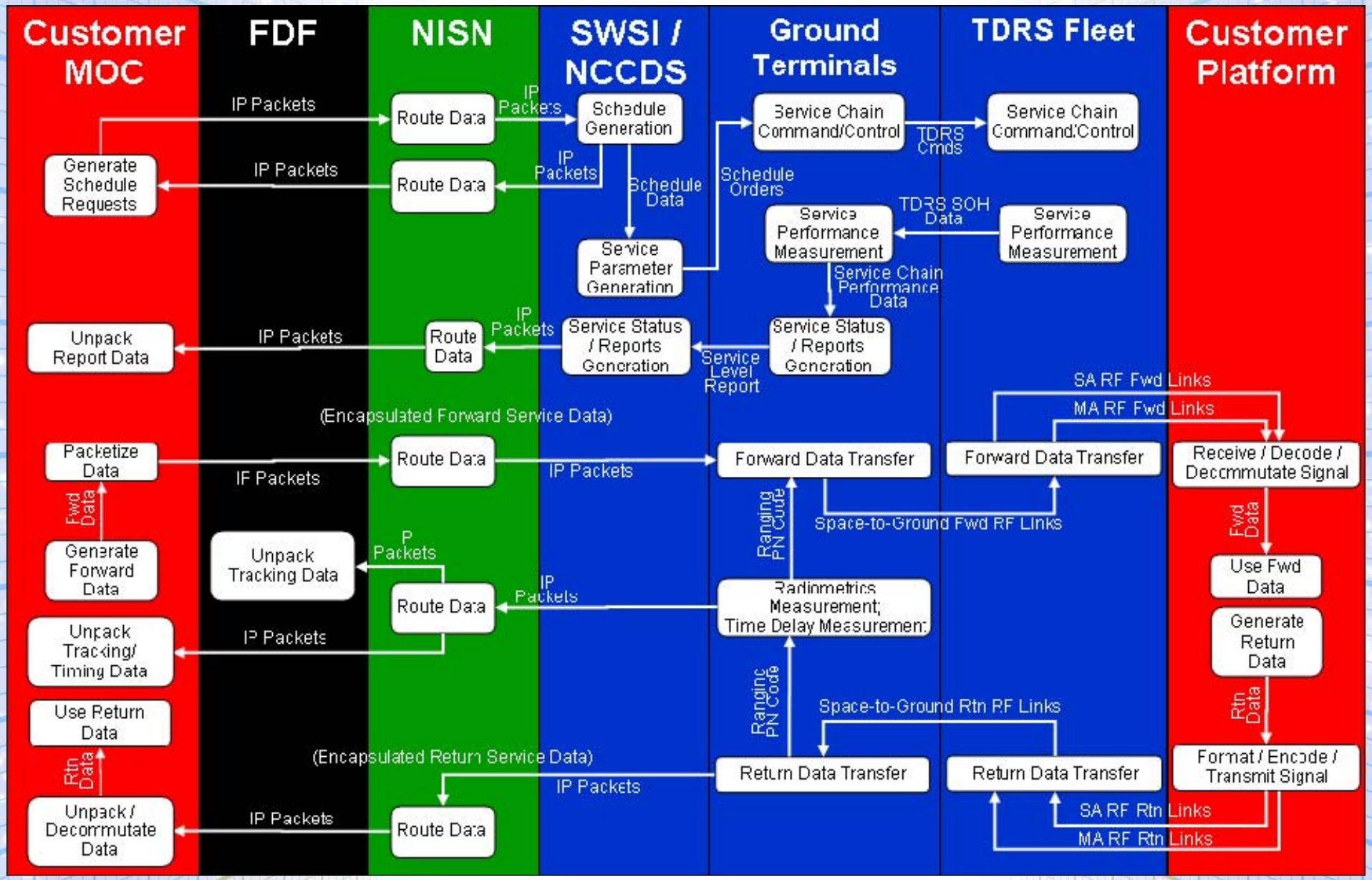
Deep Space Network (DSN)
Operational Information Exchange Matrix (OV-3)

Need-line Identifier	Informa-tion Exchange Identifier	Information Element Name				Producer		Consumer	
			Scope	Accuracy	Language	Sending Op Node Name and Identifier	Sending OpActivity Name and Identifier	Receiving Op Node Name and Identifier	Receiving Op Activity Name and Identifier
1	1a	Customer Spacecraft Data	Analysis of Customer Requirements			Customer Mission Operations	Support Service Planning & Scheduling (2)	DSN Operations Center	Support Service Preparation (3)
1	1b	Planning & Scheduling Request	Conflict Resolution, DSN Resource Allocation			Customer Mission Operations	Support Service Planning & Scheduling (2)	DSN Operations Center	Support Service Preparation (3)
1	1c	Service Schedule Updates	Conflict resolution and realtime DSN operations			Customer Mission Operations	Support Service Planning & Scheduling (2)	DSN Operations Center	Support Service Preparation (3)
2	2a	Resource Specs, Availability & Status	Customer gains understanding of DSN assets and services			DSN Operations Center	Support Service Planning & Scheduling (2)	Customer Mission Operations	Support Service Preparation (3)
2	2b	DSN Schedules	Long Range (years), Mid Range (8-weeks) and Short Range (7-day)			DSN Operations Center	Support Service Planning & Scheduling (2)	Customer Mission Operations	Support Service Preparation (3)
2	2c	Accountability Reports	All customer deliverables including real-time and post-pass deliverable			DSN Operations Center	Assess Quality & Performance (5)	Customer Mission Operations	

Near Earth Network (NEN)
Systems Communications Description (SV-2)



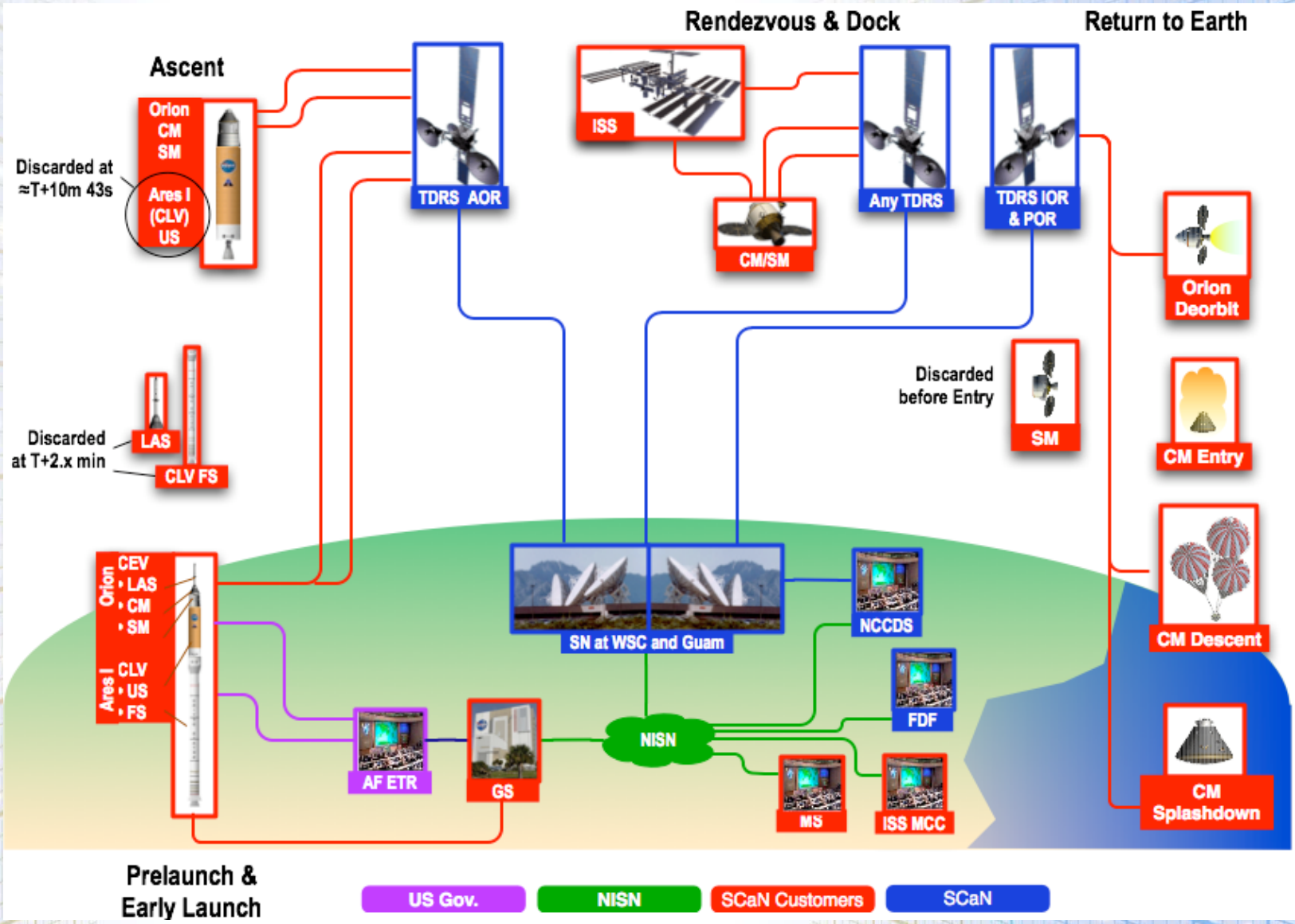
Space Network (SN)
Systems Functional Flow (SV-4)



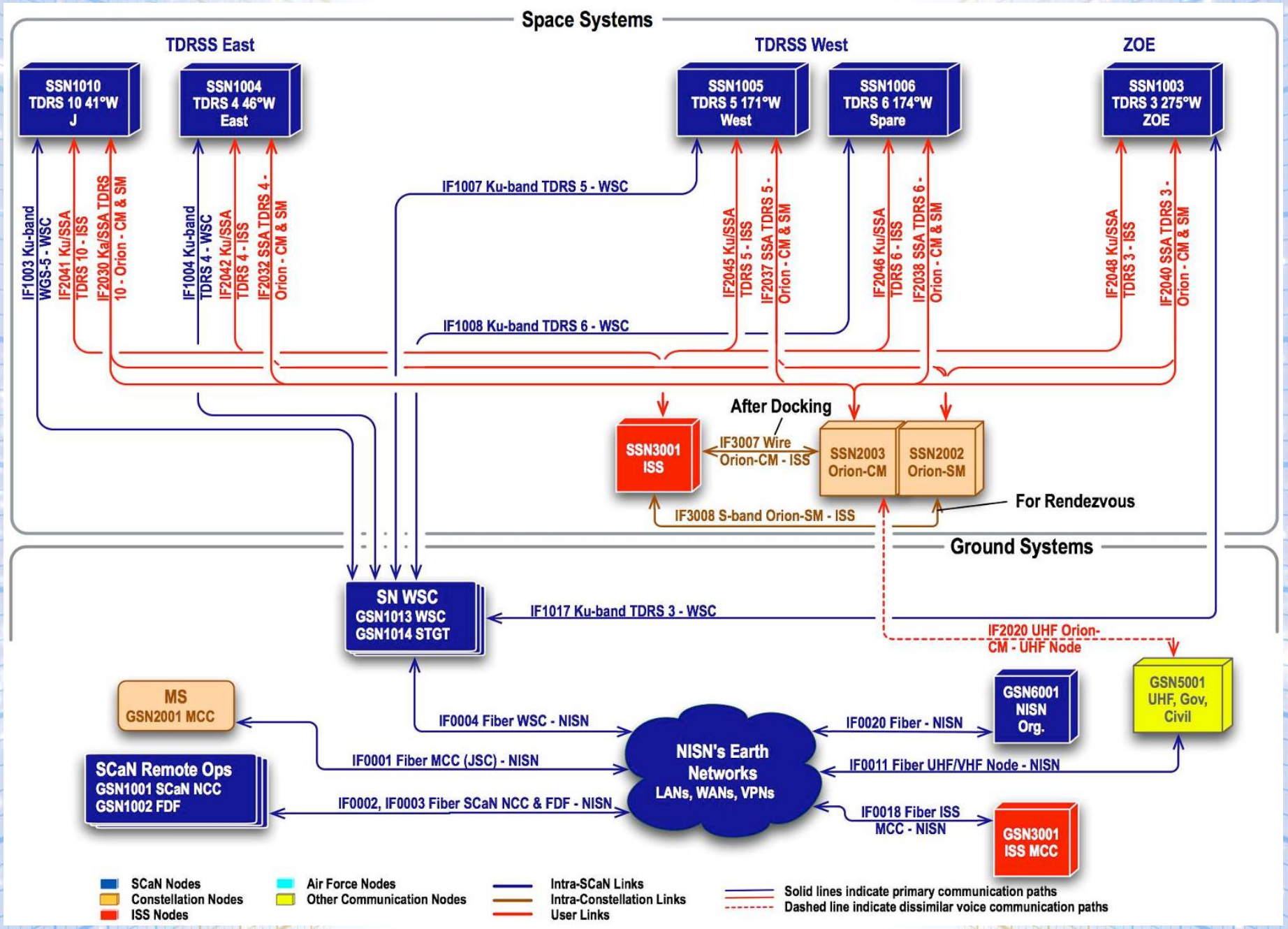
Constellation Orion-to-ISS Mission

SCaN Concept of Operations
CEV-ISS Missions

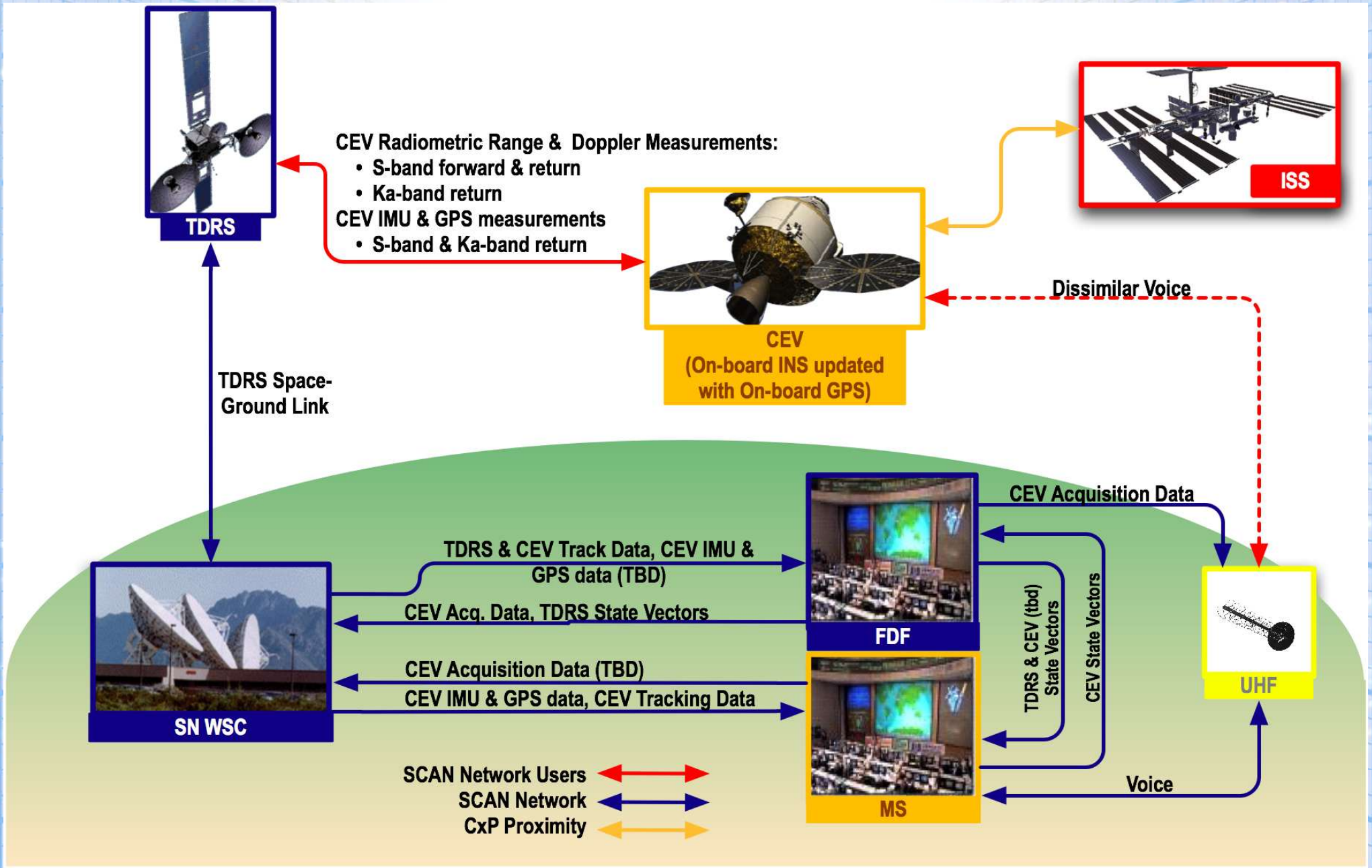
- Prelaunch
- Launch/Ascent
- Low Earth Orbit (LEO)
- ISS Operations
- Return to Earth
- Recovery



System Communications Description (SV-2)
CEV-ISS Mission, Rendezvous-Docking Phase



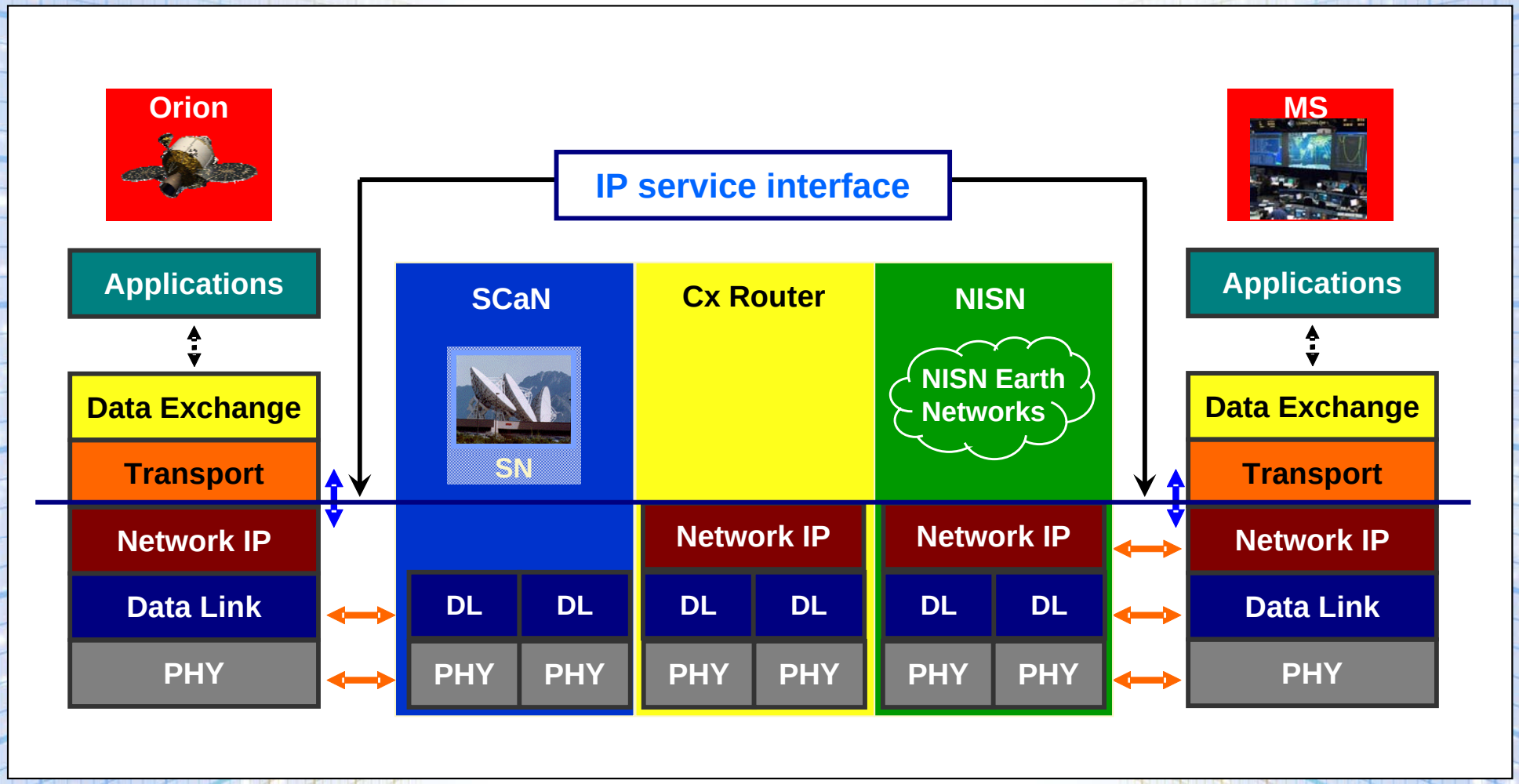
SCaN Network Navigation Architecture
CEV-ISS Mission, Rendezvous-Docking Phase



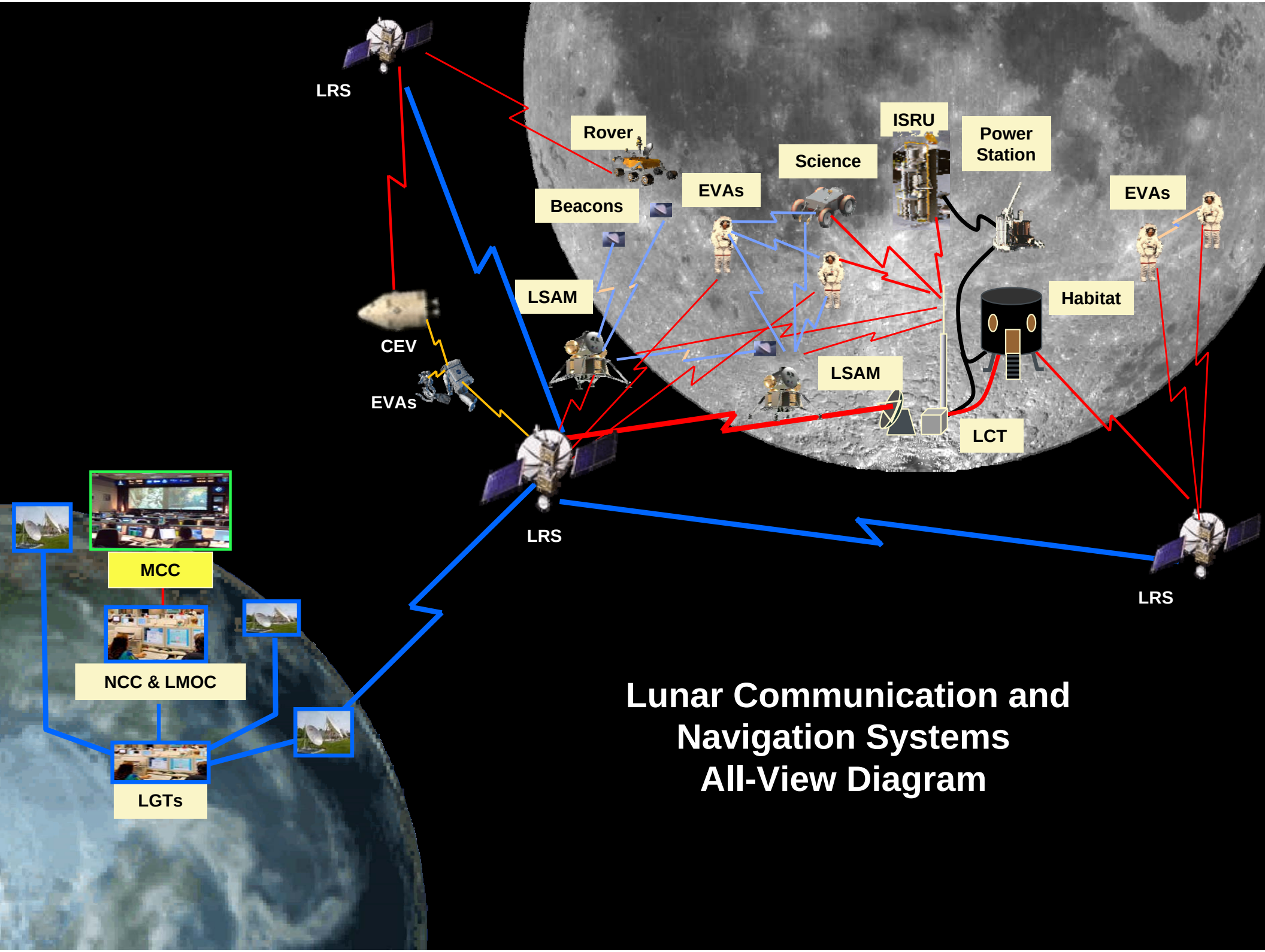
End-to-End IP Network Architecture

The Constellation Project has established the initiative to extend communication infrastructures based on IP protocol from ground segment to flight/space segment to achieve interoperability among its elements.

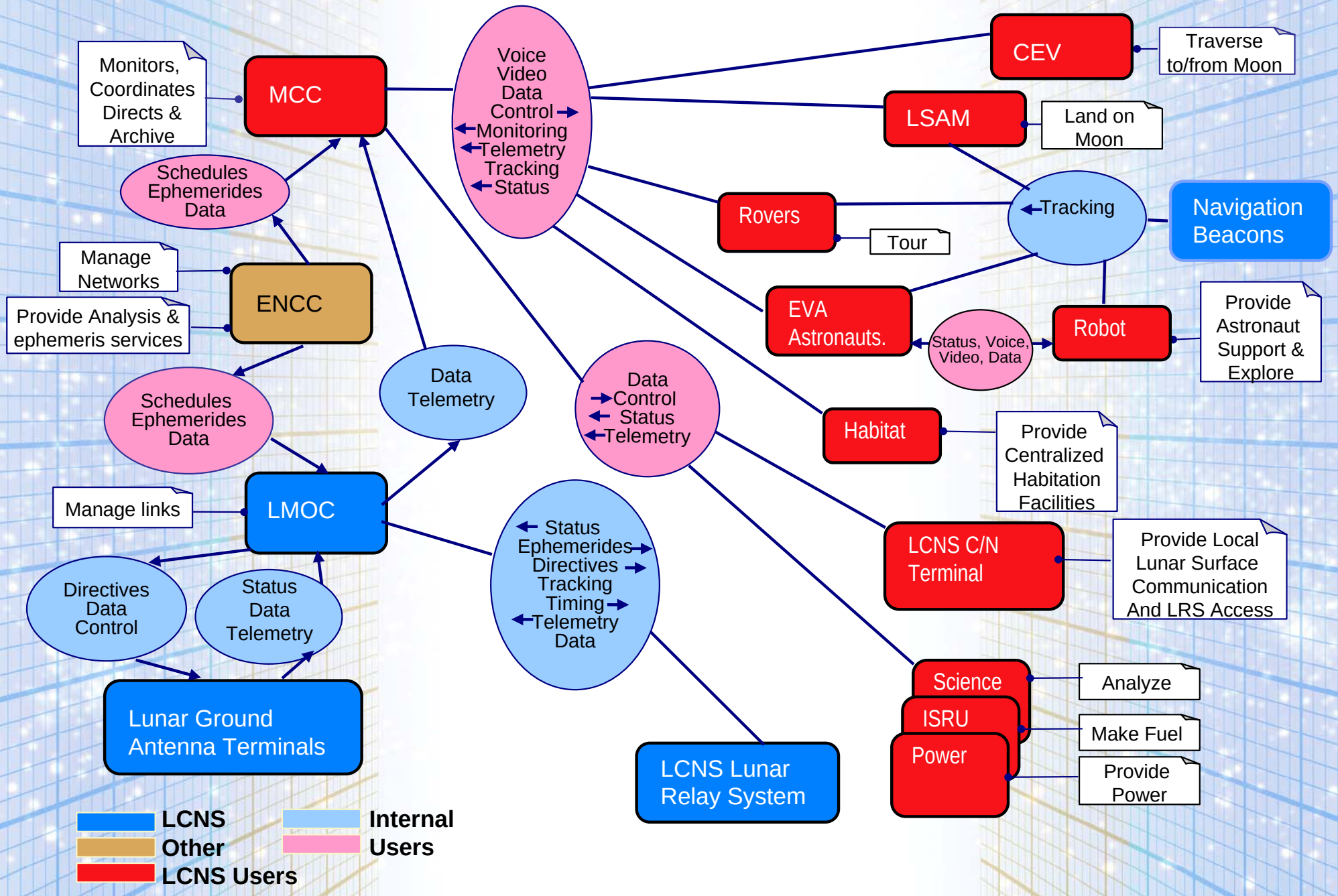
SCaN Networks can accommodate IP Service Interfaces to CxP systems.



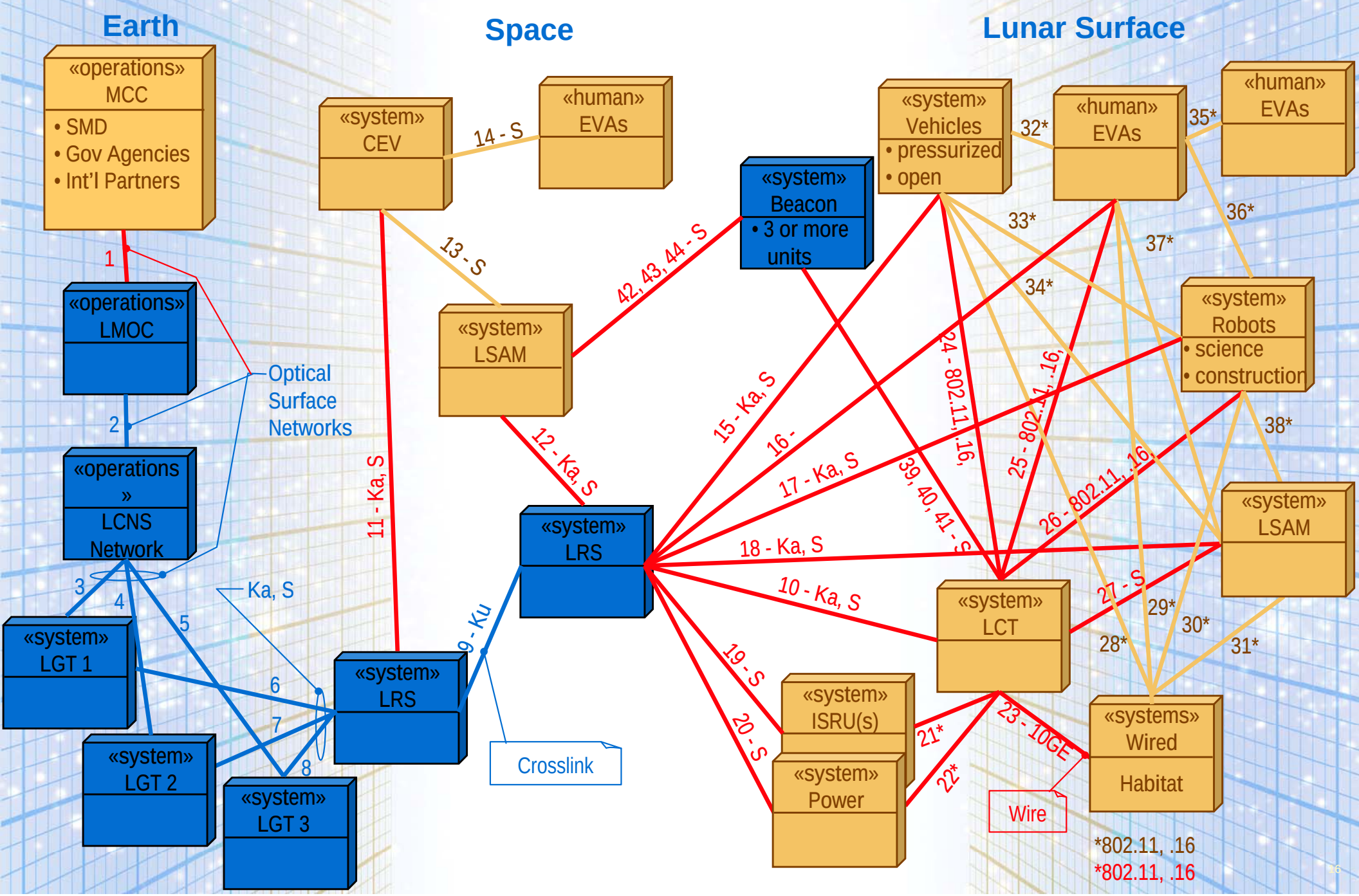
NASA Lunar Mission and Communication Networks


LRS
Rover
ISRU
Power Station
Science
EVAs
Beacons
EVAs
LSAM
Habitat
CEV
EVAs
LSAM
LCT
LRS
LRS
MCC
NCC & LMOC
LGTs
Lunar Communication and Navigation Systems All-View Diagram

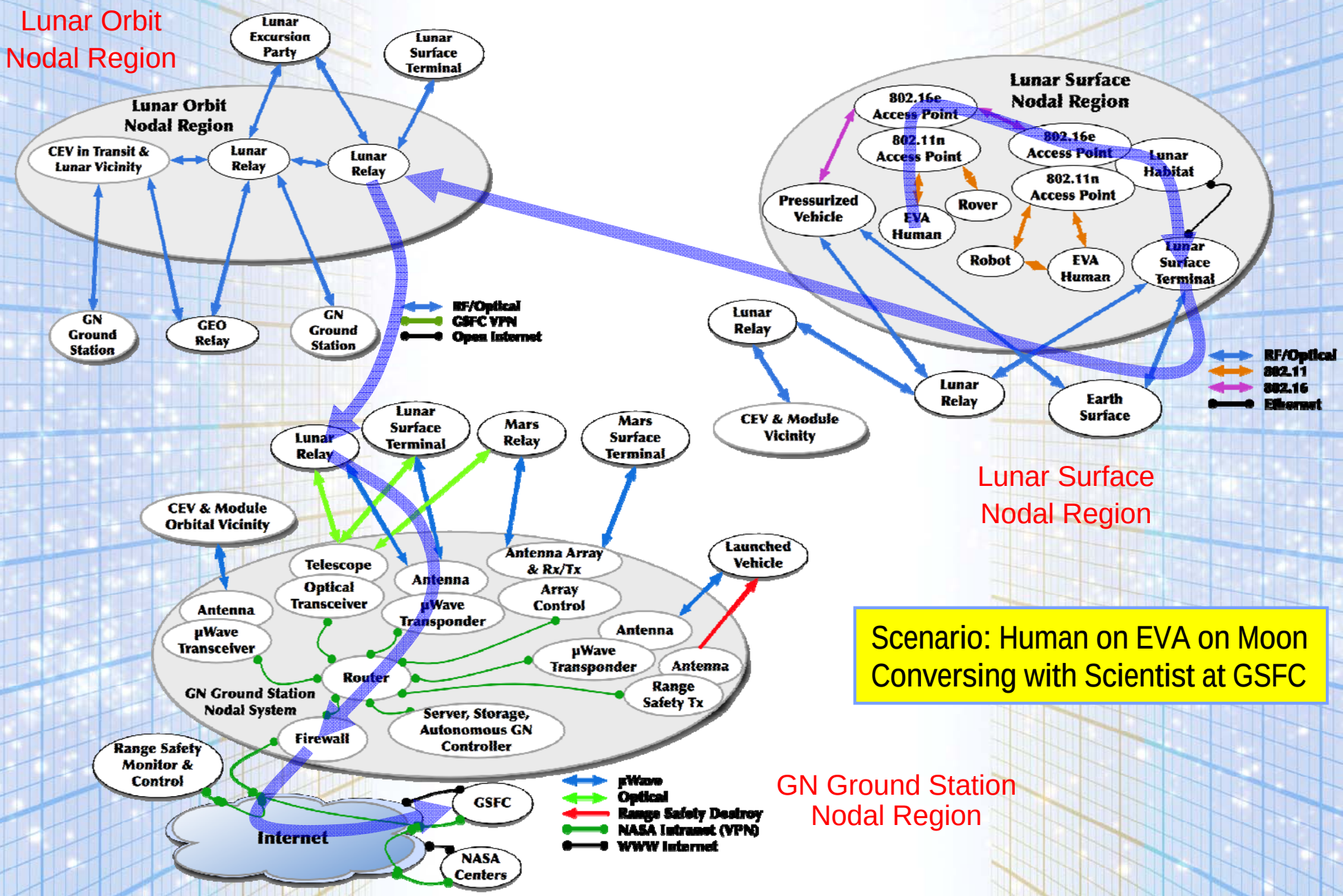
Lunar Communication and Navigation Systems (LCNS) Operational Node Connectivity (OV-2)



Lunar Communication and Navigation Systems (LCNS)
System Communications Description (SV-2)

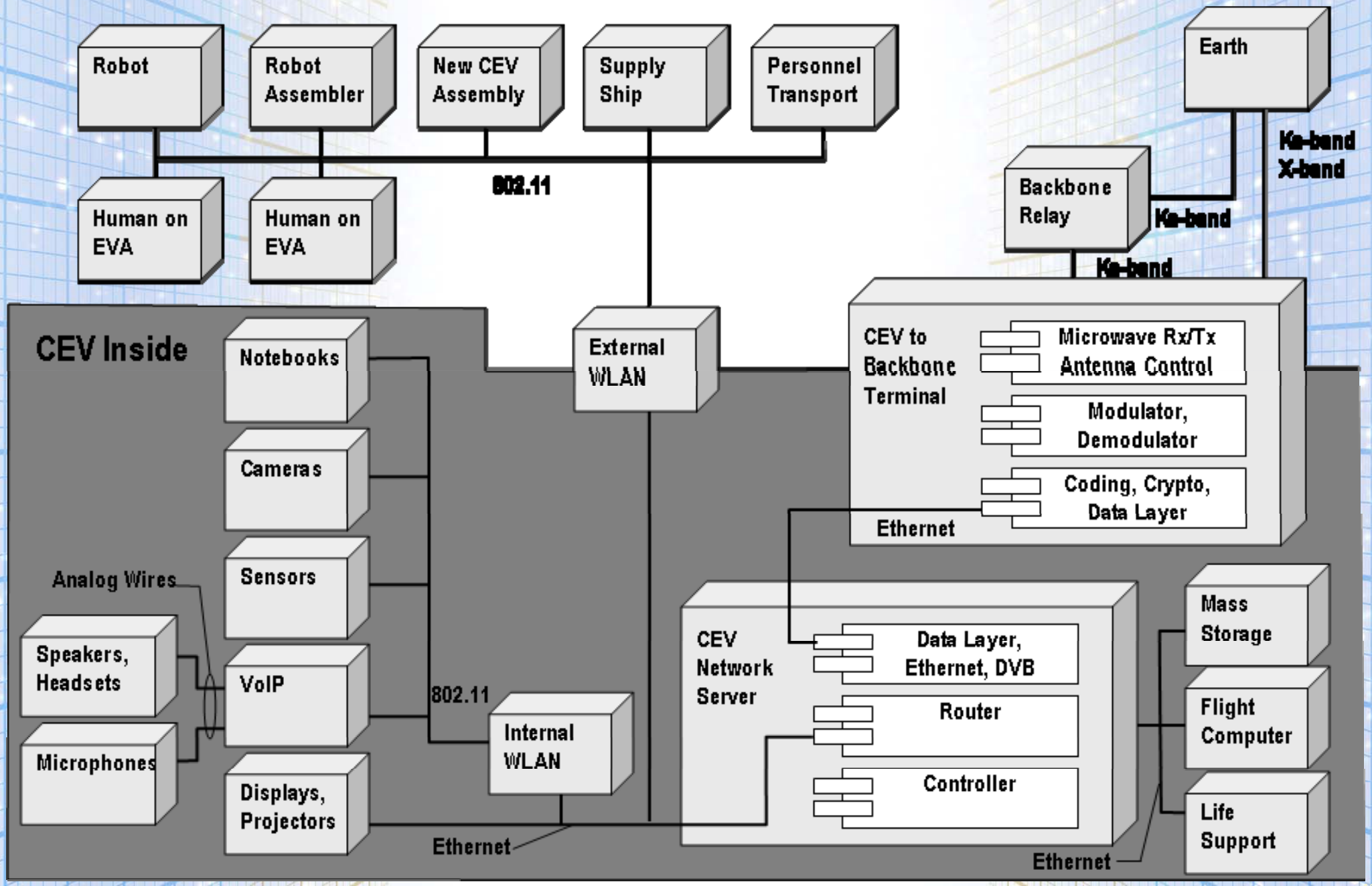


Moon/Earth Space Network OV-2 diagrams networked together to form a System View (SV-4)

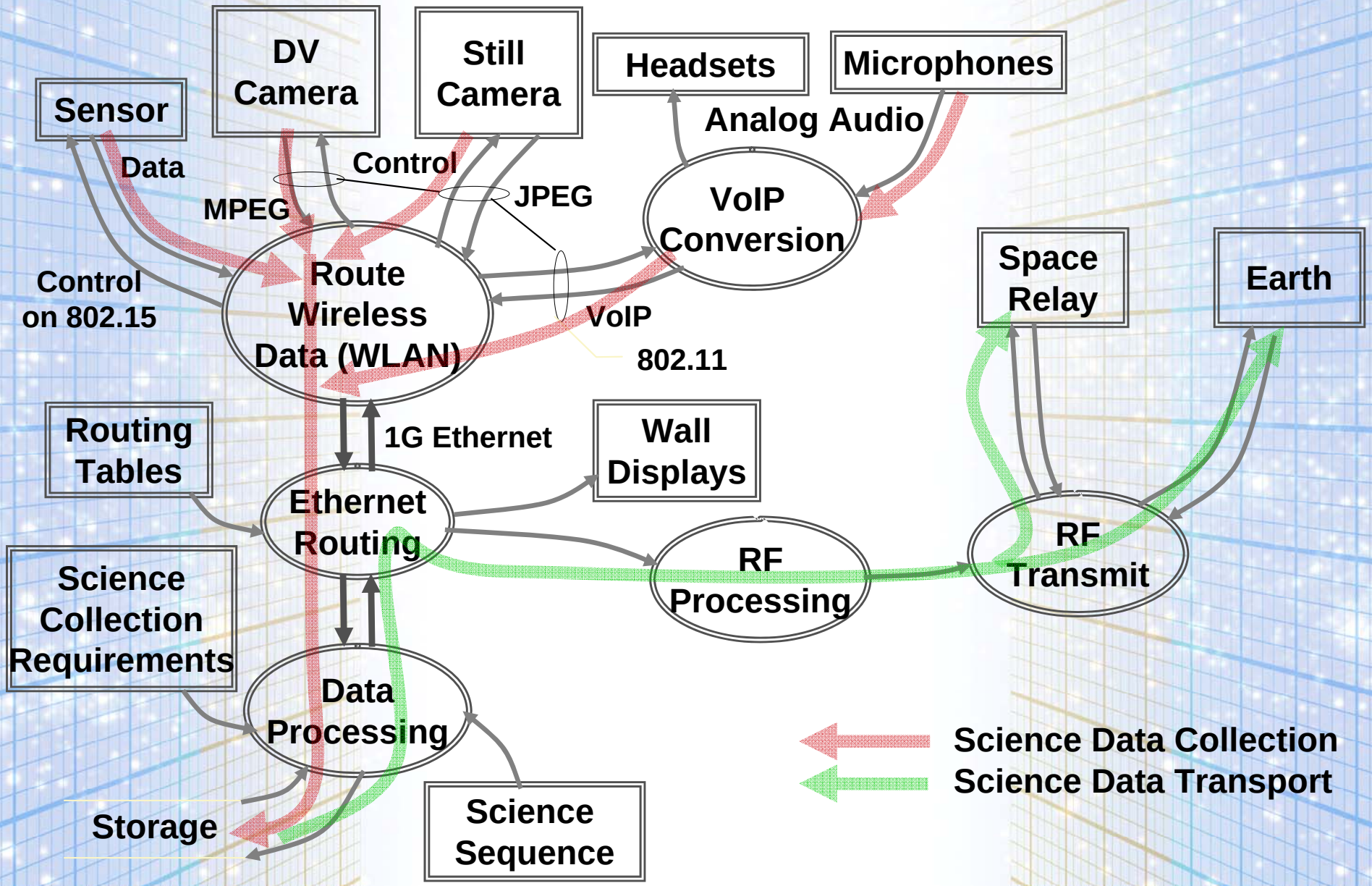


Scenario: Human on EVA on Moon Conversing with Scientist at GSFC

Crew Exploration Vehicle
System to System Connections (SV-2)

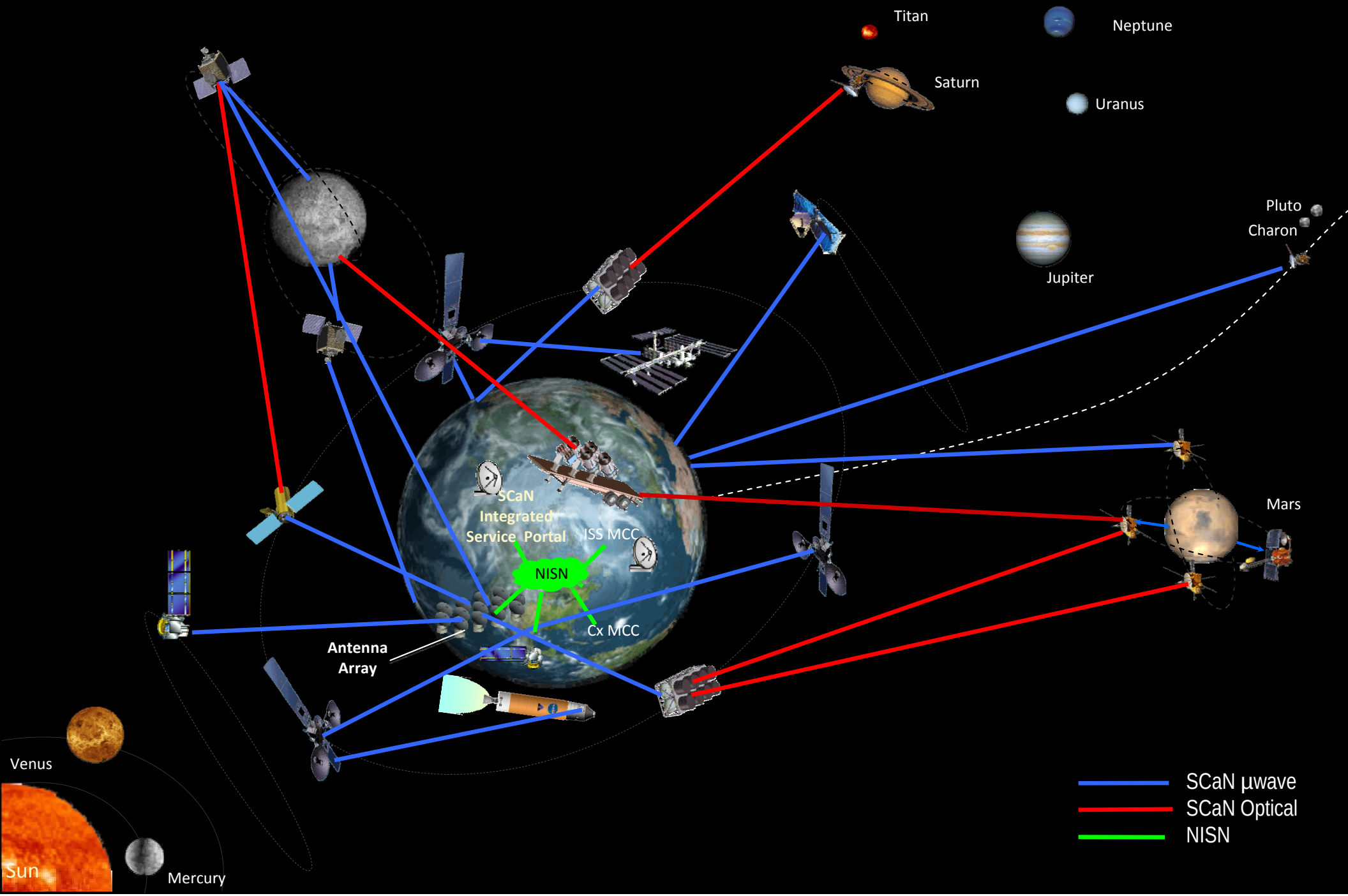


Crew Exploration Vehicle Science Capture Functional Description (SV-4)

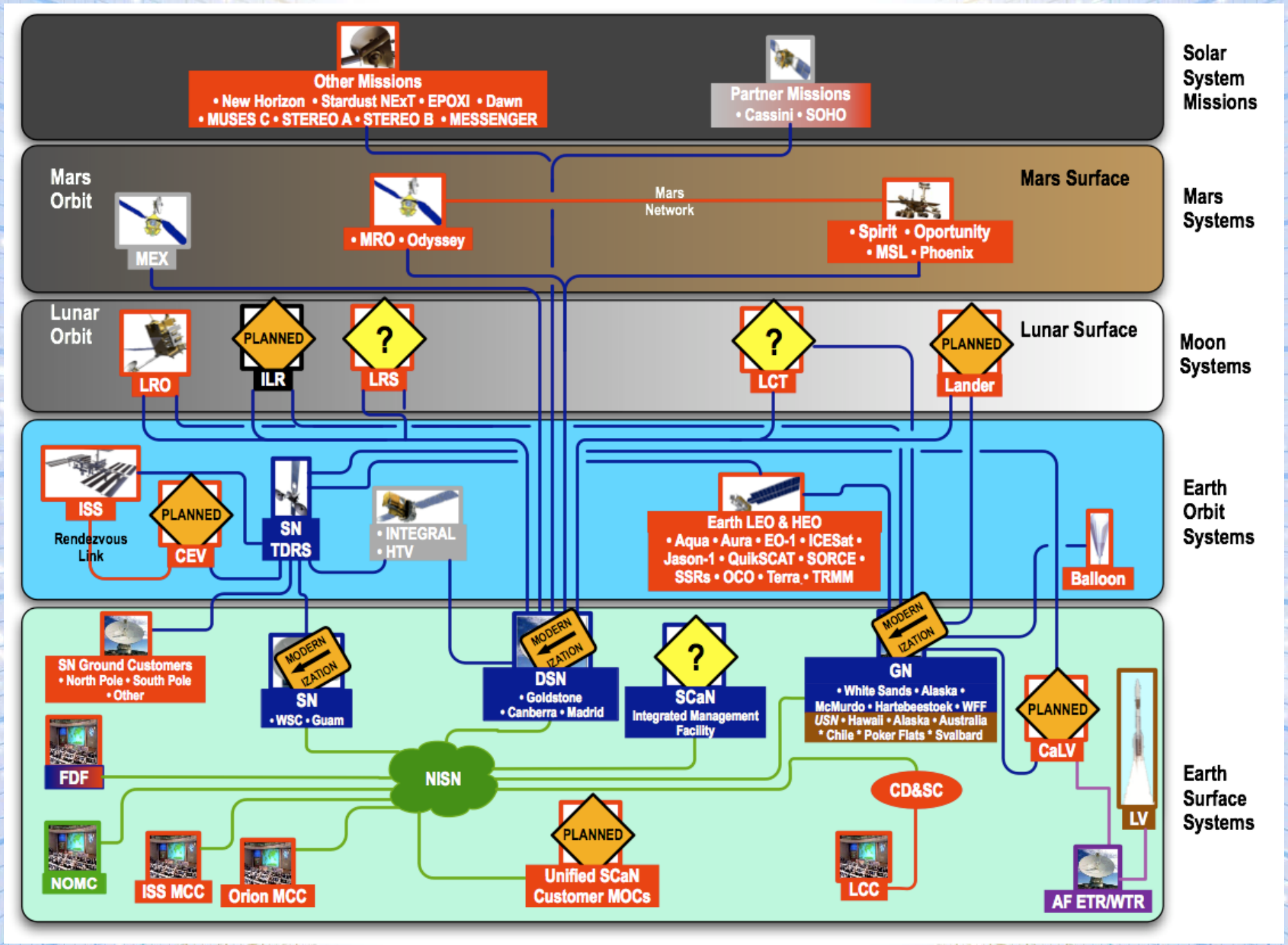


SCaN Future Architecture

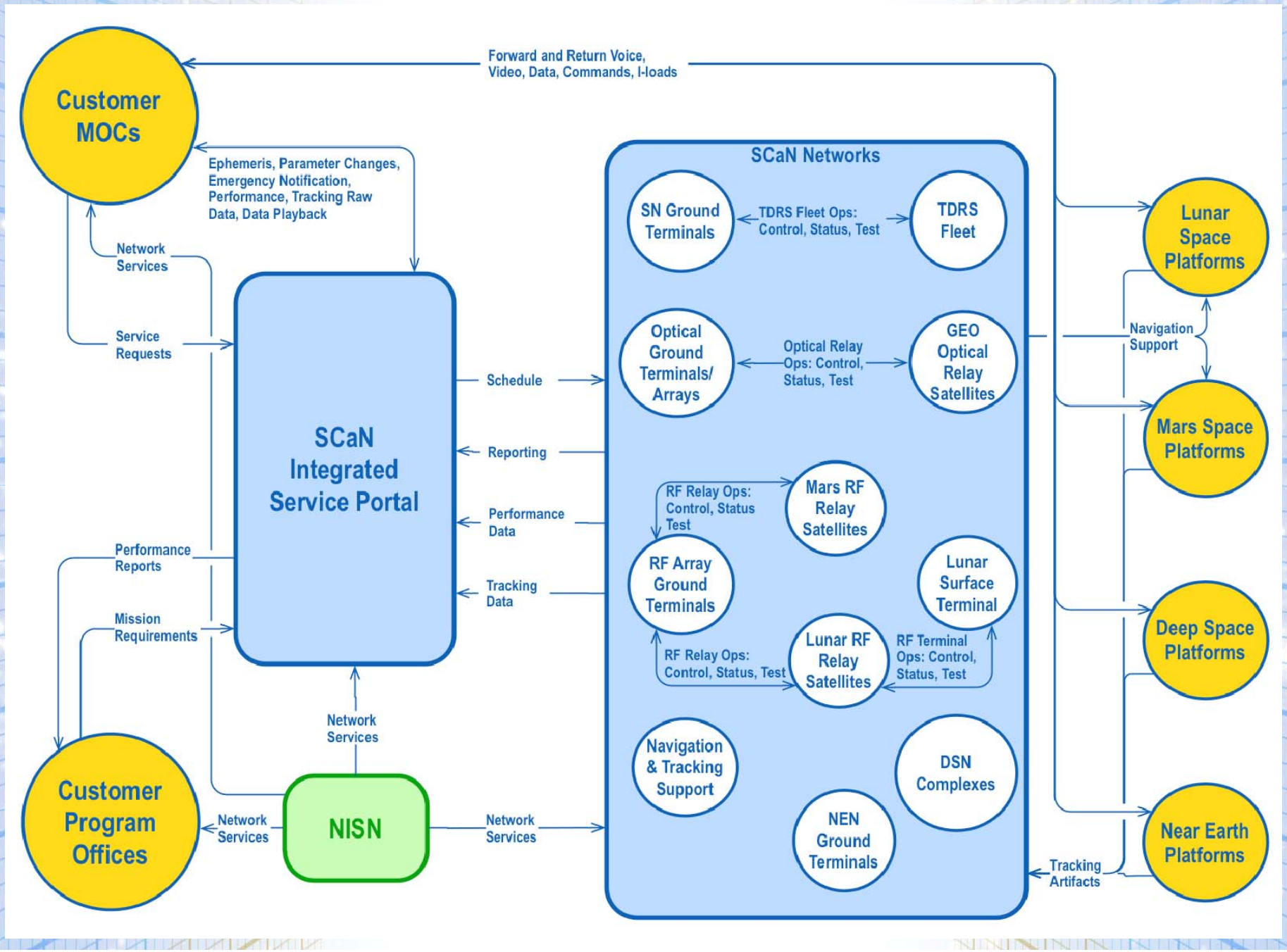
SCaN Integrated Communication Architecture
All-View Diagram



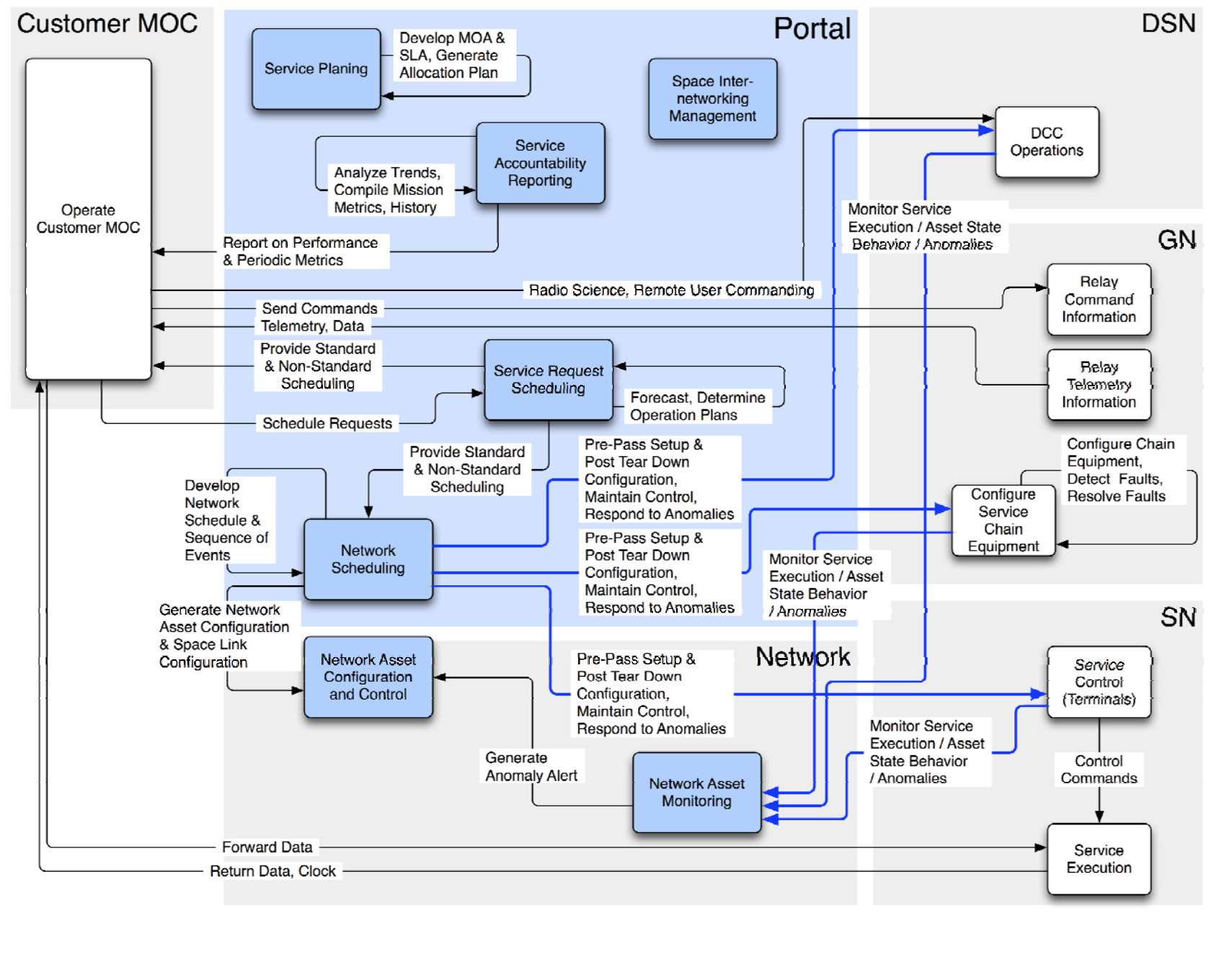
Future SCaN Network System Interfaces Diagram



Future SCaN Network
Customer/Systems Operational Relationship



Future SCaN Network Operational Activities Flow (OV-5)



Looking Forward

- System Interoperability
- Cross-Organizational Interfaces and Decision Making Processes
- Software Architecture and Lifecycle
- Horizontal Technical Coordination and Integration
- Architecture Cost-benefit Analysis
- Developing NASA-Wide Architecting Process
  - Levels and Stages (Definition, Description and Design)
- Architecture Performance and Evaluation
- Integration of Architecture with Requirements and ConOps
- Implementation Follow-up

Credits

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