Lunar Communications & Navigation Global Landscape

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Lunar Communication & Navigation

LunaNet Overview

- Set of **coorporating** networks
- Providing interoperable **communication** and **navigation** services
- Based on a framework of **mutally agreed-upon standards**
- Enabling **interoperability**.

Service Oriented

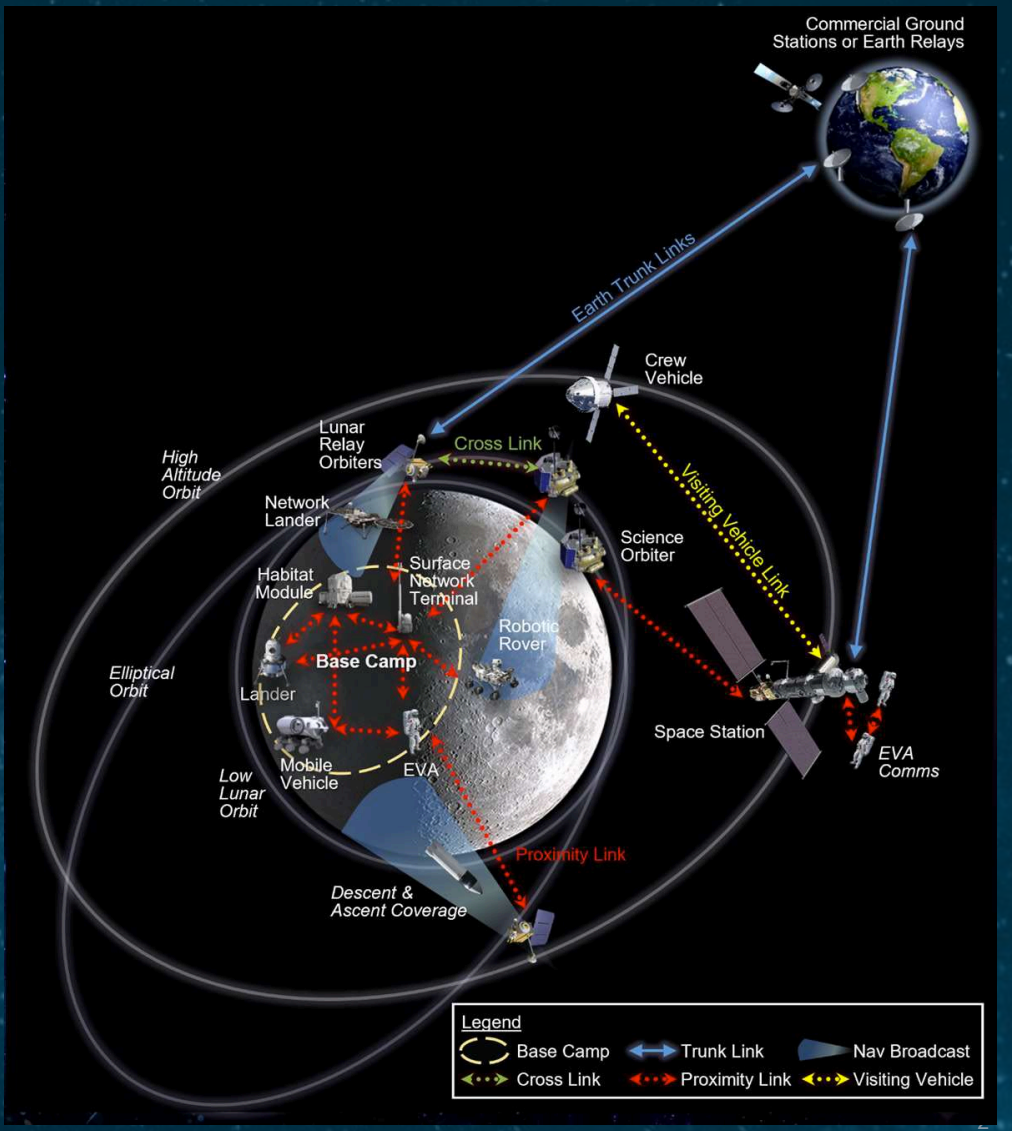
Open

Scalable

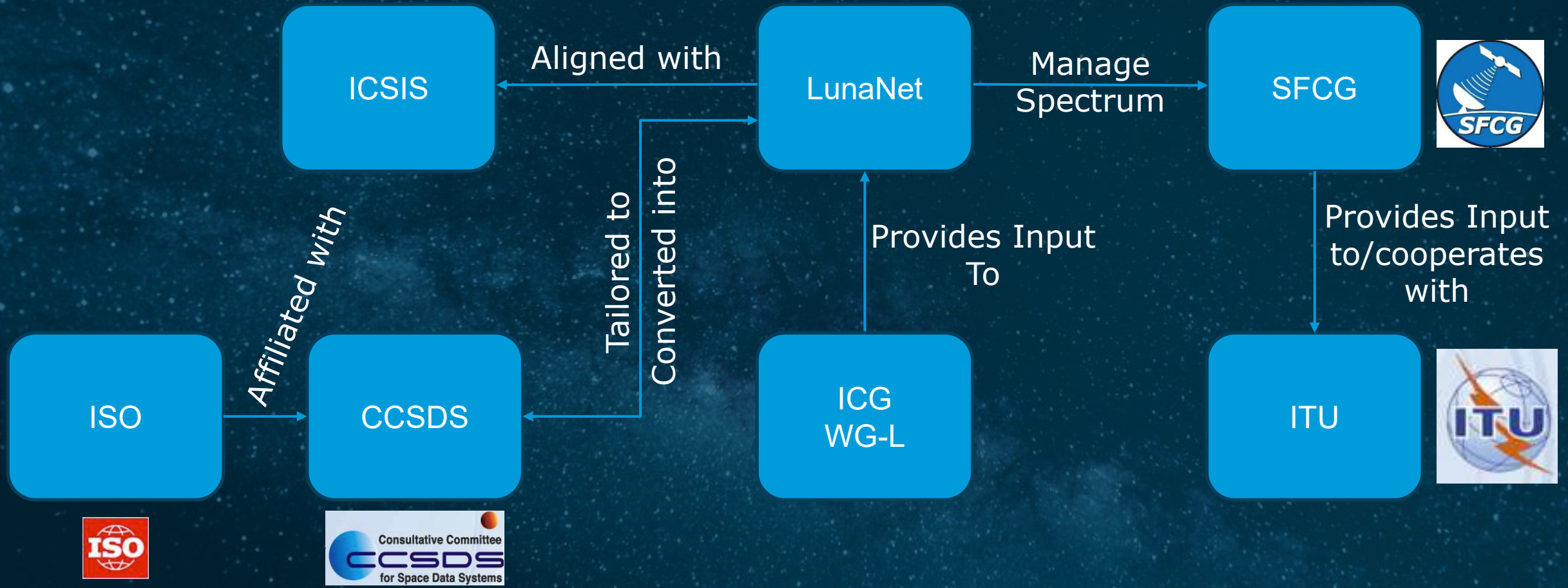
Extendable

Resilient

Secure



Standards for Lunar COM and NAV



Establishment of ICG WG-L (Oct 2024)

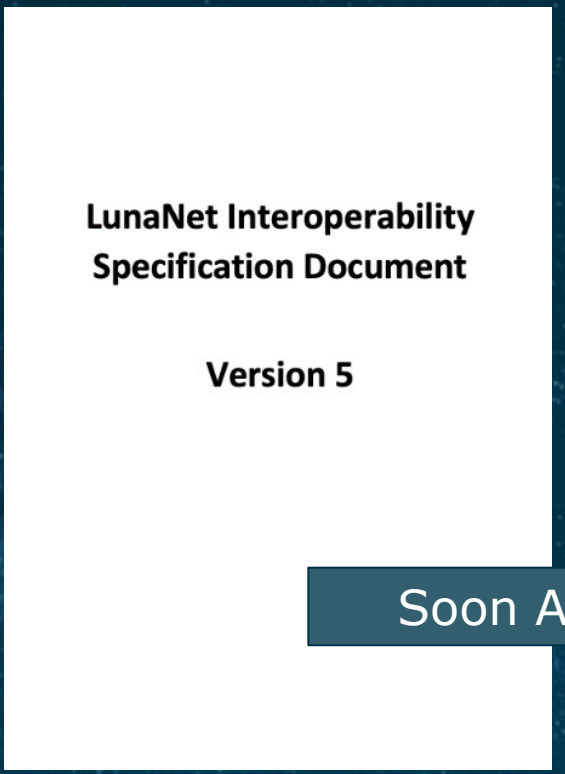
LunaNet Interoperability Specification (LNIS)

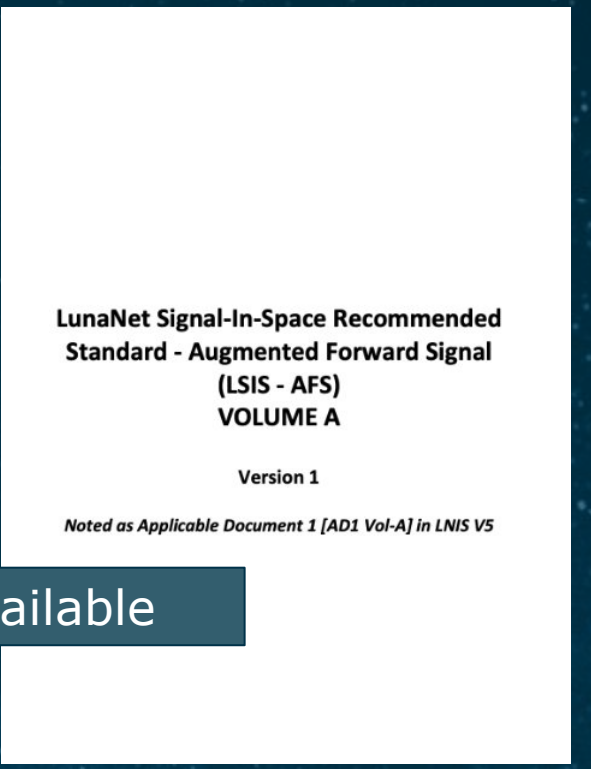
Set of **mutually agreed-upon** specifications

Being developed with international partners through the **LNIS working group**

Includes a set **of Applicable Documents** (in development):

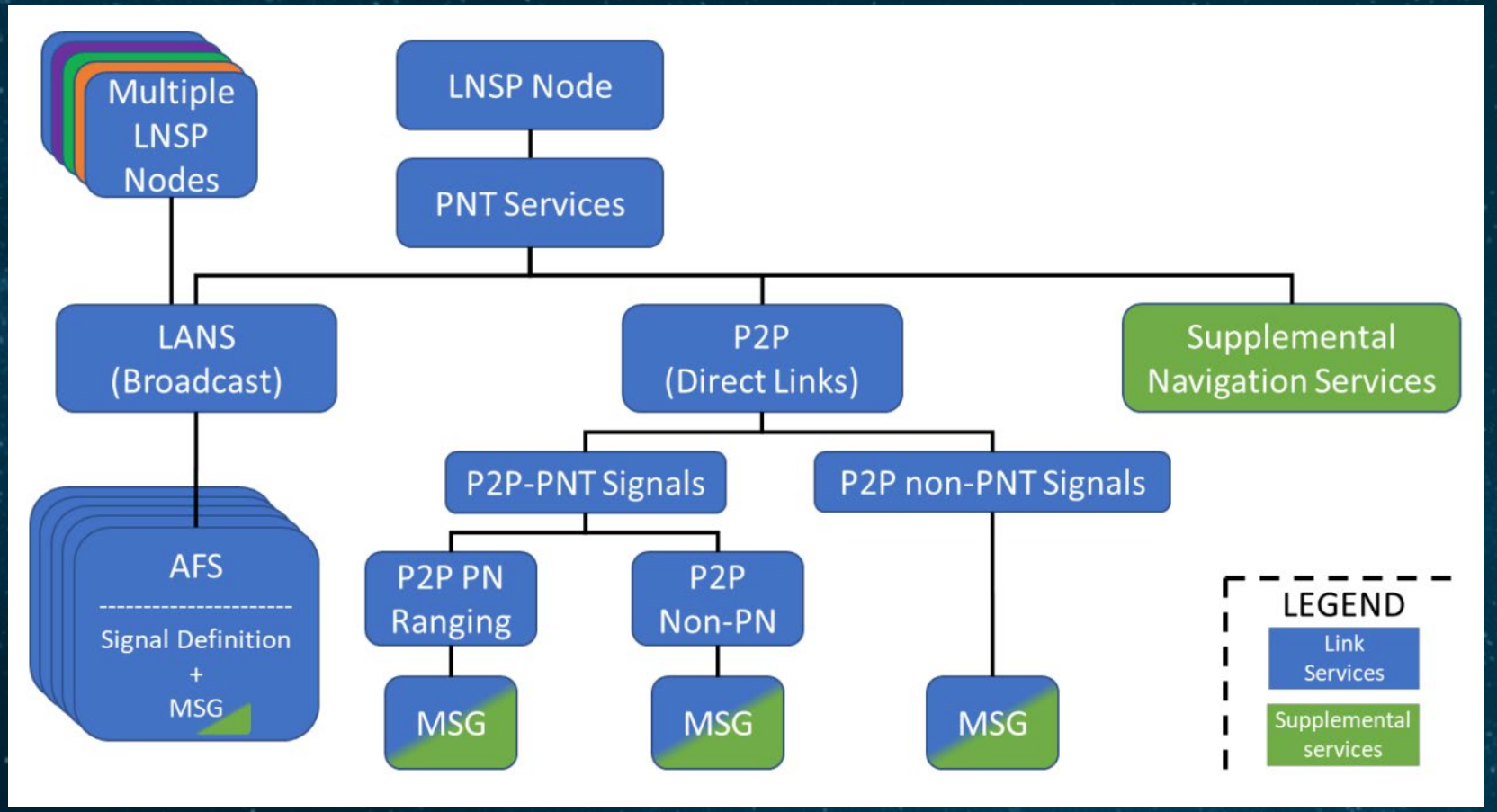
- AD1 Volume A LunaNet Signal-In-Space Recommended Standard (LSIS) Augmented Forward Signal (AFS)
- AD1 Volume B LunaNet Signal-In-Space Recommended Standard (LSIS) Point-to-Point Signals
- AD2 LunaNet Measurement Schema and Parameters
- AD3 LunaNet Detailed Message Definition Document
- AD4 LunaNet Location Services for Users
- AD5 Lunar Reference System and LunaNet Reference Time System Standard
- AD6 LunaNet Data Services Document
- AD7 LunaNet LunaSAR Definition Document
- AD8 LunaNet Interoperability Security Specifications



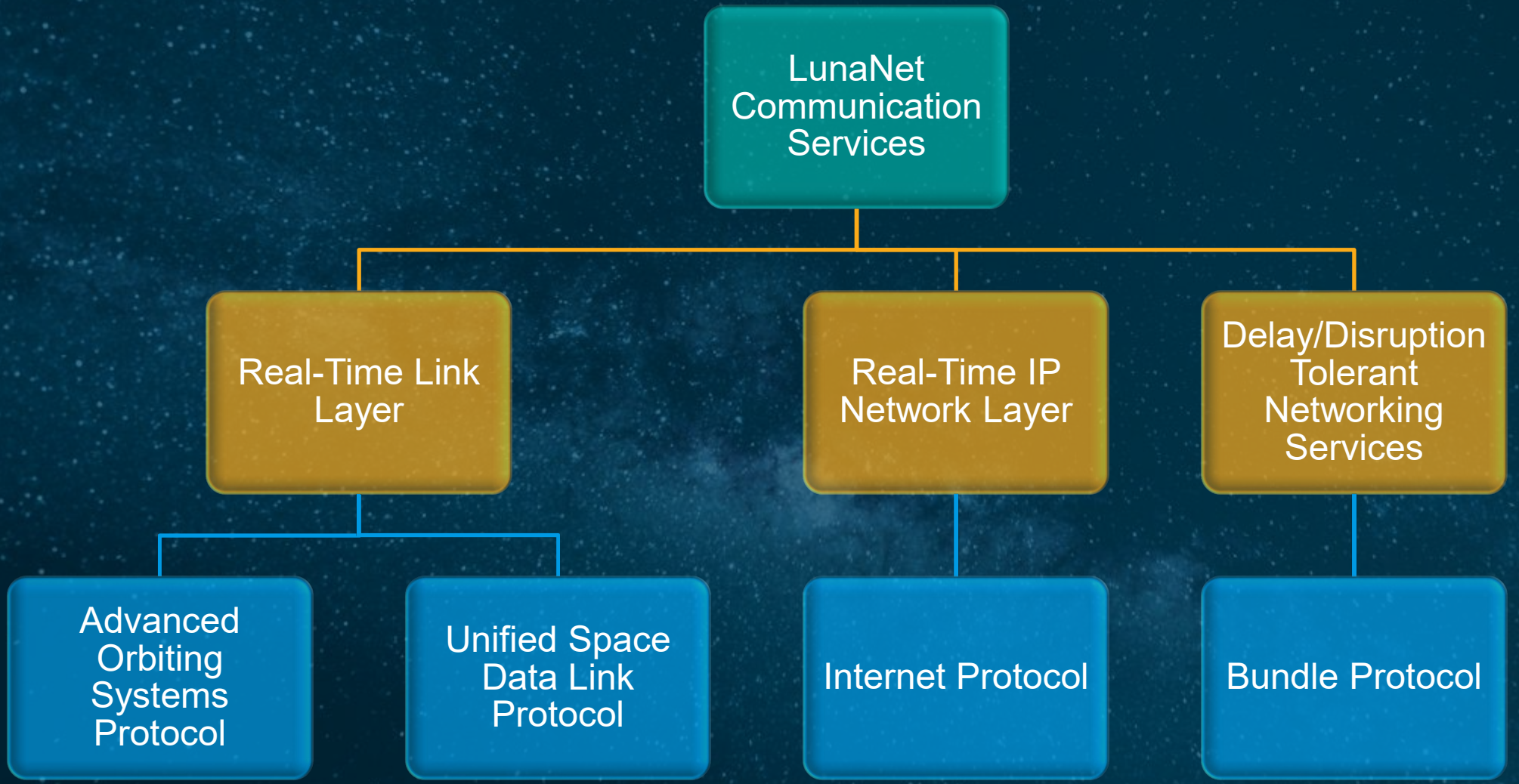


Soon Available

LunaNet – Framework of PNT Services



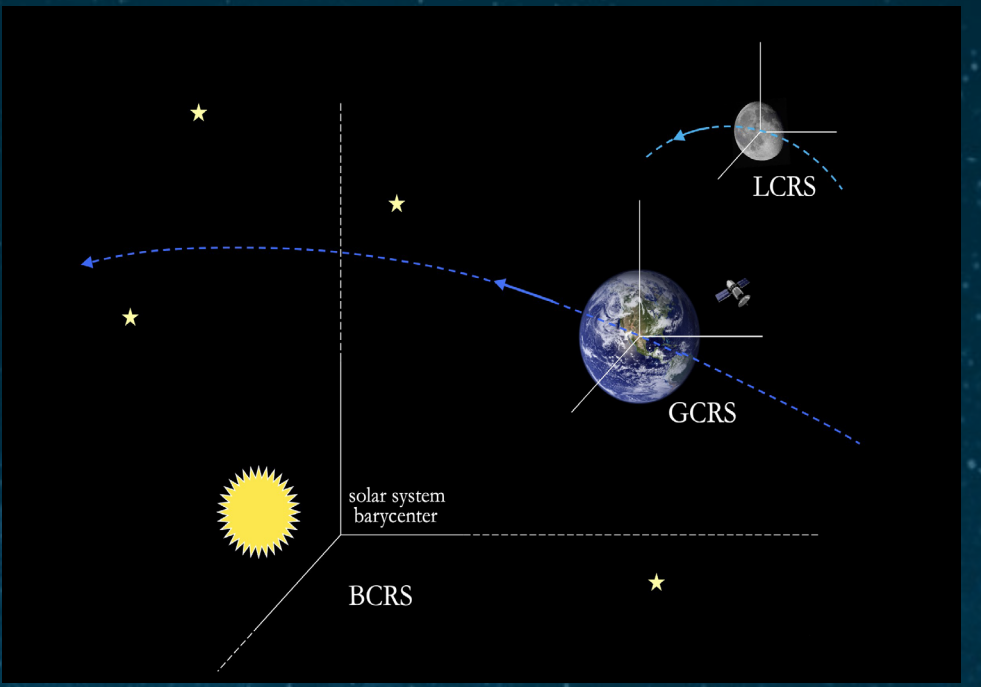
LunaNet – Framework of COM Services



Lunar PNT Foundational Systems

- Need for lunar time and reference systems

- International coordinations underway
  - **IAU**: Definition of Lunar Celestial Reference System
  - **IAG**: Connection between Celestial, Earth and Lunar Ref
  - **BIPM**: Lunar Coordinated Time (like UTC)



The New York Times

The Moon May Get Its Own Time Zone

As different countries plan lunar missions, the European Space Agency says that creating a time zone up there may simplify things.

BBC

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White House wants Moon to have its own time zone

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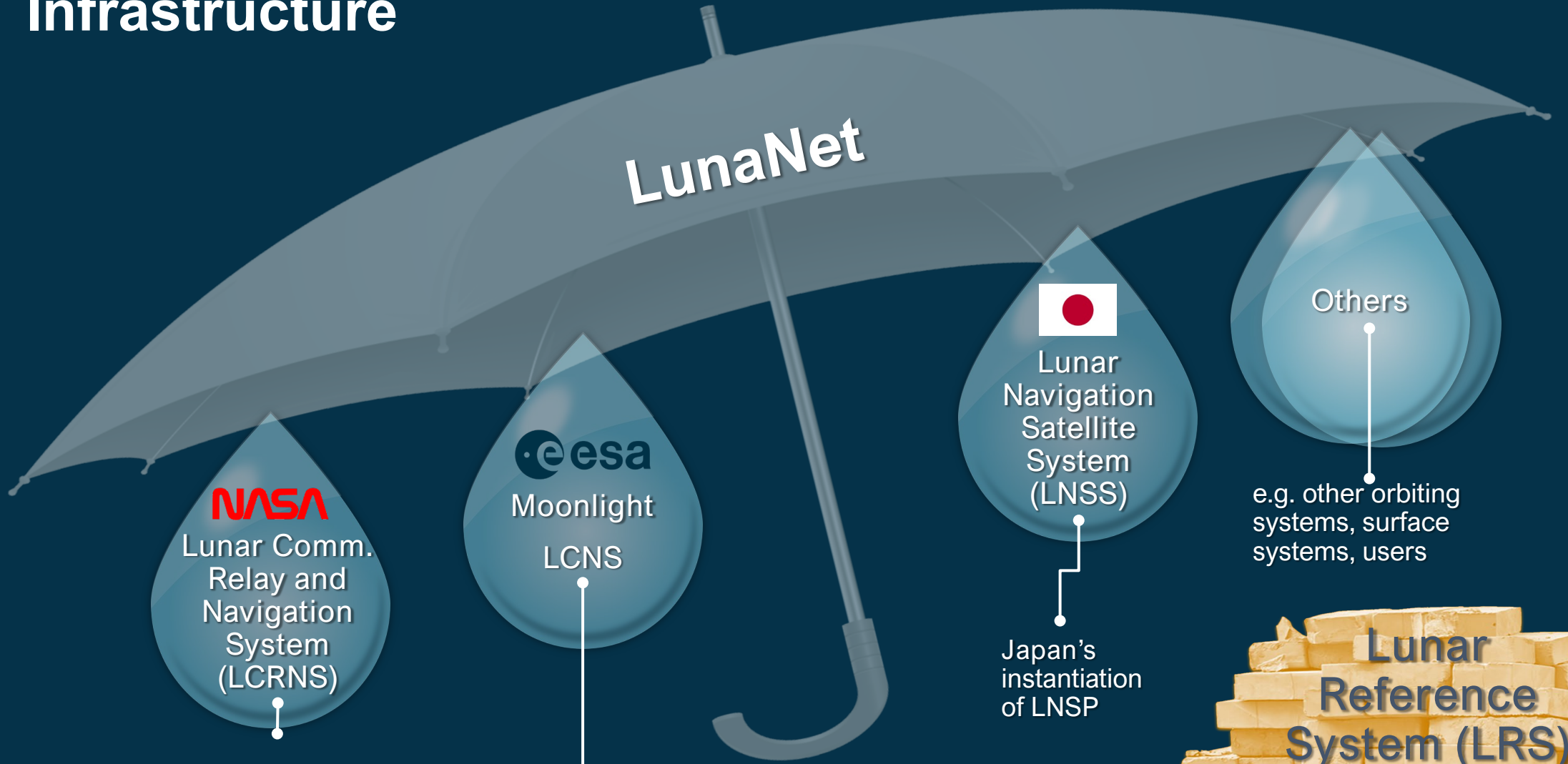
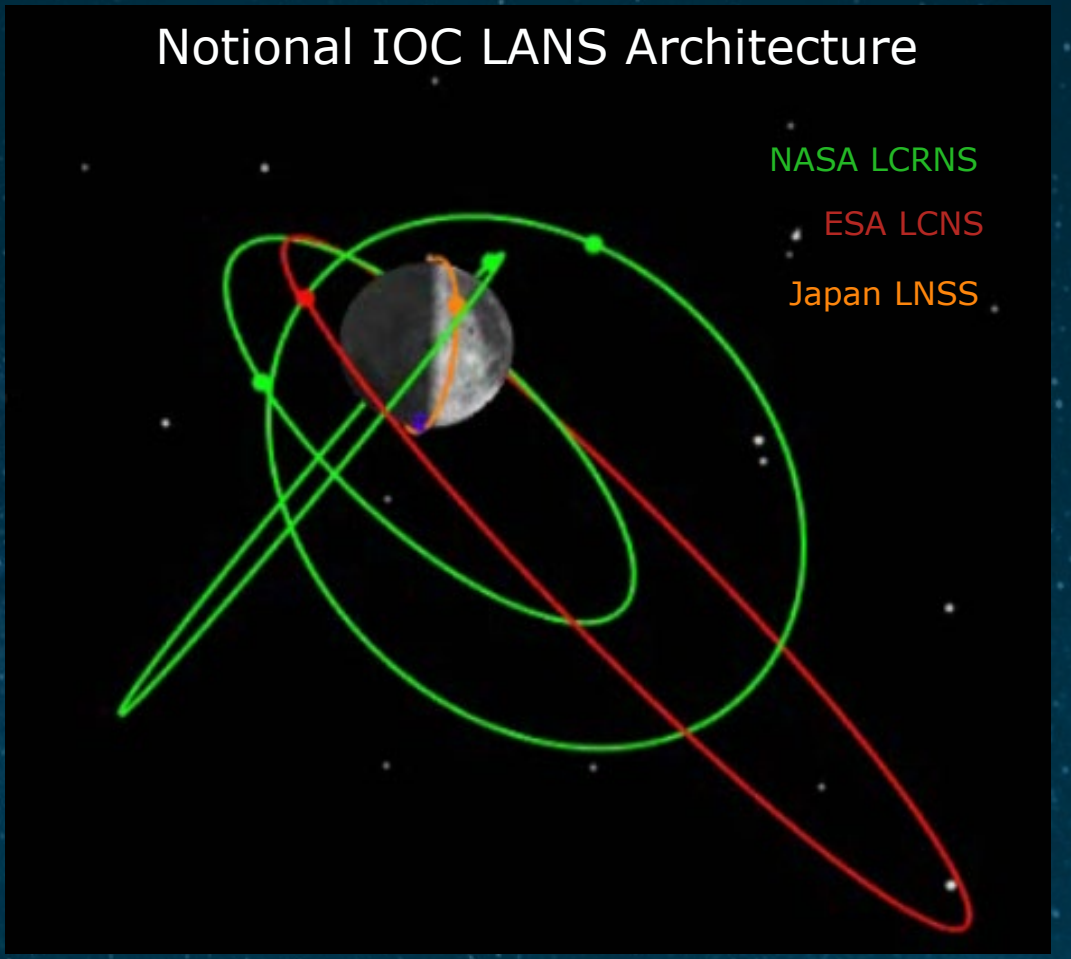
Time zones on the Moon: How do you tell the time in space and why is ESA pushing for them?

Infrastructure



LANS Interoperability Demo

First ever LunaNet **position**, **velocity** and **time** (PVT) from the lunar surface!



Governance/Coordination

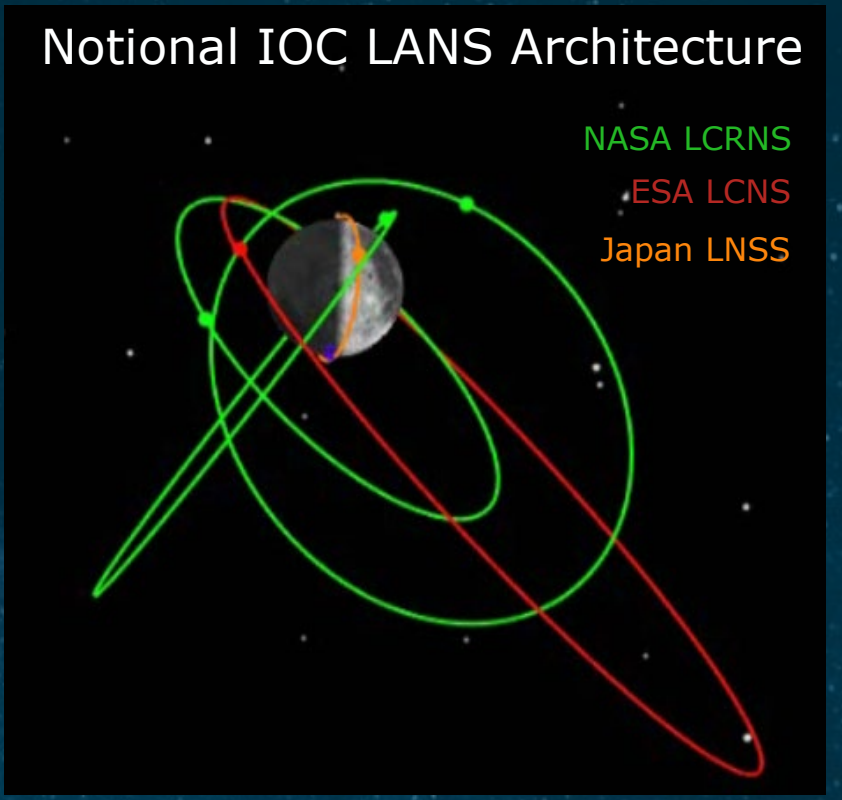
Coordination

Governance

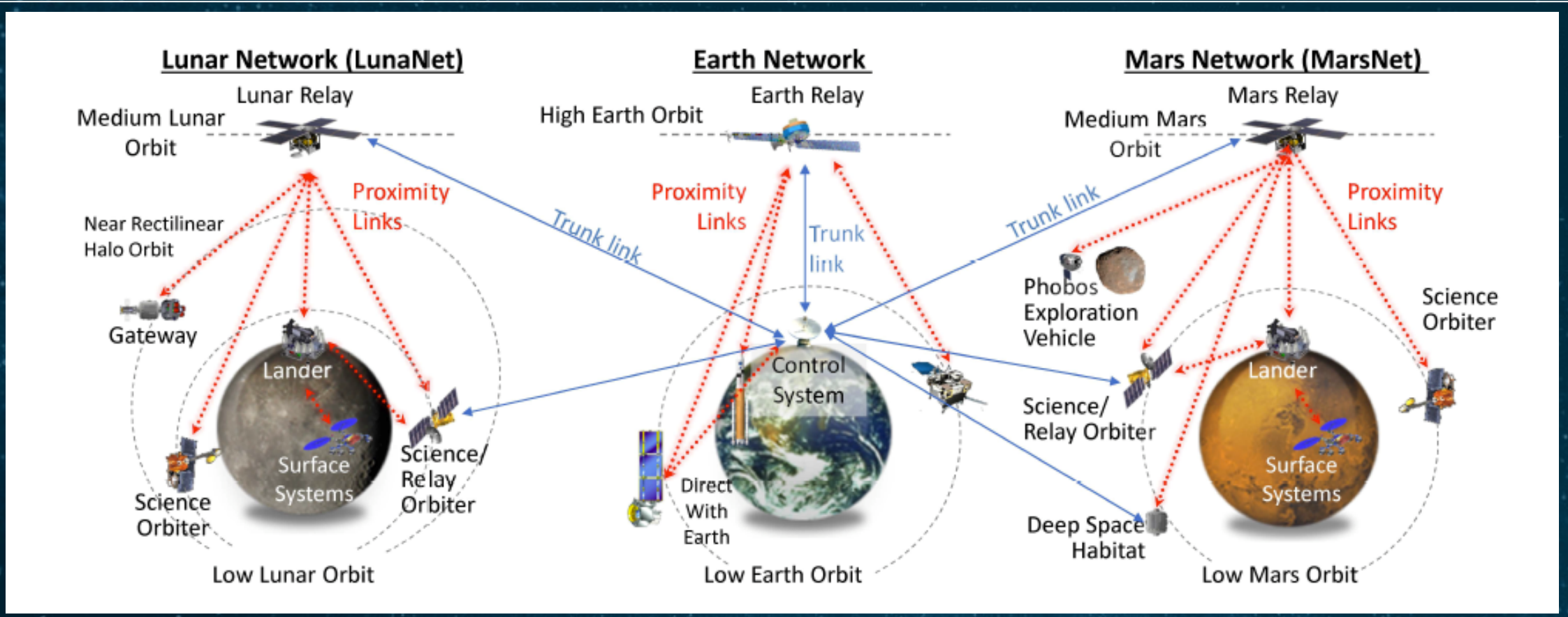
Orbits

PRN

Freq



An Extenable Framework



The International Mars Exploration Working Group (IMEWG) is currently developing **MarsNET**

Summary

- Definition through **tri-lateral** working groups
- LunaNet leverages **international standards**
- PNT services (Broadcast and P2P)
- Communication services
- NASA, ESA and Japan LunaNet systems underway!

LunaNet Specification V5 (Draft)

Joint ICG-IOAG Multilateral Cislunar PNT Workshop

11-13 February 2025, Vienna, Austria and broadcast

Registration open until 6 December 2024

https://www.unoosa.org/oosa/en/ourwork/icg/working-groups/b/CislunarPNT2025.html