Interplanetary Internet Governance

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The Internet at the Half Century Mark
Emerging Technologies Quickly Become Entrenched

WHERE WILL THE INTERNET BE IN THE NEXT HALF CENTURY?
The Internet’s Next Frontier will Likely be in Both Infinitesimally Small and Astronomically Large Spaces
A Solar System Internet

Discovery
Space Travel
Commercial Uses
Intelligence

 Exploration
Human Colonization
Space Stations
National Security

Source: NASA
Arrangements of Technical Architecture are Arrangements of Power
Internet governance can generally be defined as the administration and design of the technologies that keep the Internet operational and the enactment of policy around these technologies.

There is not one issue called Internet governance, but numerous functions, from standards setting to the administration of critical Internet resources, to private interconnection agreements, the public policy role of private information intermediaries, to government regulatory structures.
Anticipatory Governance Questions for an Interplanetary Internet

What anticipated governance functions and heliopolitical frameworks will be necessary to design, administer, and secure an interplanetary communication future that benefits all humankind?

- **Unique Space Challenges**: What are the unique technical affordances and governance complexities that will shape interplanetary internet architecture and governance?
- **Space Governance Context**: What are the space governance frameworks and treaties that now exist and what is their relevance to deep-space ICTs?
- **Terrestrial Internet Governance Applicability**: What core layers of Internet governance on Earth are likely to extend into deep-space, which do not apply, and what is missing?
- **Anticipated Flashpoints**: What lessons from terrestrial Internet governance can help inform structures of interplanetary Internet governance?
Deep-Space Challenges to Internet Design and Governance

- SPACE DEBRIS
- ASTRONOMICAL DISTANCES
- NATURAL DISRUPTIONS
- PLANETARY MOTION
- CONSTRAINED RESOURCES
- TIME INCONSISTENCIES
- SOVEREIGNTY UPENDED
The United Nations Office for Outer Space Affairs (UNOOSA) was launched in 1958. Its forum for international space treaties and principles is the Committee on the Peaceful Uses of Outer Space (COPUOS).

**The Outer Space Treaty**

1967

**The Rescue Agreement**

1968

**The Space Liability Convention**

1972

**The Registration Convention**

1976

**The Moon Agreement**

1984

**ARE THESE TREATIES APPLICABLE TO A SOLAR-SYSTEM INTERNET?**
International Space Treaty Framework
Not Easily Applicable to the Cyber Domain

- **Technology Transformed.** Predates most Internet technologies including the World Wide Web! Does not overtly address ICTs.

- **Strategic Importance of Satellites on Earth.** Predates mass satellite proliferation and earth strategic dependency on satellites, including for transportation, financial transactions, weather, television, Internet access.

- **National Security Space Dependency.** Predates terrestrial national security dependency on space systems, including real-time monitoring and command and control networks.

- **Multilateral Not Multistakeholder.** Focuses on nation states only and not private actors. Predates commercial space programs so has limited references to private ordering.
There Are Other Multilateral Agreements

THE ARTEMIS ACCORDS

SECTION 5 – INTEROPERABILITY

The Signatories recognize that the development of interoperable and common exploration infrastructure and standards, including but not limited to fuel storage and delivery systems, landing structures, communications systems, and power systems, will enhance space-based exploration, scientific discovery, and commercial utilization. The Signatories commit to use reasonable efforts to utilize current interoperability standards for space-based infrastructure, to establish such standards when current standards do not exist or are inadequate, and to follow such standards.
A Framework of Multistakeholder Internet Governance Relevant in Space (and a Few Differences)

Notes on Some Early Differences:

- Client-server Architecture Upended by Unique Conditions in Space
- Nodes are Numbered. (Bundle Protocol nodes)
- IANA and SANA Both Entering Space Number Assignment Arena?
- Delay and Disruption Tolerant Network Standards
- Bundle Protocol Rather than the Internet Protocol
- Specialized CERTS and CSIRTS for Space?
- Private Companies Not Yet in the Lead (like early ARPANET innovation environment; requires incentive structure and open protocols)
- Interconnection is Initially Public Not Private; Opp. for Greater Transparency via “Contract Plans”
- Government Cooperation Far More Important but Jurisdiction and Sovereignty Disrupted.
A Common Numbering System is Necessary for Success
Conflicts Will Likely Emerge over Control of Addressing
The Solar-System Internet Should Interoperate with Classical Internet
Avoiding Fragmentation Requires Standards Harmonization
Open Standards Necessary Now for Private Investment Later
Standardization Does Not Assure Implementation or Usage
Standardization in this Space May Become Highly Politicized
Infrastructure Will be Co-opted as a Proxy for Political Power
Tensions Will Exist between Multilateral v. Multistakeholder Models
Network Security Will Converge and Diverge with National Security
Cybersecurity Becomes the Great Human Rights Issue of Our Time
Thank You!
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