

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
Near-Earth and Interplanetary Communications (3)

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INTEROPERATING NETWORK COMMUNICATIONS ARCHITECTURE (INCA)

**Abstract**

The Interoperating Network Communications Architecture (INCA) research proposal to NASA will spur the development of interoperating network communications technology through the phased use of ground testbed facilities (Phase I), the Space Communications and Navigation (SCaN) Testbed (Phase II), and when warranted the ISS Payload Network(s) as well as other germane in-space assets (Phase III). This will support a range of Disruption Tolerant Networking (DTN) and interoperating network technology development, analysis, and assessment tasks including:

1. Testing Delay Tolerant Networking Technology with Real World Requirements 2. Pervasively Networked DTN Gateway 3. Near-Earth Emergency Preparedness and Response Network 4. Cislunar Pervasively Networked Communications Technology Development

These experiments have overlapping/intersecting spheres of interest.

The INCA experiment elements intend to exploit opportunities for both iterative and recursive development by leveraging the relationship between the experiments.

A key element of the INCA experiments is the development and/or use of a pervasively networked gateway which implements the Xrosslink Internet Services Protocol to provide quality of service based routing.

Of particular importance is the ability to structure and order the knowledge associated with defining link contexts. This must include the next hops/nodes, operational rules, and the time-to-live of any characterized links.

The primary constraint on the Ground Testbed is expediency and analog sufficiency. The STB hardware/software is already on orbit and integrated as an external attached payload designed to accept experiment unique software loads. The ISS payload network has a collection of on orbit hardware/software/network resources which can be deployed and augmented as necessary.

The approach and perspective of each INCA experiment varies:

1. Testing Delay Tolerant Networking Technology with Real World Requirements approaches the problem of maturation of DTN technology and facilitating its use from an end-user requirements perspective.

2. Pervasively Networked DTN Gateway approaches the problem of maturation of DTN technology and facilitating its use from an infrastructure perspective.

3. Near-Earth Emergency Preparedness and Response Network Focal Point approaches the problem of maturation of DTN technology and facilitating its use from a cooperating/interoperating network interface perspective with an emphasis on terrestrial applications.

4. Cislunar Pervasively Networked Communications Technology Development approaches the problem of maturation of DTN technology and facilitating its use from a cooperating/interoperating network interface perspective with an emphasis on Cislunar applications.