SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Technologies for Space Communications and Navigation (6)

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INTEROPERATING NETWORK COMMUNICATIONS ARCHITECTURE (INCA) - AN EVOLVING COMMERCIAL MISSION TO DEMONSTRATE DELAY TOLERANT NETWORK TECHNOLOGIES COMBINED WITH QUALITY OF SERVICE BASED ROUTING FOR SPACE COMMUNICATION SYSTEMS

Abstract

This Mission seeks to advance the development and application of an Interoperating Network Communications Architecture (INCA). This effort will include four sub-mission components:

1. Testing Delay Tolerant Networking (DTN) Technology – Internet Banking

Internet banking contends with some of the most stringent requirements for performance, availability, and security. This sub-mission proposed for the International Space Station seeks to demonstrate that, through the use of DTN technology and thoughtful extensions of existing hypertext/web services, even some of the most challenging internet applications can be successfully extended into Earth orbit and beyond.

1. Pervasively Networked DTN Gateway for the International Space Station

Extending a pervasively networked environment around the Earth and into space requires an evolving ability to accommodate Delay/Disturbance Tolerant Networking. Achieving the Quality of Service (QoS) requirements for such networks requires an exquisite dynamic balancing of the driving requirements of Performance, Availability, and Security. The Xrosslink Internet Services Protocol gateway under development at XISP Inc. provides a framework for accomplishing the DTN and QoS requirements in a highly scalable computationally practical manner.

1. Near Earth Emergency Preparedness and Response Network

The ISS provides an unparalleled platform to serve as a focal point one of the operating relay nodes for the development of a new near Earth emergency preparedness and response communication network. Recent environmental emergencies/natural disasters and electromagnetic pulse (EMP) events have drawn out the need for assured first responder communications capabilities. In particular, ones that are not necessarily reliant on the availability of traditional ground infrastructure. The technology to accomplish this sub-mission can be extended to allow cooperative communications across multiple networks with interoperating nodes in the event an emergency requires it.

1. Cis-Lunar Pervasively Networked Communications

Create a Cis-Lunar pervasively networked communications environment that supports interoperable communications links between the Earth, orbital communications assets, and deployed assets beyond Earth orbit including both the surface of the moon and other near Earth objects.

Advancing and validating the application of DTN technologies has many commercial applications in space based communications systems as well as in terrestrial communication systems. Output from this mission includes: a) an ability to extend internet applications into Earth orbit and beyond, b) development

of the Xrosslink Internet Services Protocol (XISP) and gateway, and c) ability to extend communications across multiple networks with interoperating nodes in the event an emergency requires it.