

# Security-Enhanced Autonomous Network Management

## *For networking in space and dynamic military environments*

Ensuring reliable communication in next-generation space networks requires a novel network management system to support greater levels of autonomy and greater awareness of the environment and assets. Intelligent Automation, Inc., has developed a security-enhanced autonomous network management (SEANM) approach for space networks through cross-layer negotiation and network monitoring, analysis, and adaptation. The underlying technology is bundle-based delay/disruption-tolerant networking (DTN).

The SEANM scheme allows a system to adaptively reconfigure its network elements based on awareness of network conditions, policies, and mission requirements. Although SEANM is generically applicable to any radio network, for validation purposes it has been prototyped and evaluated on two specific networks: a commercial off-the-shelf hardware testbed using Institute of Electrical Engineers (IEEE) 802.11 Wi-Fi devices and a military hardware testbed using AN/PRC-154 Rifleman Radio platforms. Testing has demonstrated that SEANM provides autonomous network management resulting in reliable communications in delay/disruptive-prone environments.

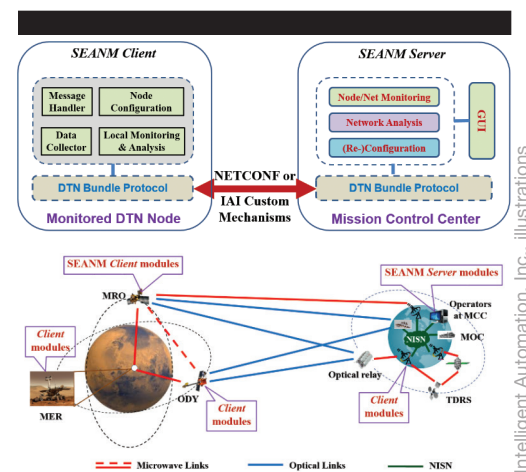
## Applications

### NASA

- ▶ Space Communications and Navigation (SCaN) network integration
- ▶ Robotic missions

### Commercial

- ▶ Dynamic and tactical military environments
- ▶ Undersea networks
- ▶ Satellite communications
- ▶ Wireless sensor and ad hoc networks



## Phase II Objectives

- ▶ Develop an autonomous networking and network management system for space networks:
  - Advanced bundle protocol-based DTN network support
  - Proactive network monitoring and prediction
  - Cross-layer information sharing and negotiation
  - Network analysis and reconfiguration
- ▶ Implement the proposed SEANM scheme using hardware implementations
- ▶ Perform extensive performance evaluations
- ▶ Develop and incorporate the developed concepts and techniques into prototypes

## Benefits

- ▶ Reduces costs
- ▶ Enhances reliability

## Firm Contact

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