ISS Technology Demonstration

The SPATIAM DTN Platform – BIBE

Principal Investigator: Dr. Alberto Montilla, Spatiam Corporation. a.montilla@spatiam.com

Research reported in this project presentation was awarded through ISS National Lab Research Announcement 2023-7: Technology Advancement and Applied Research Leveraging the ISS National Lab. Spatiam Corporation is working with Axiom Space as the implementation partner.

IETF 123. July 24, 2025

Property of Spatiam Corporation. All rights reserved. Approved for publication.

SPATIAM DTN PLATFORM in ISS

Technology demonstration

Setup and operated a managed DTN Network, following a Service Provider Architecture in the ISS for 18 days.

Objectives

- Demonstrate core capabilities of a commercial operational DTN network in LEO.
  - Setup of network overlay, Transfer payload TT&C, contact plan management.
  - 24x7 operation – multiple contacts over several days.
- Demonstrate operational capabilities of the SPATIAM DTN Manager.
  - Multi-administrative management, Interoperation between multiple BP stack implementations, Advanced topology management, dynamic contact plan updates.
- Demonstrate Advanced capabilities of the SPATIAM DTN Platform.
  - DTN Management, application security and BPSec, Bundle in Bundle encapsulation.

ISS National Laboratory
CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE

This research is supported by the International Space Station U.S. National Laboratory under agreement number UA-2023-9166.

SPATIAM DTN PLATFORM in ISS

Using BIBE

Main BIBE configuration elements

Standard Configuration: BIBE applied to the data path between ISS and Ground Gateways (source/destination based forwarding rules). Payload nodes data encapsulated on BIBE with:

- Security configuration (NULL context available in ION)
- Bundle Status Reports to the manager.

Other test configuration used:

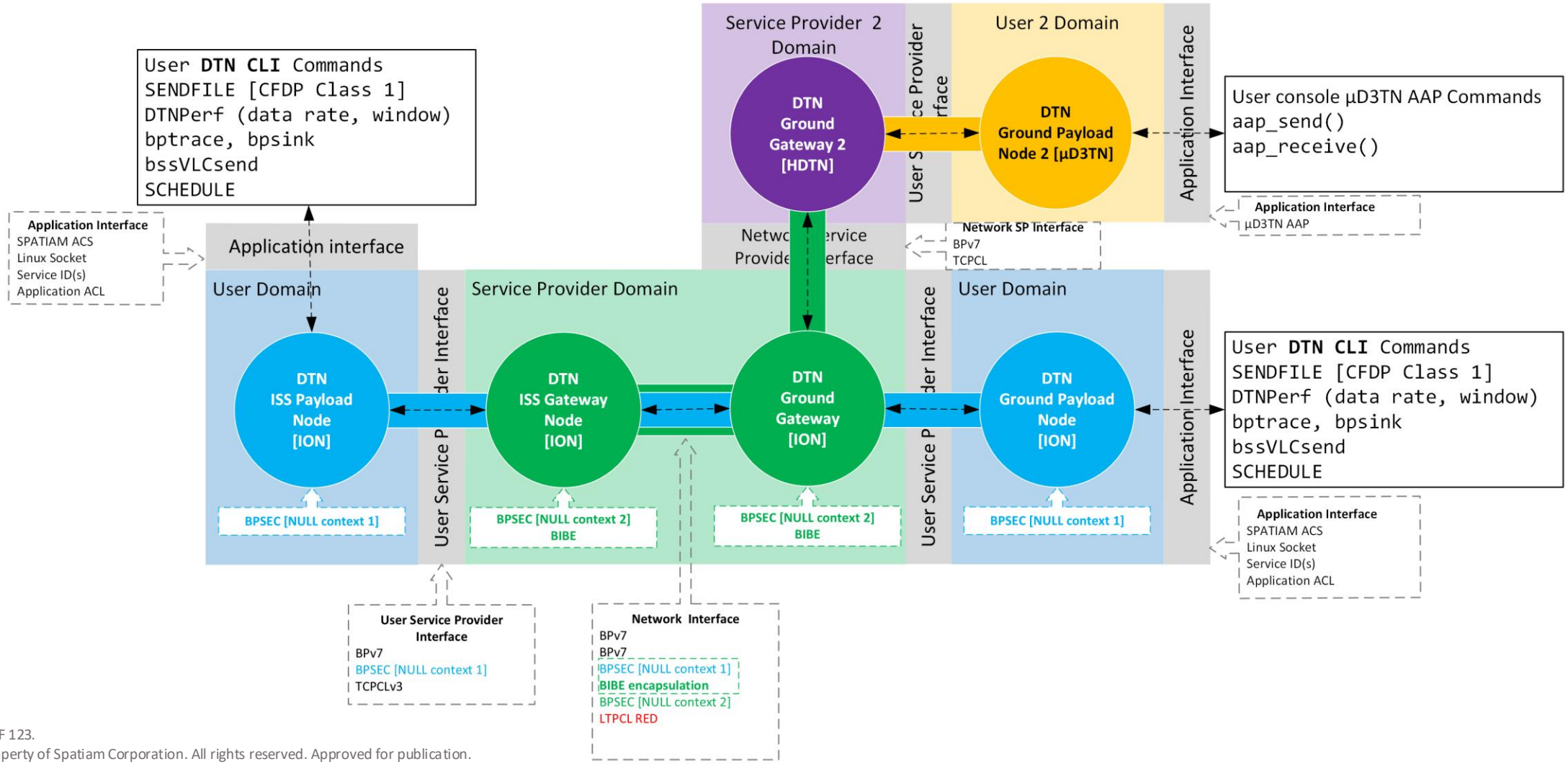
- BIBE Bundle Retransmission Method (BRM)

ISS National Laboratory
CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE

This research is supported by the International Space Station U.S. National Laboratory under agreement number UA-2023-9166.

SPATIAM DTN PLATFORM in ISS

Forwarding User Data



Property of Spatiam Corporation. All rights reserved. Approved for publication.

Conclusions and Lessons Learned

Considerations	Commentary
Service Provider Architecture	BIBE provides proper separation of concerns (security, forwarding) for a Service Provider, relative to the payload data.
Bundle Retransmission Method	Current timer-based algorithm is too prone to flooding the network in presence of link performance mismatch (including higher bit error rate or configured data rate in the contact plan). *Carlo Caini team at UNIBO has implemented enhancements (on UNIBO-BP implementation) to prevent flooding. They include exponential back-off n timers*

Property of Spatiam Corporation. All rights reserved. Approved for publication.

Thank You!

ISS Technology Demonstration
The SPATIAM DTN Platform

Dr. Alberto Montilla, Spatiam Corporation

a.montilla@spatiam.com

Research reported in this project presentation was awarded through ISS National Lab Research Announcement 2023-7: Technology Advancement and Applied Research Leveraging the ISS National Lab. Spatiam Corporation is working with Axiom Space as the implementation partner.

IETF 123. July 24, 2025

Property of Spatiam Corporation. All rights reserved. Approved for publication.