DTN

HOSC DTN Gateway Test Report

Cleveland, OH 2012

Status

- Goals of this activity
  - Test the HOSC DTN Gateway for operational use
- Current activity
  - Test the Implementation of a new DTN2 gateway at the HOSC
  - Confirm integration of DTN nodes into the S-band uplink and Ku-band downlink of the ISS for limited use
  - Implement Aggregate Custody Signal to ISS platforms
  - Verify operational support for CU onboard components
  - Verify ability to support METERON OpsCon-2

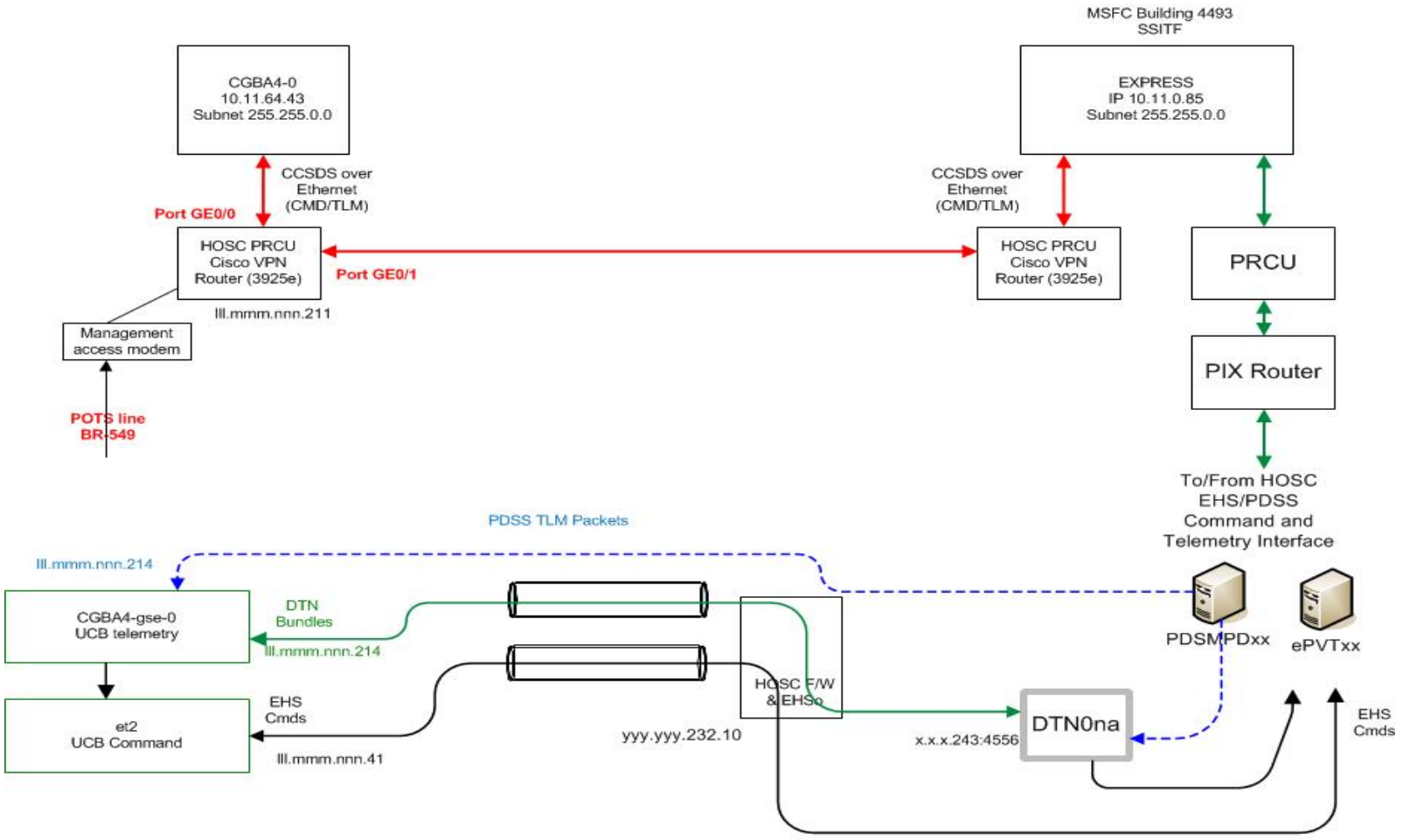
Status

- HOSC DTN Node
  - Couples payload uplink architecture with downlink delivery at the HOSC
  - Upgrade and virtualize the HOSC DTN nodes to 64 bit O/S
  - Move the implementation to DTN2.8
  - Add Aggregate Custody Signal into the HOSC DTN2 node
  - Implement ACS independently of ION
  - Feedback lessons learned and patches into the DTN2 community
  - Transition the HOSC with build 15 to support upcoming payload activities

Status

- Basic test configuration
  - **Prior to external testing, extensive test was completed internally**
    - DTN2 to DTN2
    - ION (IOS) to DTN2
    - Live downlink stream thanks to cooperation from CU-Boulder
  - **MSFC system requirements**
    - IVV/Simulation String - EHS software 15.x (MOP – IN32:Test)
    - Test and Simulation Processor (TASP) - 5.0.1-6
    - Payload Data Services System (PDSS) - PDSS 5.0.2
    - PDSS DTN - DTN 2.1 (modified DTN2.8)
    - Payload Rack Checkout Unit (PRCU)
    - Telescience Resource Kit (TReK) Command Bridge
  - **CU-Boulder system requirements**
    - CGBA4-0
    - CGBA4-gse-0 - UCB telemetry -
    - ION BP/TCP/ACS/ECOS
    - ET2 – UCB command

Multi-site test layout



ACS test config

Status

- **Features to Be Tested**
  - Remote access to HOSC DTN services via an IPSec-compliant VPN
  - CGBA's utilization of the Aggregate Custody Signal (ACS) generated by a DTN2 implementation
  - Bundle traffic compliance with RFC 6260 (CBHE)
  - HOSC DTN nodes ability to support the Aggregate Custody Signal (forward telemetry bundles to CU-Boulder)
  - EHS software implementations for HM-3388/3410 to support DTN2
  - The mapping of DTN bundle activity to a UserID
  - The CU-Boulder onboard gateway's ability to support the HOSC DTN uplink capability
  - RFC 5050 compliant acknowledgements sent from the intermediate HOSC DTN node using DTN URI and IPN URI
  - Measuring sustained throughput capabilities of BP on Ku-downlink and with ACS in the S-band uplink.

Status

- **Six test scenarios were exercised**
  1. Test Acceptance of simple custody signal (non- ACS)
     - AOS CLA and DTN2 router processed APID 949 (CGBA4) bundles correctly
     - HOSC DTN router sends BP Custody Signals to the EHS command system for uplink to CGBA-0 via SSITF successfully
     - CGBA-4 at SSITF accepts command, CGBA4_DTN, properly
     - HOSC DTN router (DTN01a) sends non-ACS bundle to CU-Boulder (CGBA4-gse-0)
     - CU-Boulder receives non-ACS bundle and verifies content
     - DTN01A receives Custody Signals and bundles are deleted from the bundle store

Basic Bundle protocol behavior was verified

Status

- **Six test scenarios were exercised**
  2. Test Acceptance of Aggregate Custody Signals (ACS)
     - AOS CLA and DTN2 router processed APID 949 (CGBA4) bundles correctly
     - HOSC DTN router (dtn01a) sends ACS to the EHS command system for uplink to CGBA-0 at SSITF successfully
     - CGBA4-0 at SSITF accepts command, CGBA4_DTN, properly
     - HOSC DTN router sends ACS enabled bundles to CU-Boulder
     - CU-Boulder receives ACS bundles and verifies content
     - DTN01A receives Aggregate Custody Signals (ACS) and bundles are deleted from the bundle store

Basic ACS protocol behavior was verified

Status

- **Six test scenarios were exercised**
  3. Test IPN URI (w/ACS)
     - AOS CLA and DTN2 router processed APID 949 (CGBA4) bundles correctly
     - HOSC DTN router sends ACS utilizing IPN to the EHS command system for uplink to CGBA-0 at SSITF successfully
       - √ Bundle primary block was in CBHE format because all EIDs are IPN scheme compatible
     - CGBA4-0 at SSITF accepts command, CGBA4_DTN, properly
     - HOSC DTN router sends ACS enabled bundles to CU-Boulder (CGBA4-gse-0)
       - √ Bundle primary block was in CBHE format because all EIDs are ipn scheme compatible
     - CU-Boulder receives ACS enabled bundles and verifies content
     - DTN01A receives Aggregate Custody Signals (ACS) and bundles are deleted from the bundle store

CBHE behavior was verified

Status

- **Six test scenarios were exercised**
  4. Test gaps in processed Custody IDs (induced manually) between bundles while utilizing ACS
     - AOS CLA and DTN2 router processed APID 949 (CGBA4) bundles correctly
     - HOSC DTN router sends ACS with multiple fills to the EHS command system for uplink to CGBA-0 at SSITF successfully
     - CGBA4-0 at SSITF accepts command, CGBA4_DTN and processes ACS with multiple fills properly
     - HOSC DTN router sends non-ACS telemetry bundles to CU-Boulder (CGBA4-gse-0)
     - CU-Boulder receives non-ACS telemetry bundles and verifies content
     - DTN01A receives custody signals (non-ACS) and bundles are deleted from the bundle store
     - HOSC expects missed bundles to be resent and subsequently acknowledged successfully
     - HOSC verifies that the gaps are represented accurately in the Command Delog (EHS application)

Result 3 and 7 were not achieved. Unacknowledged previously received bundles were retransmitted indicating only the first fill of the ACS was processed

Status

- **Six test scenarios were exercised**
  5. Test for Queued ACKs on the HOSC-side
     - AOS CLA and DTN2 router processed APID 949 (CGBA4) bundles correctly
     - HOSC DTN router sends ACS to the EHS command system.
     - EHS command system holds the ACS in a queue ready for uplink when uplink conditions are acceptable.
     - EHS command system uplinks ACS bundles to CGBA-0 successfully
     - CGBA4-0 accepts command, CGBA4_DTN, properly
     - HOSC DTN router sends non-ACS bundles to CU-Boulder (CGBA4-gse-0)
     - HOSC expects missed bundles to be resent from CGBA4-0 at SSITF
     - CGBA4-0 receives first acknowledgement command and ignores the second acknowledgement command
     - CU-Boulder (CGBA4-gse-0) receives ACS bundles and verifies content

All items were successful but there were test unique items that required extra analysis. These were associated with the SSITF

Status

- **Six test scenarios were exercised**
  6. Test of throughput of BP via Ku band downlink and S band uplink
     - Unable to test due to ION node being overwhelmed on the initial flood attempt

Status

- **Follow-up testing is schedule for the last week of October into November**
  - Performance testing at the platform and link level
  - Resolve and retest any areas where analysis has indicated concern
  - Validate the operational configuration

Backups