



National Aeronautics and Space Administration
Jet Propulsion Laboratory, California Institute of Technology

Topics in Bundle Protocol

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12 November 2014

This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration. © 2014 California Institute of Technology. Government sponsorship acknowledged.



Outline

- Topics to address in Bundle Protocol Version 7
 - End-to-end data integrity
 - Improved support for security
 - Resource-constrained environments
 - Bugs
 - New features
- Other DTN technical topics (outside of BPv7)



End-to-end Data Integrity (1 of 2)

- Motivation:
 - Must protect against introduction of errors by implementations.
 - Must be practical in non-hostile environments where Bundle Security Protocol integrity protection would not be cost-effective.



End-to-end Data Integrity (2 of 2)

- Primary block
 - Make it immutable.
 - Move all mutable data into extension blocks.
 - Move current custodian (new extension block) and all other EIDs except source, destination, report-to. **No EID references in extension blocks.**
 - Bundles are mutable at block granularity.
 - Add optional end-to-end checksum.
- Payload block
 - Add optional end-to-end checksum.
 - An extension block?
 - Or add to the canonical block header?



Improved Support for Security

- Motivation: security is critical in these networks.
- Help make BSP easier to implement, so that it is implemented more widely and used more broadly.
- (Making primary block non-mutable simplifies canonicalization.)
- Add block ID number to canonical block format, to simplify SBSP “target” mechanism.
- Define explicit node identifiers: security blocks apply to individual nodes, not to bundle endpoints.



Resource-constrained Environments

- Motivation: UUV, UAV, Gaia, etc. environments may have limited bandwidth and processing power.
- Native internal representation for endpoint IDs that can be expressed in binary, e.g., the “ipn” scheme.
 - Remove dictionary.
 - Continue using URIs for external representation.
- New extension block for destination EIDs that can’t be expressed in binary.
- Bundle age extension block, for nodes that lack accurate clocks.



Bugs (1 of 2)

- Add the notion of "embargoes", i.e., what do you do when a route unexpectedly goes bad for a while?
 - Add another extension block (Forwarding Anomaly) and an administrative record (Reopen Signal).
- Add extension block for ID of sending node.
- Add extension block for hop count, as ultimate defense against unintended routing loops.
- Clean up a conflict between fragmentation and custody transfer identified by Ed Birrane.



Bugs (2 of 2)

- Remove unused "DTN time" values from administrative records.
- Explicitly note that CL protocols are supposed to discard data that they find to have been corrupted.



New features

- "Extended Class of Service" (incl. flow labels). Ref. draft-irtf-dtnrg-ecos-05 posted 1 July 2013.
- Basic ("imc") multicast. Add another administrative record, Multicast Petition. Ref. draft-burleigh-dtnrg-imc-00 posted 7 November 2012.



Other DTN Technical Topics

- Streamlined Bundle Security Protocol
- Bundle-in-Bundle Encapsulation Protocol
- Registry for service identifiers
- Network Management Protocol
- Security Key Management Protocol
- General solution to dynamic routing in DTNs
- Standards for node and contact discovery