BPv7 Echo Service

ietf://dtn/meetings/125

draft-taylor-dtn-echo-service

rtaylor@aalyria.com

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- Defines an echo (ping) service for BPv7 networks
- Simple reflector at a well-known endpoint
- Enables round-trip time measurement and connectivity verification
- Requests IANA allocation of service number and DTN demux
- Individual draft, -00 published

Motivation

- DTNs lack a standardised diagnostic tool like ICMP Echo
- Operators need to verify end-to-end connectivity
- Round-trip time measurement aids capacity planning and debugging
- Existing implementations already use ad-hoc echo services (e.g. service number 7)
- A standard ensures interoperability across heterogeneous deployments

How It Works

- Conceptual loopback within the node
- Receive bundle → clone → swap source and destination → submit to local BPA
- BPA handles the response as any outbound bundle
  - Standard extension block processing
  - Routing and forwarding
- Echo service itself performs minimal processing

Service Endpoints and IANA

Requesting registration in the RFC 9758 “ipn” Well-Known Service Numbers registry (with new “DTN Demux” column):

- **IPN Scheme:** e.g. `ipn:2.128` — service number 128 is the lowest in the Standards Action range
- **DTN Scheme:** e.g. `dtn://example.dtn/echo`
- Existing convention uses 7, but that is Private Use per RFC 9758 — MAY support for backwards compatibility

Primary Block Handling

- **Source / Destination:** Swap — destination becomes received source, source becomes echo endpoint
- **Creation Timestamp & Lifetime:** Preserved unchanged
  - Client controls max round-trip time
  - Status reports can be correlated
- **Bundle Processing Control Flags:** Preserved unchanged
- **Report-to EID:** Preserved unchanged
- **CRC:** Recalculated (type unchanged)

Payload and Extension Blocks

- **Payload block:** Preserved exactly as received
  - Clients can verify round-trip integrity
- **Extension blocks:** Preserved in cloned bundle
  - Block type, flags, CRC type, data all retained
  - Block numbers SHOULD NOT change (BPSec references)
  - BPA applies standard RFC 9171 processing on transmission
  - Hop Count, Previous Node, Bundle Age — BPA updates as normal

Client Considerations

- **Session disambiguation:** Multiple concurrent clients MUST use distinct source endpoints
- **Bundle integrity (BPSec):** Primary block changes break BIBs that include it
  - Clients SHOULD clear “include primary block” flag (bit 0) in integrity scope
- **Fragmentation:** Clients SHOULD set “must not be fragmented” flag
  - Cleaner diagnostic results
  - Path MTU testing via increasing bundle sizes

Security Considerations

- **Amplification attacks**
  - Limited potential (payload unchanged, minimal overhead changes)
  - Rate-limit responses; monitor for abuse; consider BPSec authentication
- **Information disclosure**
  - Confirms endpoint existence; RTT reveals topology
  - Restrict access or disable where not needed
- **Resource exhaustion**
  - Limit payload size; rate-limit; monitor resources

Appendix: Ping Client Guidance (Non-normative)

- RTT from local timestamps, not payload — no clock sync needed
- Suggested CBOR payload: `[sequence, options]`
  - Options: padding (MTU testing), timestamp (debugging), extension block list
- Status reports distinguishable by source EID in bundle identifier
- Standard statistics: loss %, RTT min/avg/max/stddev

Interop Status

- Hardy echo-service implementation successfully interop tested with:
  - **dtn7-rs**
  - **HDTN**
  - **DTNME**
- Demonstrates the spec is implementable and interoperable today

Questions for the Working Group

- Interest in WG adoption?
- Appropriateness of requesting service number 128?
- Adding the “DTN Demux” column to the existing IANA registry — any concerns?
- Any additional client considerations or security issues to address?

Thank you