ACME DTN Node ID Validation

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DTN Background

- DTN Architecture in RFC 4838
- Store-and-forward of Bundles
  - Similar to email over SMTP
- Overlay network
  - Rely on Convergence Layer adaptors for bundle transport between nodes
  - Late binding of Endpoint IDs
  - Bundle forwarding and routing
- End-to-end and per-hop security mechanisms

Figure 1: The Locations of the Bundle Protocol and the TCP Convergence-Layer Protocol above the Internet Protocol Stack
DTN Bundles

• The Bundle is the protocol data unit of DTN BP.

• A Bundle is composed of blocks.
  • One Primary block with addressing and bundle-wide parameters.
  • Sequence of Canonical blocks with type-code and block-type-specific-data.

• One canonical block is the Payload.
  • Administrative Record payloads are addressed to Node ID and processed by BP agent.

• Each bundle is stand-alone unit.
  • Addressed to an Endpoint ID
  • Sourced by a Node ID
  • Source of admin. Records can be replied-to.

• Bundle Security (BPSec) can be used to cryptographically sign, MAC, or encrypt blocks.
Motivations for Node ID Validation

- Proposed DTN TCP Convergence Layer Version 4 defines a PKIX certificate authentication mechanism.
  - Two modes of authentication: Node ID (as URI) and DNS name.
  - DNS name validation defined in RFC 6125.
  - URI validation is defined by TCPCL (RFC 6125 has only DNS-related definition).
- Question was raised “How should a CA validate a DTN claim?”
- ACME provides a well-established mechanism to do all the important bookkeeping needed by a CA.
  - Prefer this over ad-hoc mechanisms that don’t provide strong guarantees of fitness.
Proposed Validation Mechanism

• Very similar to proposed [draft-ietf-acme-email-smime].
  • New BP Administrative Record type defined.
  • Challenge Bundle supplies token-part1.
  • ACME server supplies token-part2.
  • Response Bundle combines token and generates Key Authorization result.

• Recommends Bundle Integrity cryptographic signing.
  • Useful to pass network security policy.
  • Not needed for validation itself.
Desired WG Direction

• Currently drafted as Experimental.
  • The DTN protocols are entering Standards Track status.
  • No other ACME mechanisms currently validate URI claims.
• Proposed as “If you want to do this thing, here is the best way to achieve it.”
• Any desire by ACME WG to adopt a URI validation?
• Distinction between mandatory-to-implement and optional validation mechanisms?