IETF 121 DTN Working Group

RFC4838 Discussion

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(chair hat off)

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RFC4838 History

This RFC was published on the Internet Research Task Force (IRTF) stream. This RFC is **not endorsed by the IETF** and has **no formal standing** in the IETF standards process.

This document describes an architecture that addresses a variety of problems with internetworks having operational and performance characteristics that make conventional (Internet-like) networking approaches either unworkable or impractical. We define a message- oriented overlay that exists above the transport (or other) layers of the networks it interconnects

Considerations around RFC4838

An updated DTN architecture would have some benefits

- Re-affirm (the many) elements of RFC4838 that remain unchanged
- Re-visit elements of RFC4838 that have:
  - Some elements have changed via RFC9171/RFC9172 and others
  - Some elements should be refreshed
  - Some element purposes have been rethought
- Produce an updated architecture from an IETF WG.

Why DTN Architecture?

The existing Internet protocols do not work well for some environments, due to some fundamental assumptions built into the Internet architecture:

- An end-to-end path exists for the duration of a communication session
- Retransmissions based on timely and stable feedback from data receivers is an effective means for repairing errors
- End-to-end loss is relatively small
- All routers and end stations support the TCP/IP protocols
- Applications need not worry about communication perform
- Endpoint-based security mechanisms are sufficient for meeting most security concerns
- Packet switching is most appropriate abstraction for interoperability and performance
- Selecting a single route between sender and receiver is sufficient for achieving acceptable communication performance

Some of these still are true. Some less so.

Bundle Layer Design Principles

- Use variable-length messages (not streams or limited-sized packets)
- Use a naming syntax that supports a wide range of naming and addressing.
- Use storage within the network to support store-and-forward operation over multiple paths, and over potentially long timescales.
- Provide security mechanisms that protect the infrastructure from unauthorized use by discarding traffic as quickly as possible.
- Provide coarse-grained classes of service, delivery options, and a way to express the useful lifetime of data to allow the network to better deliver data in serving the needs of applications.

Application Design Principles

- Minimize the number of round-trip exchanges.
- Cope with restarts after failure while network txns remain pending.
- Inform network of useful life/importance of data to be delivered.
- Include information in ADU to be treated as independent unit of work by network.
- Consider additional factors beyond the conversational implications of long delay paths.
  - Application may terminate between sending message and getting response.

Bundle Assumptions

1. that storage is available and well-distributed throughout the network,

2. that storage is sufficiently persistent and robust to store bundles until forwarding can occur, and

3. (implicitly) that this "store-and-forward" model is a better choice than attempting to effect continuous connectivity or other alternatives.

Specifics

Things that remain similar as specified (opinion)

- Virtual message switching
- Store-and-forward
- Nodes, EIDs, Registrations
- URI Schemes
- Late Binding
- Convergence Layers

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Specifics

Things to Review (opinion)

- Priority Classes (vs labels)
- Administrative Records (guidance on when to produce)
- Delivery Options, Administrative Records (update for BPv7)
- Reliability/Custody Transfer (methods)
- Anycast / Multicast (updated mechanisms)
- Congestion / Flow Control (updated mechanisms)
- Security (update for BPSec)