Delay Tolerant Network (DTN) Numeric Node IDs

IETF96 DTN Working Group

July 18, 2016

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https://datatracker.ietf.org/doc/draft-templin-dtn-numid

DTN Endpoint IDs

- DTN endpoint IDs are URIs that have a "scheme name" followed by a "scheme-specific part" as:

    < scheme name > : < scheme-specific part, or "SSP" >

- Scheme name "dtn" includes alphanumeric SSPs up to 1023 octets in length – this can introduce excessive overhead for resource-constrained links
- Scheme name "ipn" includes a numeric node number (between 1 and $2^{64} - 1$) followed by a numeric service number (between 0 an $2^{64} - 1$) e.g., as: "ipn:1000.2000" (see RFC6260)
- RFC7116 delegates low-numbered "ipn" values to the Space Assigned Numbers Authority (SANA) (remaining "ipn" values are administered by IANA)
- SANA has begun sub-delegating "ipn" values to actual DTN nodes
    - **Hence, the "ipn" scheme is operational and can no longer be altered or deprecated**
    - **Early adopters (CCSDS) received low-numbered values that can be encoded in fewer bytes**

Numeric Endpoint IDs

- Suitable for resource-constrained links, since numeric fields can be expressed as shortened integer values instead of long alphanumeric strings

- Suitable for encoding in CBOR, JSON, etc.

- "ipn" is only one example of a DTN numeric node ID scheme, and is "already baked" with the SANA delegation

- **Do we need an alternate numeric endpoint ID scheme or schemes?**

Alternate Numeric Naming Scheme Questions

- Q1: Fixed vs Variable-length?
  - Fixed-length for fairness, or variable-length to allow efficient codings for early adopters?
- Q2: Random vs Consecutive assignments?
  - Delegate EIDs in pseudo-random fashion to ensure fairness, or first-come, first-served monotonically increasing values
- Q3: Maximum EID Length?
  - ipn specifies a maximum length of 64bits – should alternate schemes do the same?

Numeric Naming Scheme Questions (2)

- Q4: Unicast EIDs
  - Should the alternate scheme include a range of EIDs corresponding to singleton DTN nodes?
- Q5: Multicast EIDs
  - Should the alternate scheme include a range of EIDs corresponding to groups of DTN nodes?
- Q6: Private-use EIDs
  - Should the alternate scheme include a range of EIDs that can be administratively assigned within the local DTN even though the same values may already be in use in other DTNs?
  - If so, should the private-use EIDs be assigned from the low-numbered range to allow for efficient coding compression?

Numeric Naming Scheme Questions (3)

- Q7: Universal EIDs
  - Should the alternate scheme include a range of EIDs guaranteed to be unique on a universal basis?
- Q8: Block Allocations vs. Individual Allocations
  - Should an alternate scheme allow for "block" allocations where a customer can receive a block of consecutive EID values?

Other Questions

- One universal alternate numeric naming scheme, or many?
- Delegations managed by IANA or some other agency?
- Interactions with the DTN routing system?
- Addresses vs. Identifiers?
- Scalability?