Delay Tolerant Network (DTN) Numeric Node IDs

IETF96 DTN Working Group

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DTN Endpoint IDs

• DTN endpoint IDs are URIs that have a “scheme name” followed by a “scheme-specific part” as:
  \[ \text{< scheme name > : < scheme-specific part, or "SSP" >} \]

• 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 and \(2^{64} - 1\)) 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?