IPN URI Schema Update

https://datatracker.ietf.org/doc/draft-ietf-dtn-ipn-update/

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Substantive changes from last version

In this revision of the draft, we have:

- Removed the ‘rationale text’, and formulated the document as a specification
- Split the document into clear sections:
  - The updated IPN URI scheme
  - Encoding of IPN scheme URIs as BPv7 Endpoint Identifiers
- Addressed the received comments since IETF 115

The Updated IPN URI Scheme

All IPN scheme URIs are of the form:

`ipn:`*`authority-number.node-number.service-number`*

Where:

- *`authority-number`* is the numeric identifier [0..2^{32}) of the authority that allocated the subsequent *`node-number`*.
- *`node-number`* is a common number [0..2^{32}) allocated to ipn URI resources co-located on the same node.
- *`service-number`* is the numeric identifier [0.2^{64}] for a type of service.

The Default Numbering Authority

- To maintain backwards compatibility with existing practices and allocations, the value 0 is assigned to the “Default Numbering Authority”.
- When composing IPN scheme URI’s using the Default Numbering Authority, the leading 0 is omitted: `ipn:0.X.Y` ⇒ `ipn:X.Y`
- The existing IANA registry for *`node-number`* allocations is renamed and used for further allocations.
- *`node-number`* 0 is reserved for the “null” endpoint, as defined in RFC9171.
- *`node-number`* 1 is reserved for the “localnode” non-routeable identifier.
- *`node-numbers`* [2..2^{14}) are declared “Private Use”

Registered Numbering Authorities

- Organisations may now register themselves with IANA in order to independently allocate *`node-numbers`* in the range [0..2^{32}) according to their own policies, without danger of clashes with other numbering authorities.
- Organisations may request a range of *`authority-number`* identifiers, so that organisation hierarchy can be encoded.
    - Ranges are similar in concept a Classless Inter-Domain Routing (CIDR) assignment of IP addresses
    - Ranges must be a power of 2 in length.
    - Ranges must start with low-bits zero, to allow bit-masking.

CBOR-encoding IPN URI's for BPv7

To maintain compatibility with existing deployments, 2 encoding schemes are specified:

- Two-Element scheme
  - Identical on-the-wire representation to that specified in RFC9171.
  - Semantics updated to map representation to the updated IPN URI formulation.
- Three-Element scheme
  - Usually results in a more concise encoding when non-zero authority numbers are used.
  - Incompatible with existing deployments.

The encoding schemes can be easily distinguished when encountered.

Two-Element Encoding

Encode the URI as a two-element CBOR unsigned integer array:

- First element is the concatenation of the *`authority-number`* and the *`node-number`*, represented as a single unsigned 64-bit integer:

  ```
  (authority-number << 32) | node-number
  ```

- Second element is the *`service-number`*.

When using a *`node-number`* assigned by the Default Numbering Authority, e.g. `ipn:10.1`, the wire-representation is identical to the RFC9171 specification.

Three-Element Encoding

Encode the URI as a three-element CBOR unsigned integer array:

- First element is the *`authority-number`*.
- Second element is the *`node-number`*.
- Third element is the *`service-number`*.

This encoding usually results in more concise encoding when using IPN URI's allocated by non-Default Numbering Authorities, e.g. `ipn:2.3.4`

This encoding is incompatible with existing deployments.

Feedback received on the -01 update

We are pleased to have received lots of constructive feedback from the working group, and will address the following points as quickly as possible:

- Incorrect references and typos 😉
- Rework Section 4.2 concerning Node IDs and EIDs.
- Section 8.1: `authority-number` ranges must have zero low-bits, not start on power of two.
- Reserve an `authority-number` range for “future use”, as is good practice.
- Align IANA registry content with the latest prior to publication.

Discussion points raised by update-01

The following discussion points feel short on rough consensus:

1. `authority-number` allocation policy
    a. Currently specified as “First-come, First-served” for identifiers > 4095 - is this too low?
    b. Suggestion that all allocations be subject to “Expert Review” - is this too onerous?
    c. There is no “Experimentation” allocation, is this desired?
2. `service-number` allocation policy
    a. Currently specified as “Specification Required” for identifiers < 4096 - is this too low?
    b. Should “Private Use” service-numbers be pushed into the ‘unattractive to encode’ range, or can we be smarter here?
3. There is no formal terminology for the pair (`authority-number`, `node-number`)
    a. This pair is the unique identifier of a ‘node’, but given the number of node-ish terms, e.g. `node-number`, “Node-ID”, do we really need more terms? Or do we lose clarity of specification?

Last Call?

If we can address the outstanding review comments promptly, does the Working Group consider this document ready for Last Call?