Updates of ALTO CDNI FCI

draft-ietf-alto-cdni-request-routing-alto-06

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Overview of CDNI FCI -06

- Major Updates:
  - Changed naming, for "cdni-fci-map" and "altonetworkmap"
  - Updated CDNI Capabilities Property Map using the latest unified properties specification (-08)
  - Improved the wording
  - Revised protocol specification and examples
    - Corrected examples of CDNI FCI updates using the JSON merge patch
    - Clarified protocol error handling
Remaining Issues and Solutions

● Issue 1: CDNI FCI is not a key-value store format
  ○ Solution: keep the message schema but rename CDNI FCI Map service to CDNI FCI service

Map (Key-Value Store):

```json
{
  "PID1": {
    "ipv4": [ "192.0.1.0/24", ... ]
  },
  ...
}
```

Table:

```
[{
  "pid-name": "PID1",
  "pid-value": { "ipv4": [ "192.0.1.0/24", ... ] }
},
  ...
]
```

● Issue 2: Current design allows query only by footprint or only by capability
  ○ WG has no strong opinion to allow joint footprint and capability query
  ○ Solution: Do not address it
  ○ People can propose another extension if necessary
Rename CDNI FCI Map as CDNI FCI Service

Still keep the request/response schema, but do not claim it is a map service.

"application/alto-cdnifcimap+json" -> "application/alto-cdnifci+json"

3. CDNI FCI Map

The ALTO protocol is based on an ALTO Information Service Framework which consists of several services, where all ALTO services are "provided through a common transport protocol, messaging structure and encoding, and transaction model" [RFC7285]. The ALTO protocol specification [RFC7285] defines several such services, e.g. the ALTO map service.

This document defines a new ALTO Map Service called "CDNI FCI Map Service" which conveys JSON objects of media type "application/alto-cdnifcimap+json". These JSON objects are used to transport BaseAdvertisementObject objects defined in [RFC8008]; this document specifies how to transport such BaseAdvertisementObject objects via the ALTO protocol with the ALTO "CDNI FCI Map Service". Given that the "CDNI FCI Map Service" is very similar in structure to the two already defined map services (network maps and cost maps), the specification of CDNI FCI Map below uses the same specification structure for Cost Map specification in Section 11.2.3 of [RFC7285] when specifying cost maps.

3. CDNI FCI Service

The ALTO protocol is based on an ALTO Information Service Framework which consists of several services, where all ALTO services are "provided through a common transport protocol, messaging structure and encoding, and transaction model" [RFC7285]. The ALTO protocol specification [RFC7285] defines several such services, e.g., the ALTO map service.

This document defines a new ALTO Service called "CDNI FCI Service" which conveys JSON objects of media type "application/alto-cdnifci+json". These JSON objects are used to transport BaseAdvertisementObject objects defined in [RFC8008]; this document specifies how to transport such BaseAdvertisementObject objects via the ALTO protocol with the ALTO "CDNI FCI Service". Similar to other ALTO services, this document defines the ALTO information resource for the "CDNI FCI Service" as follows.
Rename "altonetworkmap" as "altopid"

- Define a new footprint type "altopid" so that the ALTO server can use PIDs in an ALTO network map as footprints.
- If "altopid" is used, the CDNI FCI service MUST use one and only one dependent network map resource.
Update: IRD of CDNI FCI Using Property Map

- Define new entity domain types "countrycode" and "asn".
- Define a new property type "cdni-fci-capabilities".
- Use resource-specific entity properties.
Update: Query of CDNI FCI Using Property Map

```json
{
  "entities": [
    {
      "ipv4": "192.0.2.0/24",
      "ipv6": "2001:db8::/32"
    },
    {
      "properties": [
        "cdni-fci-capabilities",
        "pid"
      ]
    }
  ],
  "properties": [
    "my-default-cdnifci.cdni-fci-capabilities",
    "my-default-networkmap.pid"
  ]
}

{
  "property-map": {
    "meta": {
      "dependent-vtags": [
        {
          "resource-id": "my-default-cdnifci-map",
          "tag": "7915dc0290c2705481c491a2b4ffbec482b3cf62",
          "resource-id": "my-default-networkmap",
          "tag": "7915dc0290c2705481c491a2b4ffbec482b3cf63"
        }
      ],
      "ipv4": "192.0.2.0/24": {
        "cdni-fci-capabilities": {
          "capability-type": "FCI.DeliveryProtocol",
          "capability-value": {
            "delivery-protocols": ["http/1.1"]
          }
        },
        "pid": "pid1"
      },
      "ipv6": "2001:db8::/32": {
        "cdni-fci-capabilities": {
          "capability-type": "FCI.DeliveryProtocol",
          "capability-value": {
            "delivery-protocols": ["http/1.1"]
          }
        },
        "pid": "pid3"
      }
    }
  }
}
```
Update: Example of CDNI FCI Incremental Updates

Note that the JSON merge patch always includes the whole CDNI FCI resource. So it is **not recommended** to use the JSON merge patch to update CDNI FCI.
Clarification: Request Process of Filtered CDNI FCI

Based on the protocol errors defined in Sec 5.6, undefined "capability-type" or "capability-value" is invalid in the request, so the ALTO server MUST return an "E_INVALID_FIELD_VALUE" error in this case.

For a valid CDNI capability, if the ALTO server does not define any footprints for it, it MUST be omitted from the response.
Discussion

- Shall a CDNI FCI service announce its supported CDNI capability-types and capability-values in its IRD entry?
  - RFC 8006 (Sec 7.3) and RFC 8008 (Sec 5.3) only defines "http/1.1" and "https/1.1" as the initial capability-values for capability-type "FCI.DeliveryProtocol"
  - A new protocol type "http/2" may be registered, but an old ALTO server may not be upgraded to support it
  - When an ALTO client request this new registered capability-value, according to Sec 5.6, the ALTO server will consider it is undefined and return an "E_INVALID_FIELD_VALUE" error, which will surprise the client
  - Announcing supported capability-types and capability-values can prevent the client from sending wasted requests

"CDNI Metadata Protocol Types" Registry (Sec 7.3 of RFC 8006)
Next Steps

- Call for reviews from WG
- Go to WGLC Request?
Backup