Content Delivery Network Interconnection (CDNI) Request Routing: CDNI Footprint and Capabilities Advertisement using ALTO

draft-alto-cdni-request-routing-alto-01

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Summary of Changes

- Renamed CDNI FCI ALTO Service to CDNI FCI Map
- Introduced a precise definition for the CDNI FCI Map (Section 3)
- Refined Filter on Capabilities
  - Put in a new Section Filtered CDNI FCI Map Using Capabilities (Section 5)
- Refined Filter on Footprints
  - Put in a new Section Query Footprint Properties Using ALTO Unified Property Map Service (Section 6)
- Made extensive refinements to examples (Section 3.7/4.2/5.7/6.2)
  - IRD Example
  - Basic Example
  - Move "FCI Using ALTO Network Map Example" to "CDNI FCI Map Using ALTO Network Map" (Section 4)
  - Add Incremental Updates Examples
    - (Section 3.7.3/4.2.4/5.7.3/6.2.4)
- Add IANA considerations (Section 7)
A Precise Definition of CDNI FCI Map

- Added a schema for CDNI FCI Map response (Section 3.6)
- Two notes
  - The definition structure is the same as other previously defined maps
  - Made clear that CDNIFCIMapData definition is defined by CDNI not ALTO. Hence, it is not normative.
Filtered CDNI FCI Map Using Capabilities

-Clarify the semantic of Filtered CDNI FCI Map: Given some capabilities, which footprints have at least one of these capabilities?

```json
object {
    JSONString capability-type;
    JSONValue capability-value;
} CDNIFCICapability;

object {
    CDNIFCICapability cdni-fci-capabilities<0..*>;
} ReqFilteredCDNIFCIMap;

POST /cdnifcmmap/filtered HTTP/1.1
HOST: alto.example.com
Content-Type: application/cdnifilter+json
Accept: application/cdni

{ "cdni-fci-capabilities": [
    "capability-type": "FCI.DeliveryProtocol",
    "capability-value": {
        "delivery-protocols": [
            "http/1.1"
        ]
    },
    "footprints": [
        <Footprint objects>
    ]
]}
```

```json
{ "capability-type": "FCI.DeliveryProtocol",
  "capability-value": {
    "delivery-protocols": [
      "https/1.1",
      "http/1.1"
    ]
  },
  "footprints": [
    <Footprint objects>
  ]
}
```

```json
{ "capability-type": "FCI.AcquisitionProtocol",
  "capability-value": {
    "acquisition-protocols": [
      "https/1.1"
    ]
  },
  "footprints": [
    <Footprint objects>
  ]
}
```
Filtered CDNI FCI Map Using Capabilities

POST /cdnifcimap/filtered HTTP/1.1
HOST: alto.example.com
Content-Type: application/cdnifilter+json
Accept: application/cdni

```
{
    "cdni-fci-capabilities": [
        {
            "capability-type": "FCI.DeliveryProtocol",
            "capability-value": {
                "delivery-protocols": [
                    "http/1.1"
                ]
            }
        }
    ]
}
```

Error handling

- **E_SYNTAX**
- **E_MISSING_FIELD**
  - Only have "capability-type"
  - Only have "capability-value"
  - The value of "capability-value" is null
- **E_INVALID_FIELD_TYPE**
- **E_INVALID_FIELD_VALUE**
  - The value of "capability-value" is inconsistent with "capability-type"

Special Case 1 (not error): If "cdni-fci-capabilities" is null or the value of it has no element, the ALTO server will return the related full CDNI FCI map.

Special Case 2 (not error): If "capability-type" is not defined, the ALTO server MUST ignore this capability. If it is the only capability in the list, the ALTO server MUST return nothing.
Integrating FCI w/ ALTO Network Map

- Introduce a new footprint type "altonetworkmap"
- Update the encoding of "altonetworkmap" footprint

```json
{
    "capability-type": "FCI.DeliveryProtocol",
    "capability-value": [
        "https1.1"
    ],
    "footprints": [
        {
            "footprint-type": "altonetworkmap",
            "footprint-value": [
                "http://alto.example.com/fcifootprint001",
                "germany",
                "south-france"
            ]
        }
    ],
    "cdnifci-map": {
        "capabilities": [
            {
                "capability-type": "FCI.DeliveryProtocol",
                "capability-value": [
                    "http/1.1"
                ],
                "footprints": [
                    {
                        "footprint-type": "altonetworkmap",
                        "footprint-value": [
                            "germany",
                            "south-france"
                        ]
                    }
                ]
            },
            {
                "capability-type": "FCI.DeliveryProtocol",
                "capability-value": [
                    "https/1.1"
                ],
                "footprints": [
                    {
                        "footprint-type": "altonetworkmap",
                        "footprint-value": [
                            "germany",
                            "south-france"
                        ]
                    }
                ]
            }
        ]
    }
}
```
Added IANA Considerations

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- CDNI Metadata Footprint Type Registry
  - altonetworkmap

- ALTO Entity Domain Registry
  - asn
  - countrycode

- ALTO CDNI FCI Property Type Registry
  - cdni-fci-capabilities
Clarification Items

• Media type of CDNI FCI map and filtered CDNI FCI map
  – Current: application/cdni
  – To be correct, we plan change to application/alto-cdni-fci-map+json
  – A generic problem: import embedding (current approach) or modular embedding (need new approaches such as multipart, which is tabled for now)

• The data component's name of CDNI FCI Map and Filtered CDNI FCI Map
  – Currently: cdnifci-map
  – Proposed Change: cdni-fci-map
  – Consist with network-map/cost-map/endpoint-cost-map
Next Steps

• More reviews will be appreciated
• Go to the WGLC
• Rename "cdni-fcimap" → "cdni-fci-map"

Version 00

```
"cdni-fcimap": {
  "capabilities": [{
    "capability-type": "FCI.DeliveryProtocol",
    "capability-value": {
      "delivery-protocols": ["http/1.1"]
    }
  },
  "footprints": [<Footprint objects>]
}
```

Version 01

```
"cdni-fci-map": {
  "capabilities": [{
    "capability-type": "FCI.DeliveryProtocol",
    "capability-value": {
      "delivery-protocols": ["http/1.1"]
    }
  },
  "footprints": [<Footprint objects>]
}
```
Context

- CDNI WG has defined [RFC8008], which has defined precisely the semantics of Footprint & Capability advertisement Interface (FCI) and provided guidelines on the FCI protocol, but the exact protocol is explicitly outside the scope [RFC8008]

- ALTO charter item: define an FCI protocol based on ALTO
  - Consider FCI as a new ALTO service
  - Specification of transport of FCI JSON objects using ALTO
  - Investigate possibility to take advantage of both the ALTO base protocol [RFC 7285] and additional capabilities such as ALTO incremental updates (draft-ietf-alto-incr-update-sse-07)
FCI Examples

```
{
    "capabilities": {
        "capability-type": "FCI.RedirectMode",
        "capability-value": {
            "redirection-modes": [
                "DNS-I",
                "HTTP-I"
            ]
        }
    },
    "footprints": [
        <Footprint objects>
    ]
}
```

```
{
    "capabilities": {
        "capability-type": "FCI.DeliveryProtocol",
        "capability-value": {
            "delivery-protocols": [
                "http/1.1"
            ],
            "footprints": [
                <Footprint objects>
            ]
        }
    }
}
```

Example Footprint object describing a footprint covering the IP address ranges 192.0.2.0/24 and 198.51.100.0/24:

```
{
    "footprint-type": "ipv4cidr",
    "footprint-value": ["192.0.2.0/24", "198.51.100.0/24"]
}
```
Query Footprint Properties using ALTO Unified Property Service

- The structure of this section is the same as we proposed in the last interim

- Error handling is the same as unified property map service
Revised Examples in **Sections (3.7/4.2/5.7/6.2)**

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