

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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IETF 100 Interim
Dec 18, 2017

Overview

- Proposed changes to the draft:
 - Rename CDNI FCI ALTO Service to CDNI FCI Map Service
 - Use a JSON Patch example for Incremental FCI Update Example
 - Use examples in Section 5.2 and 5.3 of draft-ma-cdni-capabilities-09 for FCI Using ALTO Network Map Example
 - Filter on Capabilities
 - Filter on Footprints

Rename CDNI FCI ALTO Service

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Use a JSON Patch Example

```
POST /updates/fci HTTP/1.1
Host: fcialtoupdate.example.com
Accept: text/event-stream,application/alto-error+json
Content-Type: application/alto-updatestreamparams+json
Content-Length: ###
{ "add": {
  "my-fci-stream": {
    "resource-id": "my-fci-map"
  }
}
```

```
HTTP/1.1 200 OK
Connection: keep-alive
Content-Type: text/event-stream
event: application/alto-updatestreamcontrol+json
data: {"control-uri": "http://fcialtocu.example.com/updates/streams/3141592653589"}

event: application/cdni,my-fci-stream
data: { ... full cdni message ... }

event: application/merge-patch+json,my-fci-stream
data: { ... Merge patch update of cdni objects ... }

event: application/json-patch+json,my-fci-stream
data: { ... JSON patch update of cdni objects, e.g., footprints entries ... }
```

Use Examples in draft-ma-09

```
GET /networkmap HTTP/1.1
Host: http://alto.example.com/fcifootprint001
Accept: application/alto-networkmap+json,application/alto-error+json
```

```
HTTP/1.1 200 OK
Content-Length: 319
Content-Type: application/alto-networkmap+json
```

```
{
  "meta" : {
    "vtag": [
      {"resource-id": "my-eu-netmap",
       "tag": "1266506139"}
    ]
  },
  "network-map" : {
    "south-france" : {
      "ipv4" : [ "192.0.2.0/24", "198.51.100.0/25" ]
    },
    "germany" : {
      "ipv4" : [ "192.0.3.0/24" ]
    }
  }
}
```

To reference an ALTO network map as an FCI footprint, set the footprint-type to "altonetworkmap", and set the first entry in the footprint-value to the URI of the ALTO server hosting the network map, followed by a list of PID names contained in the network map.

```
GET /fcimap HTTP/1.1
Host: alto.example.com
Accept: application/alto-fcimap+json,application/alto-error+json
```

```
HTTP/1.1 200 OK
Content-Length: 618
Content-Type: application/alto-fcimap+json
```

```
{
  "meta" : {
  },
  "fcimap" : {
    "capabilities" : [
      { "capability-type": "FCI.DeliveryProtocol",
        "capability-value": [
          "http1.1"
        ]
      },
      { "capability-type": "FCI.DeliveryProtocol",
        "capability-value": [
          "https1.1"
        ]
      },
      "footprints" : [
        { "footprint-type": "altonetworkmap",
          "footprint-value": [
            "http://alto.example.com/fcifootprint001",
            "germany",
            "south-france"
          ]
        }
      ]
    }
  }
}
```

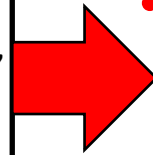
Review of CDNI FCI Map

```
{
```

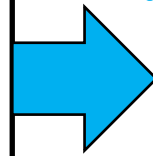
```
"meta" : {...}  
"cdni-fcimap": {  
  "capabilities": [  
    {
```

Capability Advertisement Object

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



- Capability Object
- capability-type
- capability-value



- Footprint Objects
- footprint-type
- footprint-value

Two types of queries:

Q1. Given a **Capability**, which **Footprints** have this capability?

Q2. Given a **Footprint**, which **Capabilities** cover it?

Q1 Design: Filter on Capabilities

- A filtered CDNI FCI map is still a CDNI FCI map.
- An ALTO client can supply parameters limiting the scope of the resulting CDNI FCI map.

IRD Example:

HTTP/1.1 200 OK

Content-Length: #####

Content-Type: application/alto-directory+json

```
{
  "meta" : {},
  "resources" : {
    "my-fci-map" : {
      "uri" : "http://fcialto.example.com/fcimap",
      "media-type" : "application/cdni",
      "accepts" : { "application/alto-cdnifilter+json" },
      "uses": ["my-fci-map" ]
    }
  },
  ...
}
```

Query Example:

POST /fcimap/filtered HTTP/1.1

HOST: alto.example.com

Content-Type: application/alto-cdnifilter+json

Accept: application/cdni, application/alto-error+json

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

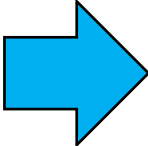
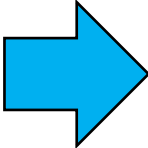
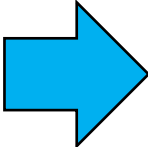
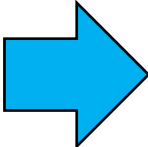
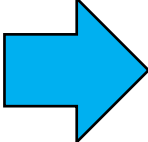
Proposed Addition

- Filtered on Capabilities
 - Filtered CDNI FCI Map
 - Accept Input Parameters
 - CDNI Capability Object
 - Uses
 - CDNI FCI Map
 - Response
 - The same format as the CDNI FCI Map

Q2 Design: Filter on Footprints

- **Design Decision:** using Unified Property Map, refer to [I-D.ietf-alto-unified-props-new].
- Therefore, we need to map a **Footprint** to **Entities in a domain**.

Mapping a **Footprint** as a set of **Entities** examples:

<pre>{ "footprint-type": "countrycode", "footprint-value": ["us"] }</pre>		"countrycode:us"
<pre>{ "footprint-type": "ipv4cidr", "footprint-value": ["192.0.2.0/24", "198.51.100.0/24"] }</pre>		"ipv4:192.0.2.0/24", "ipv4:198.51.100.0/24"
<pre>{ "footprint-type": "asn", "footprint-value": ["as64496"] }</pre>		"asn:as64496"
<pre>{ "footprint-type": "ipv6cidr", "footprint-value": ["2001:db8::/32"] }</pre>		"ipv6:2001:db8::/32"
<pre>{ "footprint-type": "altonetworkmap", "footprint-value": [URI, "german", "south-africa"] }</pre>		"pid:german", "pid:sourth-africa"

Q2 Design: Filter on Footprints

- **Design Decision:** registering one new Unified Property Map property type "**cdni-capabilities**" and the value of this property is an array of **Capabilities**.
- Each **Entity** has the "**cdni-capabilities**" property.

```
{"cdni-capabilities": [  
  {  
    "capability-type": FCI.DeliveryProtocol,  
    "capability-value": ...  
  },  
  {  
    "capability-type": FCI.AcquisitionProtocol,  
    "capability-value": ...  
  },  
  {  
    "capability-type": FCI.RedirectionMode,  
    "capability-value": ...  
  },  
  ...  
}]
```

Using Unified Property Map to Specify Capabilities

```
GET /propmap/full/cdnifci HTTP/1.1
HOST: alto.example.com
Accept: application/alto-
propmap+json,application/alto-error+json
```

```
HTTP/1.1 200 OK
Content-Length: ###
Content-Type: application/alto-propmap+json
```

```
{
  "property-map": {
    "meta": {
      "dependent-vtags": [
        {"resource-id": "my-default-fcimap",
         "tag":
          "7915dc0290c2705481c491a2b4ffbec482b3cf62"},
        {"resource-id": "my-default-networkmap",
         "tag":
          "7915dc0290c2705481c491a2b4ffbec482b3cf63"}
      ]
    }
  },
}
```

```
"countrycode:us": {
  "cdni-capabilities": [{"capability-type":,
                        "capability-value":}]
},
"ipv4:192.0.2.0/24": {
  "cdni-capabilities": [{"capability-type":,
                        "capability-value":}],
  "pid": "pid1"
},
"ipv4:198.51.100.0/24": {
  "cdni-capabilities": [{"capability-type":,
                        "capability-value":}],
  "pid": "pid2"
},
"ipv6:2001:db8::/32": {
  "cdni-capabilities": [{"capability-type":,
                        "capability-value":}],
  "pid": "pid3"
},
"asn:as64496": {
  "cdni-capabilities": [{"capability-type":,
                        "capability-value":}]
}
}
```

Filter on Footprints

Query Example:

```
POST
/propmap/lookup/cdnicapabilityobject
HTTP/1.1
HOST: alto.example.com
Content-Type: application/alto-
propmapparams+json
Accept: application/alto-
propmap+json,application/alto-error+json
Content-Length:
```

```
{
  "entities": [
    "ipv4:192.0.2.0/24",
    "ipv6:2001:db8::/32"
  ],
  "properties": [ "cdni-capabilities" ]
}
```

Response Example:

```
HTTP/1.1 200 OK
Content-Length: ###
Content-Type: application/alto-propmap+json
```

```
{
  "property-map": {
    "meta": {
      "dependent-vtags": [
        {"resource-id": "my-default-fcimap",
         "tag": "7915dc0290c2705481c491a2b4ffbec482b3cf62"}
      ]
    },
    "ipv4:192.0.2.0/24": {
      "cdni-capabilities": [{"capability-type":,
                           "capability-value":}]
    },
    "ipv6:2001:db8::/32": {
      "cdni-capabilities": [{"capability-type":,
                           "capability-value":}]
    }
  }
}
```

Proposed Addition

- Filter on Footprints
 - Using Unified Property Map
 - Representing Footprint Objects as Unified Property Map entities
 - ASN Domain
 - COUNTRYCODE Domain
 - Example
- IANA Considerations
 - Register two new entity domains
 - COUNTRYCODE
 - ASN (Autonomous system Number)
 - Register one new property type
 - "cdni-capabilities"

Next Steps

- Update the draft according to feedback

Q & A

Thanks

Backup slides

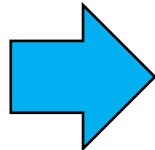
Q2 Design: Filter on Footprints

- Design Decision: using Unified Property Map, refer to
- Therefore, need to map a footprint to entities.
- Mapping from footprints to entities
- Two steps to transfer a CDN FCI Map into unified property map
 - Each **footprint object** is represented as a set of extensible property map **entities** in a domain.
 - Each **entity** is mapped into a list of **Capability objects preperities**.

"

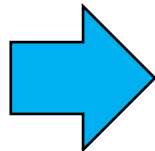
Representing a Footprint object as a set of entities examples:

```
{ "footprint-type": "countrycode",  
  "footprint-value": ["us"] }
```



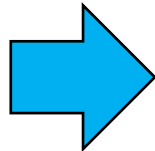
```
" countrycode:us "
```

```
{ "footprint-type": "ipv4cidr",  
  "footprint-value": ["192.0.2.0/24",  
                    "198.51.100.0/24"] }
```



```
" ipv4:192.0.2.0/24 ",  
" ipv4:198.51.100.0/24 "
```

```
{ "footprint-type": "asn",  
  "footprint-value": ["as64496"] }c
```



```
"asn:as64496"
```