

# 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 101  
March 19, 2018  
London

# 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

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```
object {  
  CDNIFCIMapData cdnifci-map;  
} InfoResourceCDNIFCIMap : ResponseEntityBase;
```

```
object {  
  CDNIFCIOObject capabilities<1..*>;  
} CDNIFCIMapData
```

```
object {  
  JSONString capability-type;  
  JSONValue capability-value;  
  CDNIFCIFootprint footprints<0..*>;  
} CDNIFCIOObject;
```

```
object {  
  JSONString footprint-type;  
  JSONString footprint-value<1..*>;  
} CDNIFCIFootprint
```

- 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?

```
object {  
  JSONString capability-type;  
  JSONValue capability-value;  
} CDNIFCICapability;  
  
object {  
  CDNIFCICapability cdni-fci-capabilities<0..*>;  
} ReqFilteredCDNIFCIMap;
```

```
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"  
        ]  
      }  
    }  
  ]  
}
```

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

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



```
{  
  "dependent-vtags" : [  
    {  
      "resource-id": "my-eu-netmap",  
      "tag": "3ee2cb7e8d63d9fab71b9b34cbf764436315542e"  
    }  
  ],  
  "cdnifci-map": {  
    "capabilities": [  
      { "capability-type": "FCI.DeliveryProtocol",  
        "capability-value": [  
          "http/1.1"  
        ]  
      },  
      { "capability-type": "FCI.DeliveryProtocol",  
        "capability-value": [  
          "values": [  
            "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

# Make CDNI FCI Map Structure Consist with Network/Cost Map

- 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.RedirectionMode",
      "capability-value": {
        "redirection-modes": [
          "DNS-I",
          "HTTP-I"
        ]
      }
    }
  ]
}

{
  "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

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- 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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