

CDNI Named Footprints Support

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Motivation

- New dCDN use cases emerged that require advanced footprint capabilities
 - Distinct access networks under common dCDN management
 - Differentiated CDN layers (edge and “last-mile” cache layers)
 - CDN requirements by geography (e.g. GDPR)
- These use cases call require
 - Footprints to be used in metadata inside and outside of FCI (e.g. in configuration, logging, cache management) in a consistent manner
 - Complex footprint definition logic
 - Support for dynamically changing footprints

Proposed Changes

- **Extend FCI to advertise referenceable named footprint objects**
 - **Footprints accessible via both common advertisement and individually**
 - **Hierarchical advertisement**
 - **Namespace support**
 - **Client-side caching support**
- **CDNI operation changes to include retrieval and periodic refreshment of footprint advertisements**
- **Add two new footprint types**
 - **“named” footprint type references the FCI advertisement**
 - **“expr” footprint uses CDNI MEL expressions to define a footprint**
- **Change complex footprint types to specify an optional datasource (“asn”, “country” and “subdivisioncode”)**

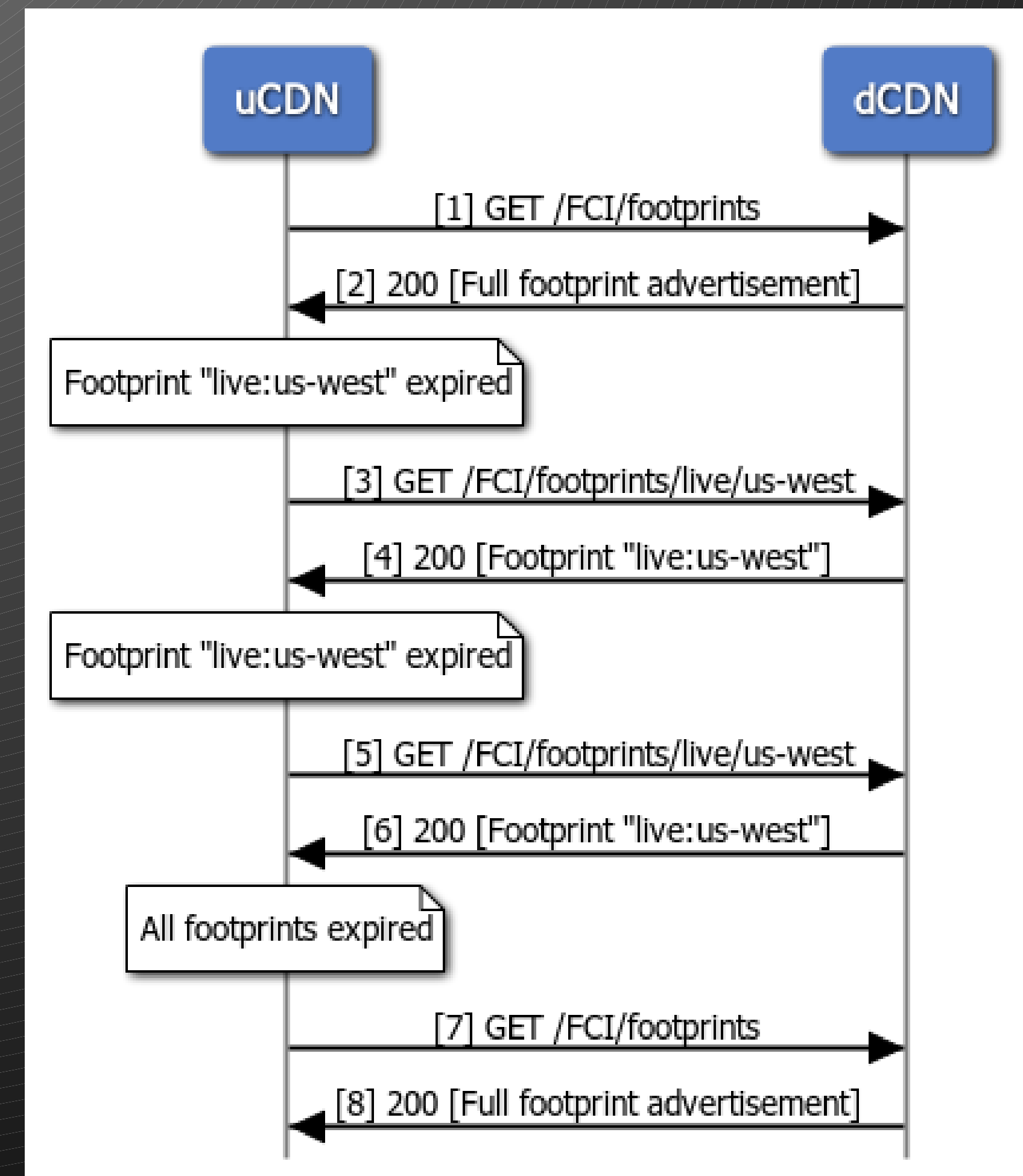
Footprints Advertisement

- GET /OC/FCI/footprints
- GET /OC/FCI/footprints/<namespace>/
- GET /OC/FCI/footprints/<namespace>/<footprint>

```
[
  {
    "footprint-namespace": "default",
    "footprint-type": "coverage",
    "footprints": [
      {
        "footprint-name": "default/us",
        "footprint-expires": "2023-02-09T17:32:28Z",
        "footprint-uri":
          "https://oc.dcdn.com/FCI/footprints/default/us",
        "footprint-def": {
          "footprint-type": "asn",
          "footprint-value": "1234:1"
        },
        "footprints": [
          {
            "footprint-name": "default:us/us-edge",
            "footprint-expires": "2023-02-09T17:32:28Z",
            "footprint-uri":
              "https://oc.dcdn.com/FCI/footprints/default/us/us-edge",
            "footprint-def": {
              "footprint-type": "expr",
              "footprint-value": "$sep.asn = 1234:1 and
                ( $sep.ipv4addr ipmatch "192.168.1/24"
                  or $sep.ipv6addr ipmatch "2001:db8:3333:4444/48" ) "
            }
          }
        ]
      },
      {
        "footprint-name": "default/brasil",
        "footprint-expires": "2023-02-09T17:32:28Z",
        "footprint-uri":
          "https://oc.dcdn.com/FCI/footprints/default/brasil",
        "footprint-def": {
          "footprint-type": "asn",
          "footprint-value": "1234:2"
        }
      }
    ]
  }
]
```

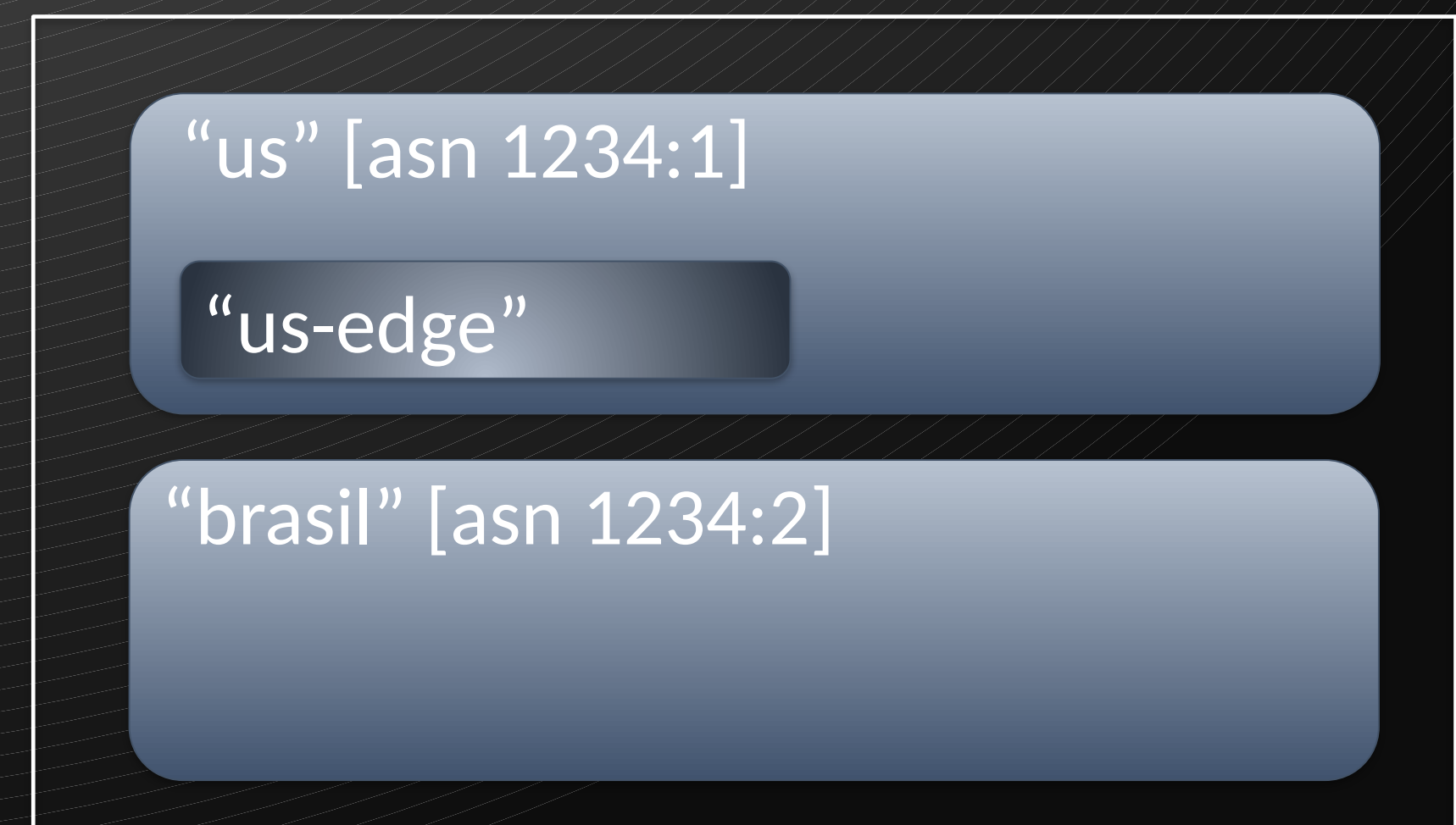

Footprint Definitions Caching

- Each footprint definition comes with expiration attribute
- uCDN bootstraps by retrieving and caching all footprint resource definitions
- uCDN refreshes footprints as they expire
- uCDN may skip refreshing footprint definitions that it's not using



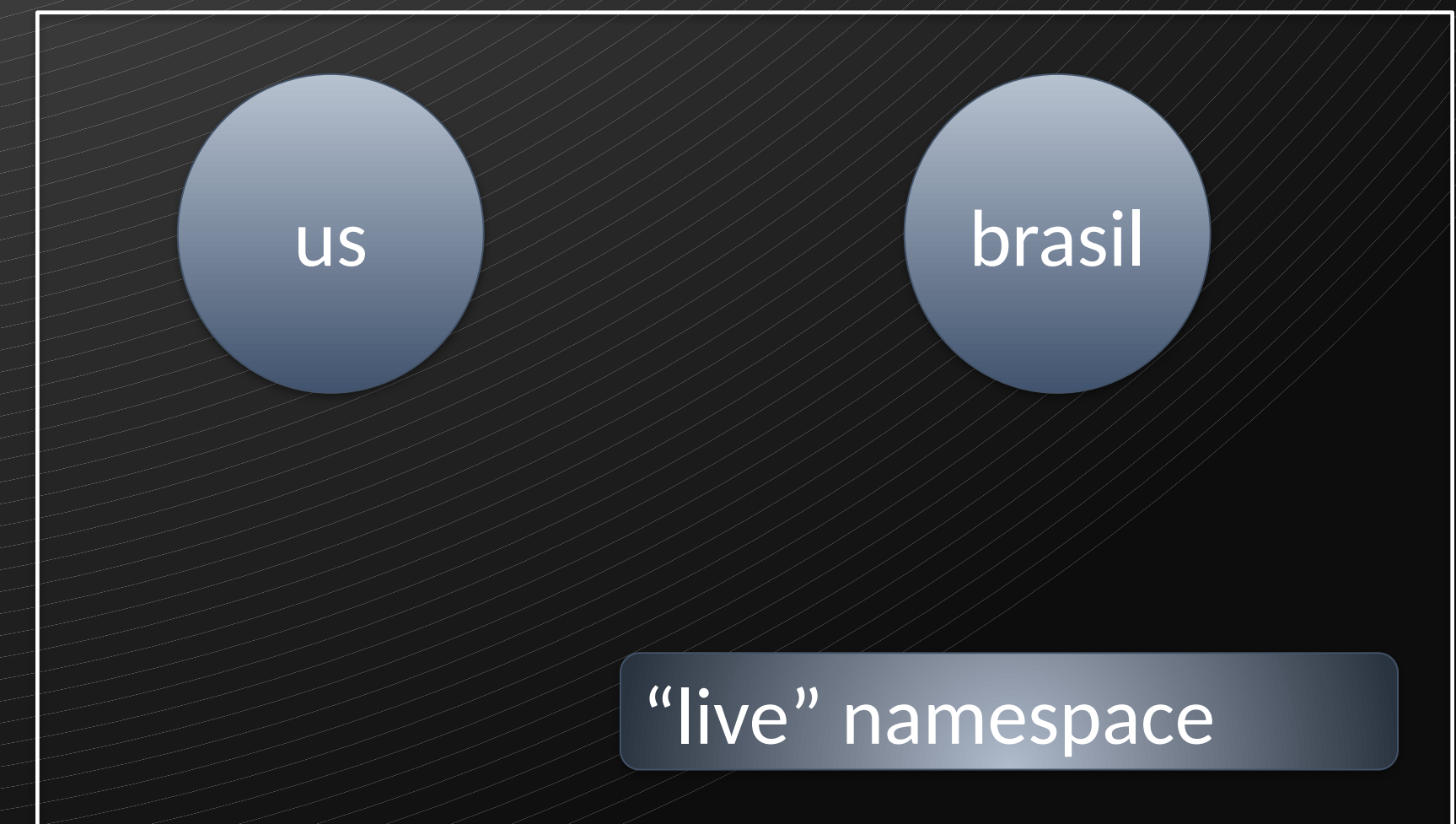
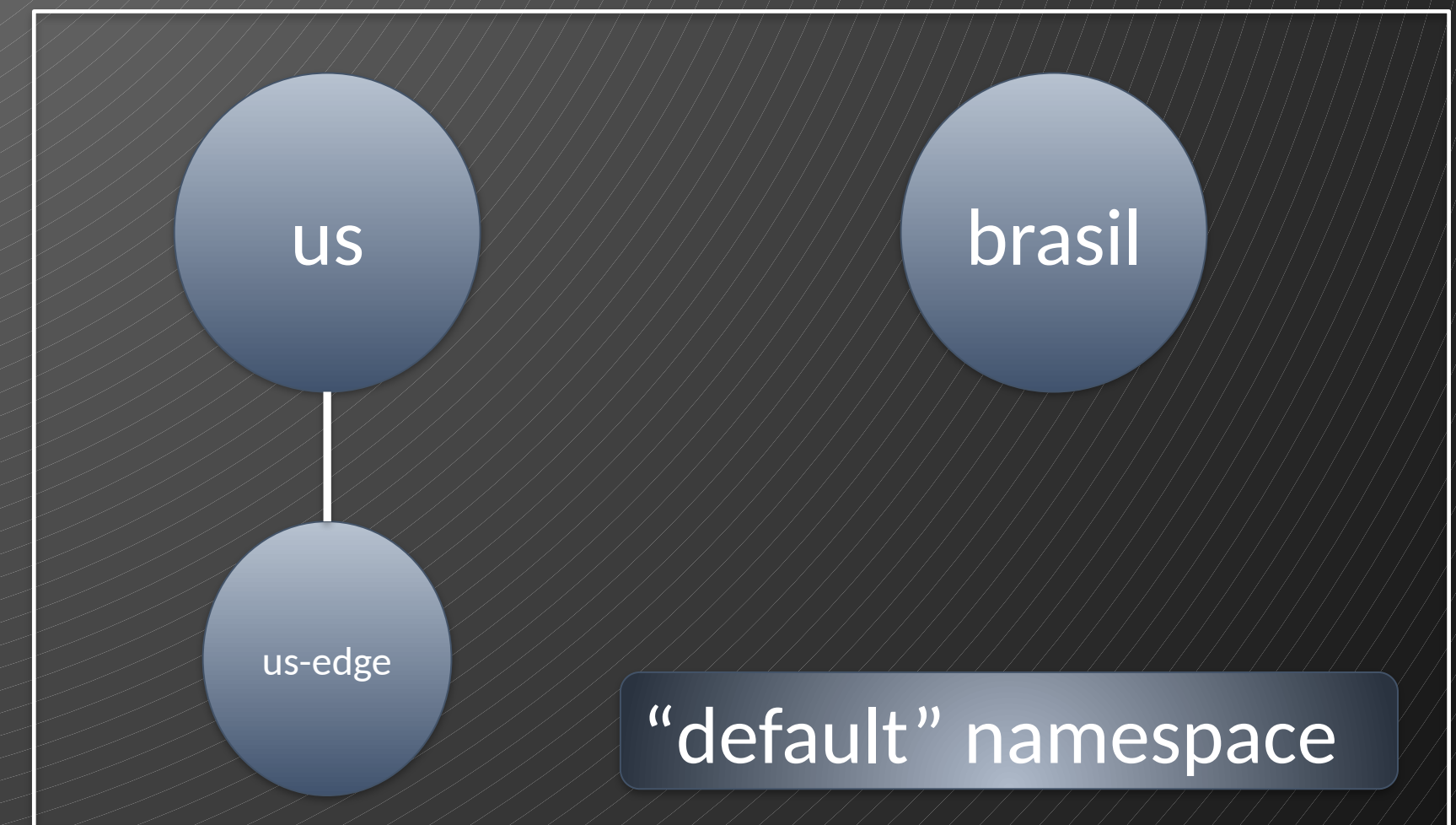
Hierarchy

- Explicit hierarchy defined in the advertisement to accommodate multiple footprint types
- Parent footprint includes all children footprints
- Unambiguous endpoint matching within one footprint tree (“namespace”)



Namespaces

- Namespaces allow dCDN to advertise different types of footprint break-down, to accommodate different types of traffic
 - dCDN has edge layer that handles VOD traffic only
- Endpoint resolves to footprint unambiguously within each namespace
- Offer support for “coverage” and “resource” footprint



"Expr" footprint type

○ Extending MEL to support "endpoint" variables

- ep.asn
- ep.ipv4addr
- ep.ipv6addr
- ep.country
- ep.subdivision

```
{
  "footprint-type": "expr",
  "footprint-value": "$ep.country == "us" and not
    $ep.ipv4addr ipmatch ('10.1.1/24' or
    '10.1.2.0/24')
}
```

```
{
  "footprint-type": "expr",
  "footprint-value": "$ep.asn = 1234 or
    ( $ep.ipv4addr ipmatch "192.168.1/24" ) or
    ( $ep.ipv6addr ipmatch "2001:db8:3333:4444/48" )
"
```

```
{
  "footprint-type": "expr",
  "footprint-value": "$ep.country == "us" and
    not $ep.subdivision=="us-ny"
}
```


THANKS!