Integrating Routing with Content Delivery Networks

Brian Field, Jan van Doorn, Jim Hall

Comcast

Current CDN Technology Issues

Current CDN Technology Issues:
- Vendor cache's aren't open
- Origins aren't considered part of CDN

Useful CDN features:
- Single/open/unified control plane protocol:
  – Caches and origins
- Caches network aware:
  – Child cache->parent cache
  – Parent cache->origin
- CDN dynamically self-configures based on asset "hotness"

CDN "hot" asset problem drives solution

- From CDN resource perspective, want to treat "foobar.com" differently from "foobar.com/olympics/"

- How do we solve this in the network space?
    - Aggs and more specifics
        - `24.0.0.0/16 -> 24.0.11.16`
        - `24.0.0.0/24 -> 24.0.1.4`

- Apply to content domain:
    - `foobar.com -> 24.0.3.17          !Cache's IP`
    - `foobar.com/olympics -> 24.0.141.15 !Cache's IP`
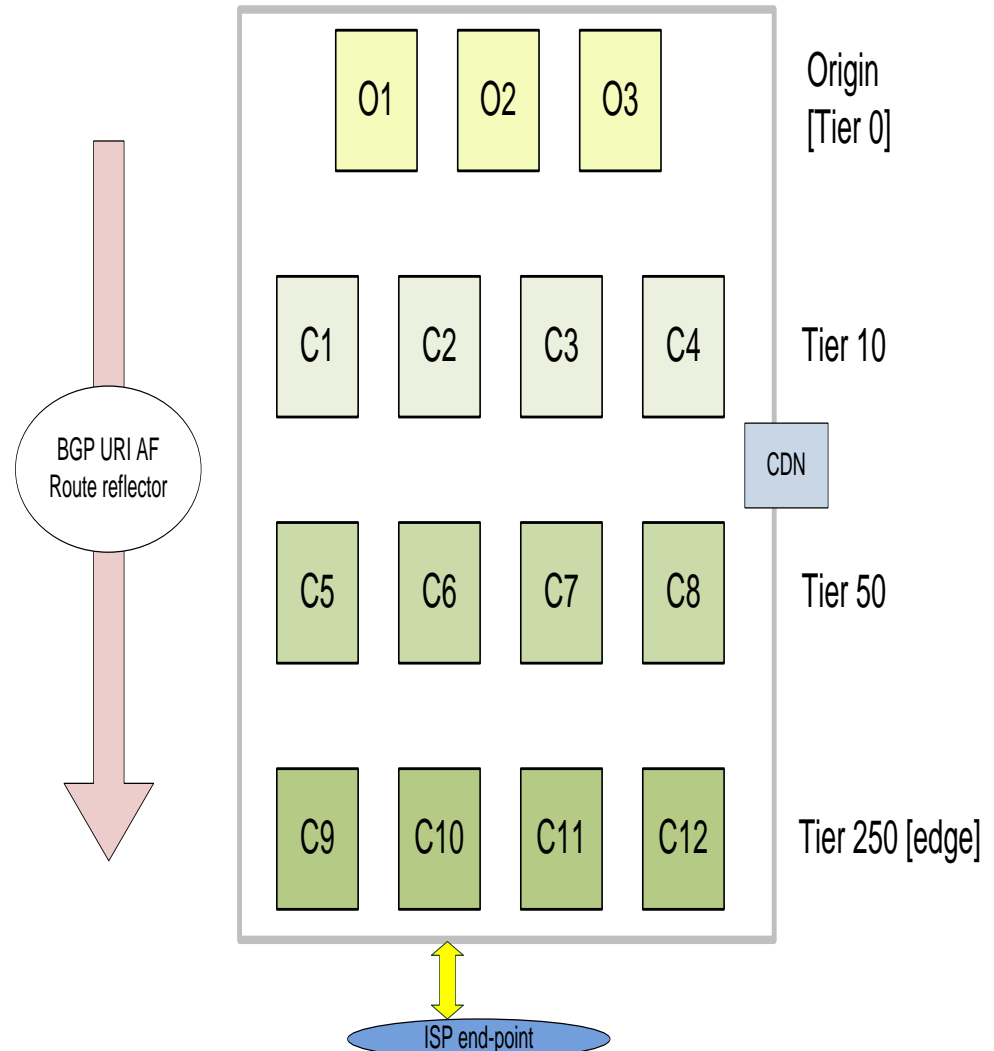
MP-BGP for Intra-CDN signaling
[BGP URI AF is control plane inside CDN]

URI AF NLRI:

- URI -> Cache/Origin NH IP
- "foobar.com" -> 24.0.32.11
- "foobar.com/olympics"->24.0.191.43
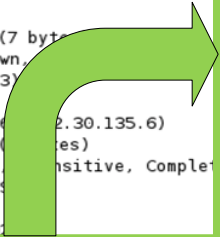
Operation:

- Origins announce URI->NH
- CDN (caches) process/select/propagate announcement down through CDN caches updating NH
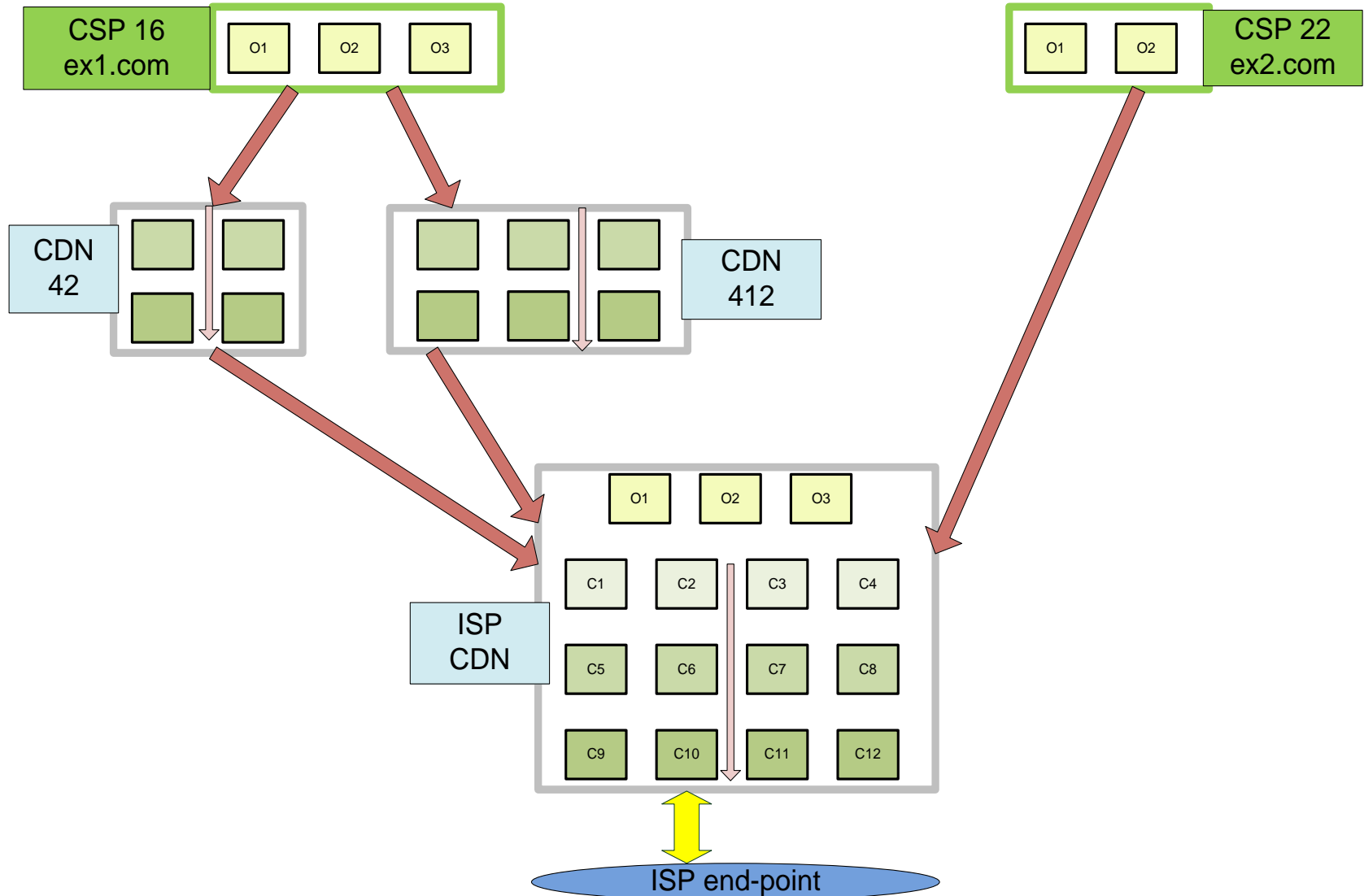- Caches perform standard prefix selection algorithm (on URIs)
- CDN is single ASN.

BGP URI AF
Route reflector

| O1 | O2 | O3 | Origin [Tier 0] |

| C1 | C2 | C3 | C4 | Tier 10 |

CDN

| C5 | C6 | C7 | C8 | Tier 50 |

| C9 | C10 | C11 | C12 | Tier 250 [edge] |

ISP end-point

BGP URI – working code on caches and origins

Inter-CDN signaling via eBGP URI

CDN VPNs ["multi-tenant"]
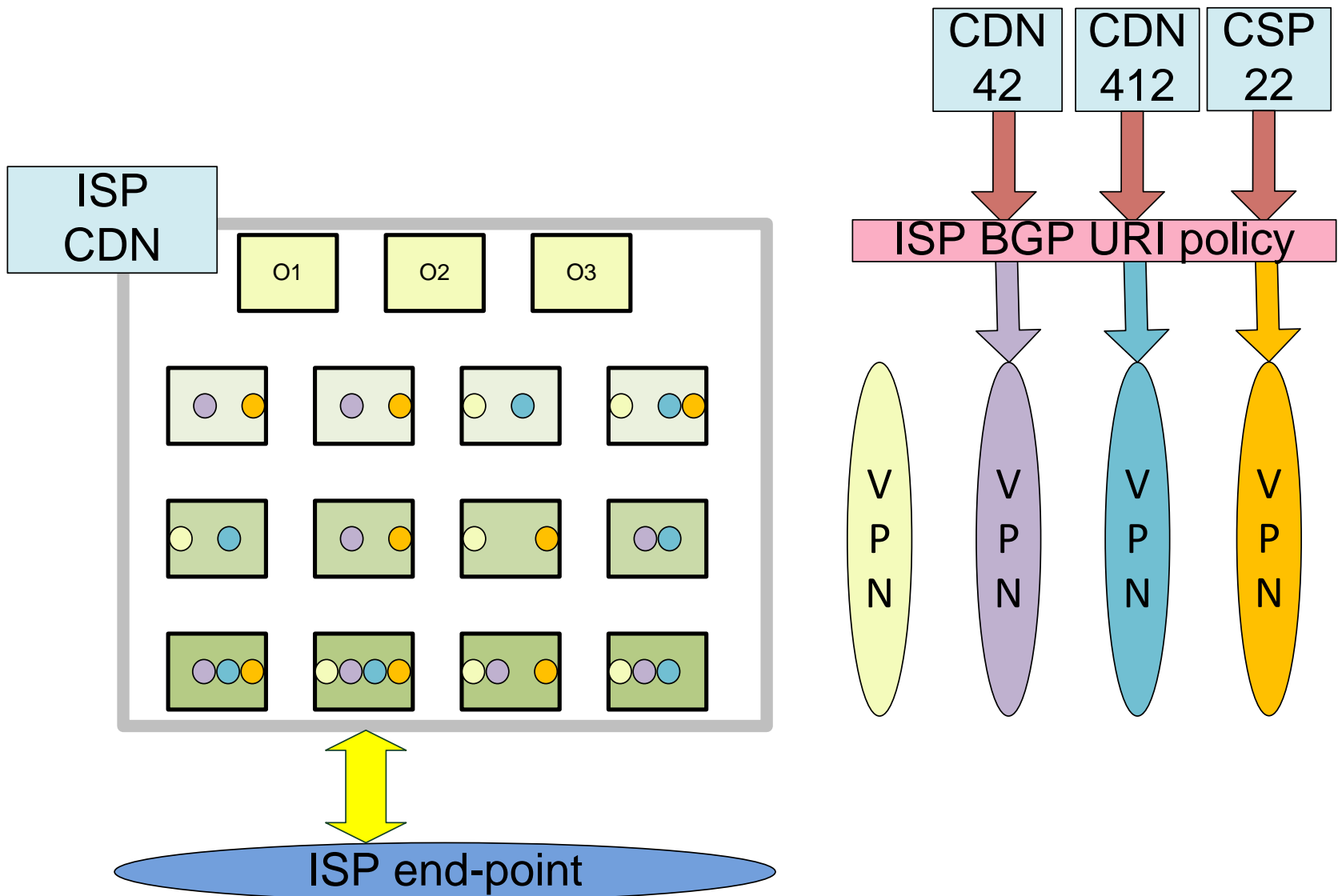
Summary

Proposal:

- iBGP URI:
  - Intra-CDN/Origin signaling

- eBGP URI:
  - Inter-CDN signaling

- Leverage all the existing BGP know-how and apply it to CDN
  - Skills, knowledge, policy logic, features, tools, capacity planning, code bases, etc.

Benefits:

- ISP manages how content flows into their infrastructure from upstream CDNs

- Enables ISP to build own CDN in open vendor eco-system

- Enable ISP and Content sources to partner and develop cost effective delivery system via CDN VPNs

Thanks!