

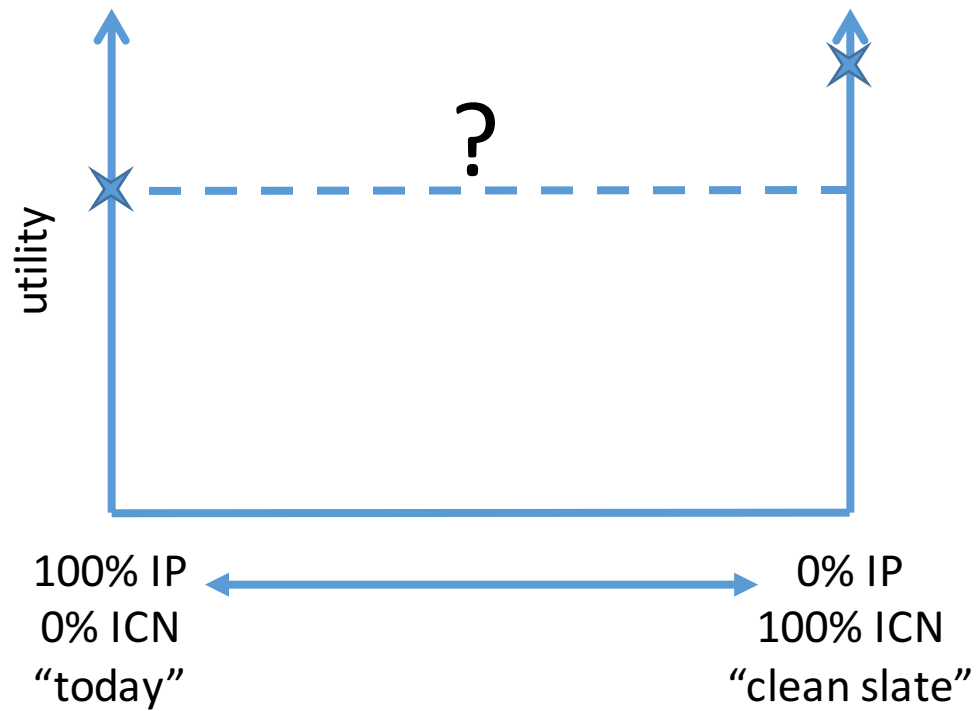
CDN to CCN Transition Approach

Greg White, Greg Rutz

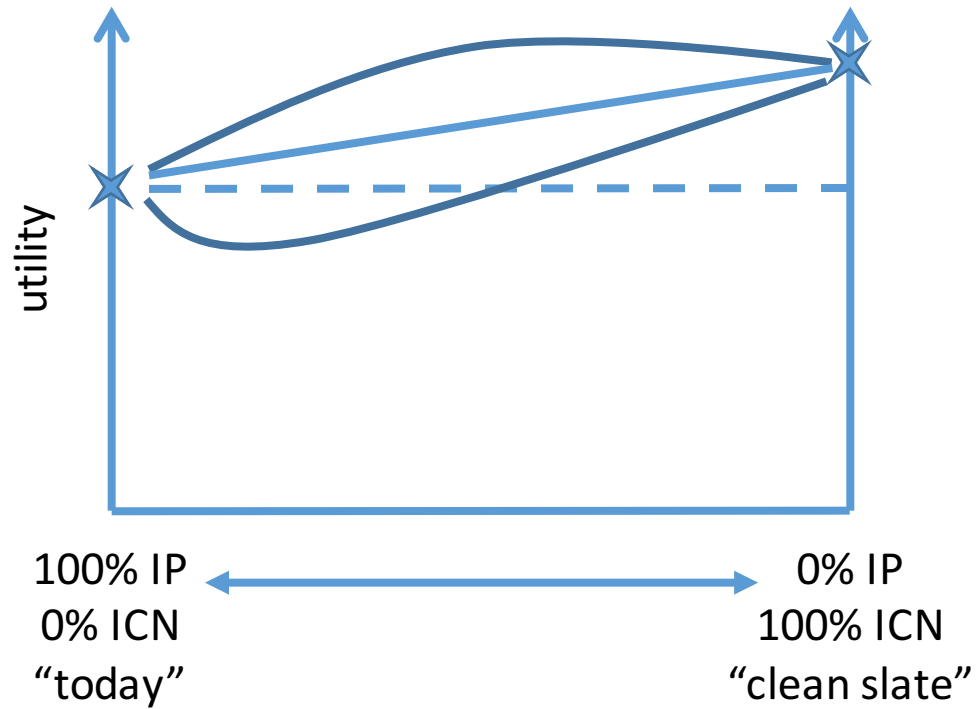
ICNRG

IETF95 – April 7, 2016

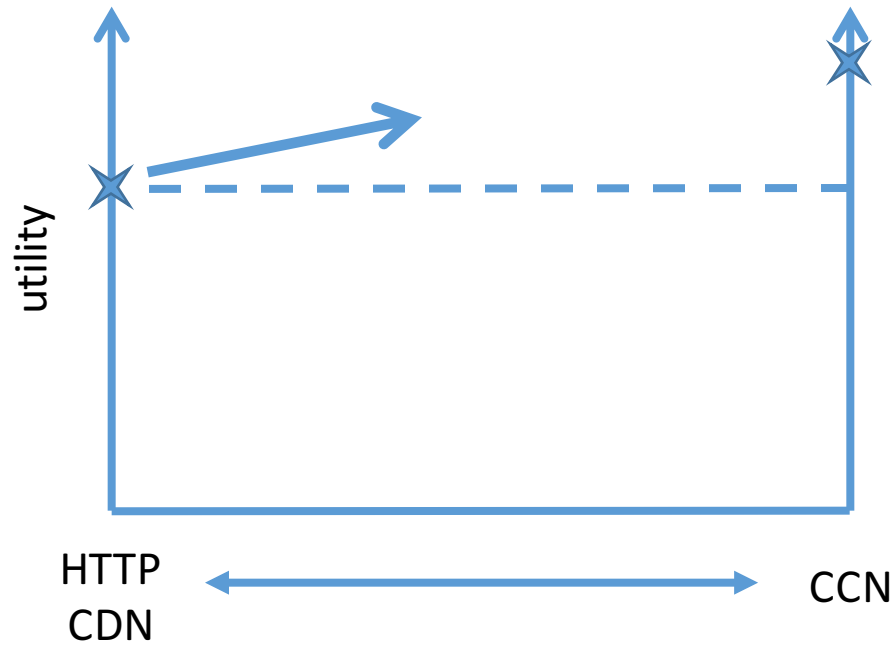
Network Utility



Network Utility

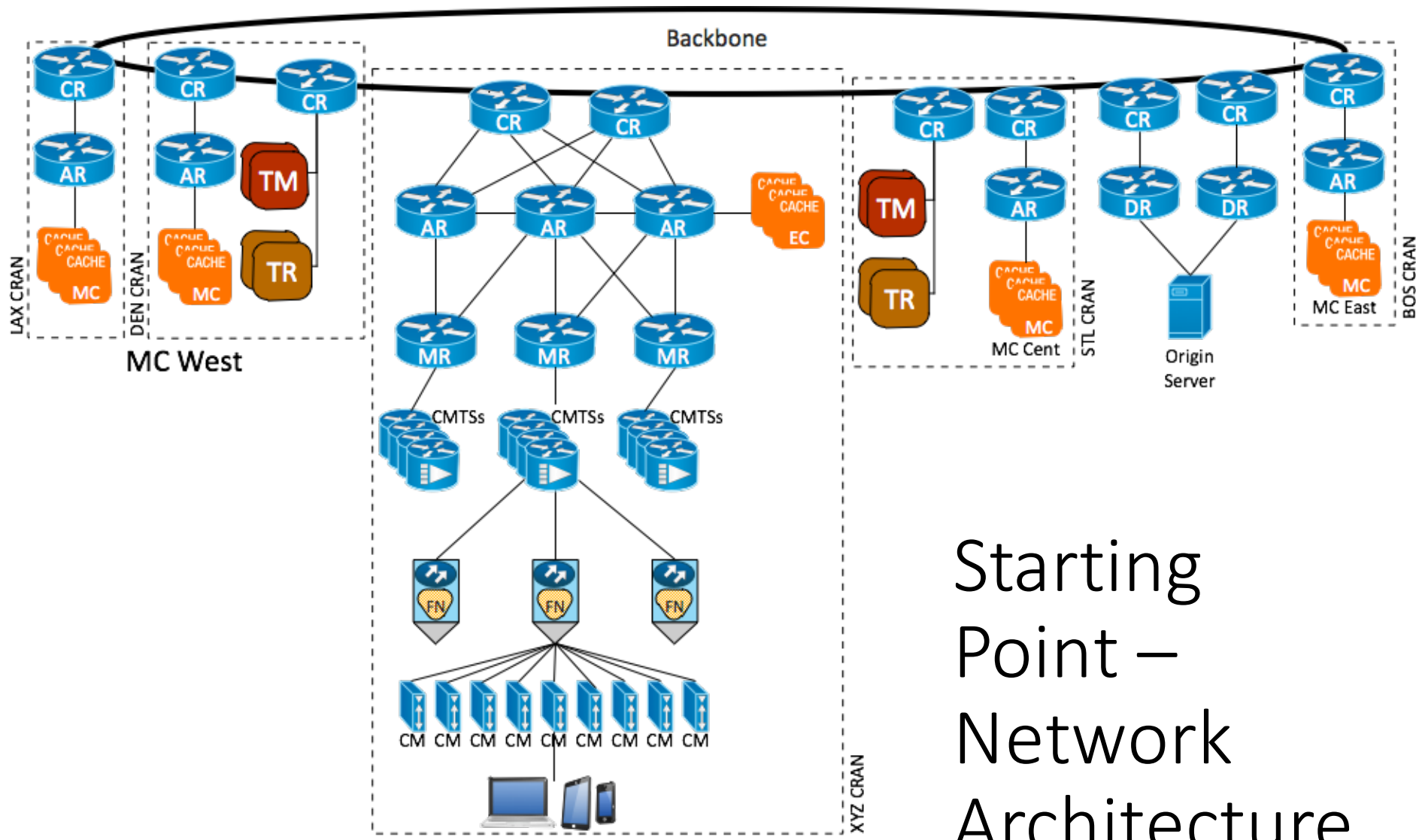


Network Utility



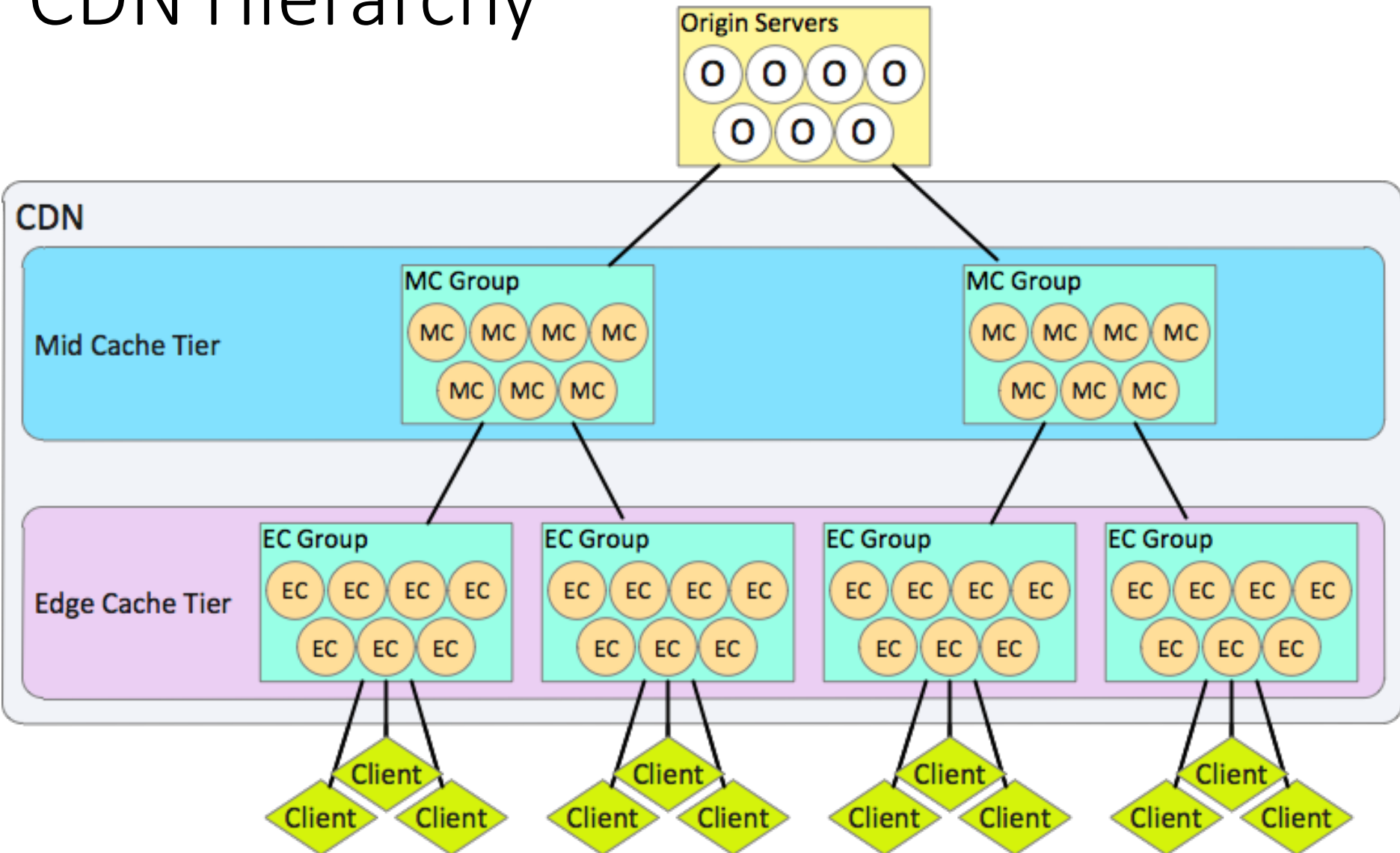
Goals

- Develop a transition approach
 - Based on a realistic HTTP CDN & IP access network
 - Incremental – accruing benefits along the way
 - Delay touching core network infrastructure – start with CDN equipment
- White paper available at:
 - <http://cblelabs.co/1S8knCB>



Starting Point – Network Architecture

CDN Hierarchy



Traffic Control

- <http://traffic-control-cdn.net>
- Traffic Router
 - Coverage Zone Map – IP subnet to cache-group mapping
 - DNS Routing - Edge Cache selected based on query hostname and client location
 - HTTP Routing - Edge Cache selected based on HTTP request URL and client IP
 - Consistent Hashing – within a region, all similar requests are directed to the same Edge Cache
- Traffic Monitor
 - Continuously monitors cache load and marks caches as “unavailable” for future requests if they become overloaded

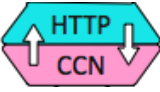
Pain points

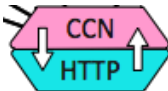
- Cache balance
 - Video assets are assigned to Edge Caches at the Asset level
 - e.g. the entire “Bridge of Spies” movie passes through a single Edge Cache in each region
 - Highly popular content can swamp a cache
 - Only solution is to monitor and react by taking the “hot” cache offline
 - Now Bridge of Spies is being cached in two ECs in the region
- Accurate mapping of client IP address to zone
 - Maintaining Coverage Zone Map is error prone

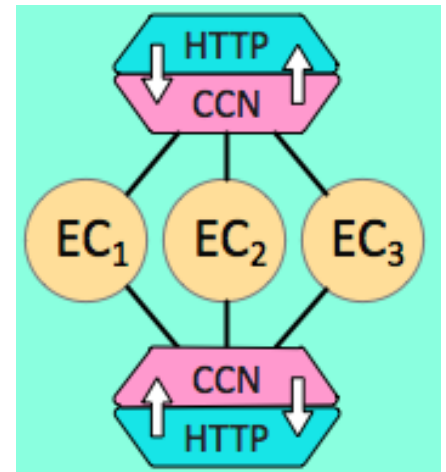
Islands and Bridges

- Target cache clusters
 - “Cache cluster” = set of caches attached to the same router
- Connect the clusters
 - CCN over IP tunneling

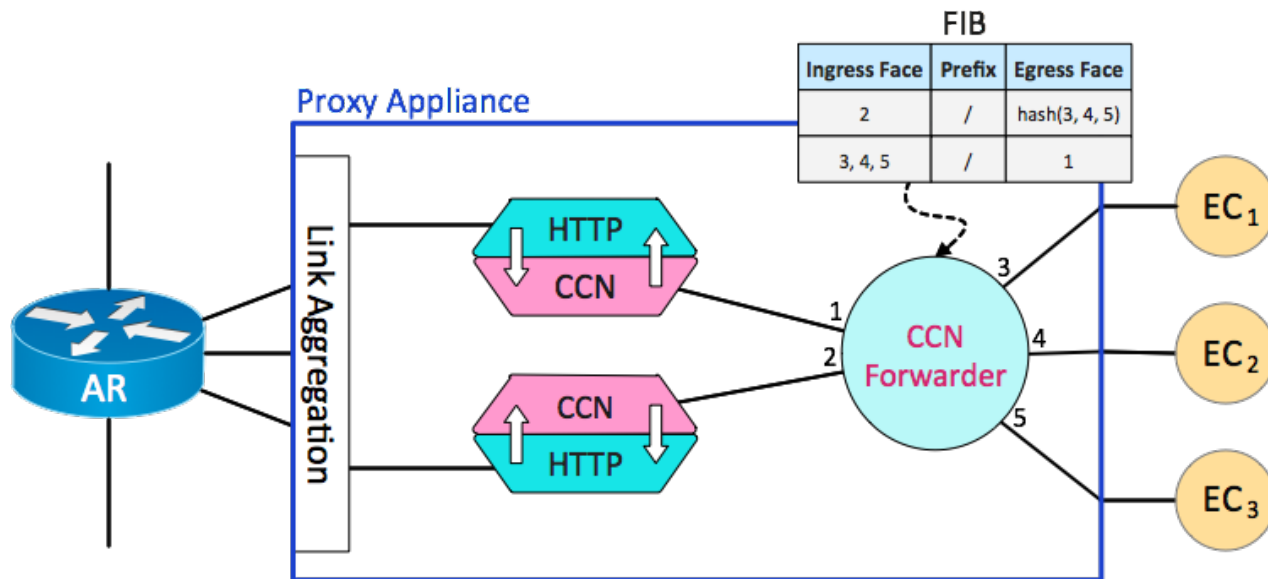
Transition technologies

- CCN->HTTP proxy 
 - CCN Producer & HTTP Client
 - Maps CO Name/Hash to HTTP Range Request
 - Two options discussed:
 1. Proxy generates manifest, disable CO signature verification
 2. Origin HTTP server provides a manifest with pre-calculated hash to range-request mapping

- HTTP->CCN proxy 
 - HTTP server & CCN consumer
 - Algorithmic mapping of request-uri to object name



Proxy Appliance



Specialized CCN forwarding

- Cache implementation
 - Not a CCN forwarder
 - No PIT or FIB
 - Upon receiving Interest:
 - In cache? -> return cached CO
 - else -> return Interest
 - Upon receiving Content Object:
 - Push into cache

- Proxy Appliance
 - Ingress-indexed FIB
 - Hash-based Strategy

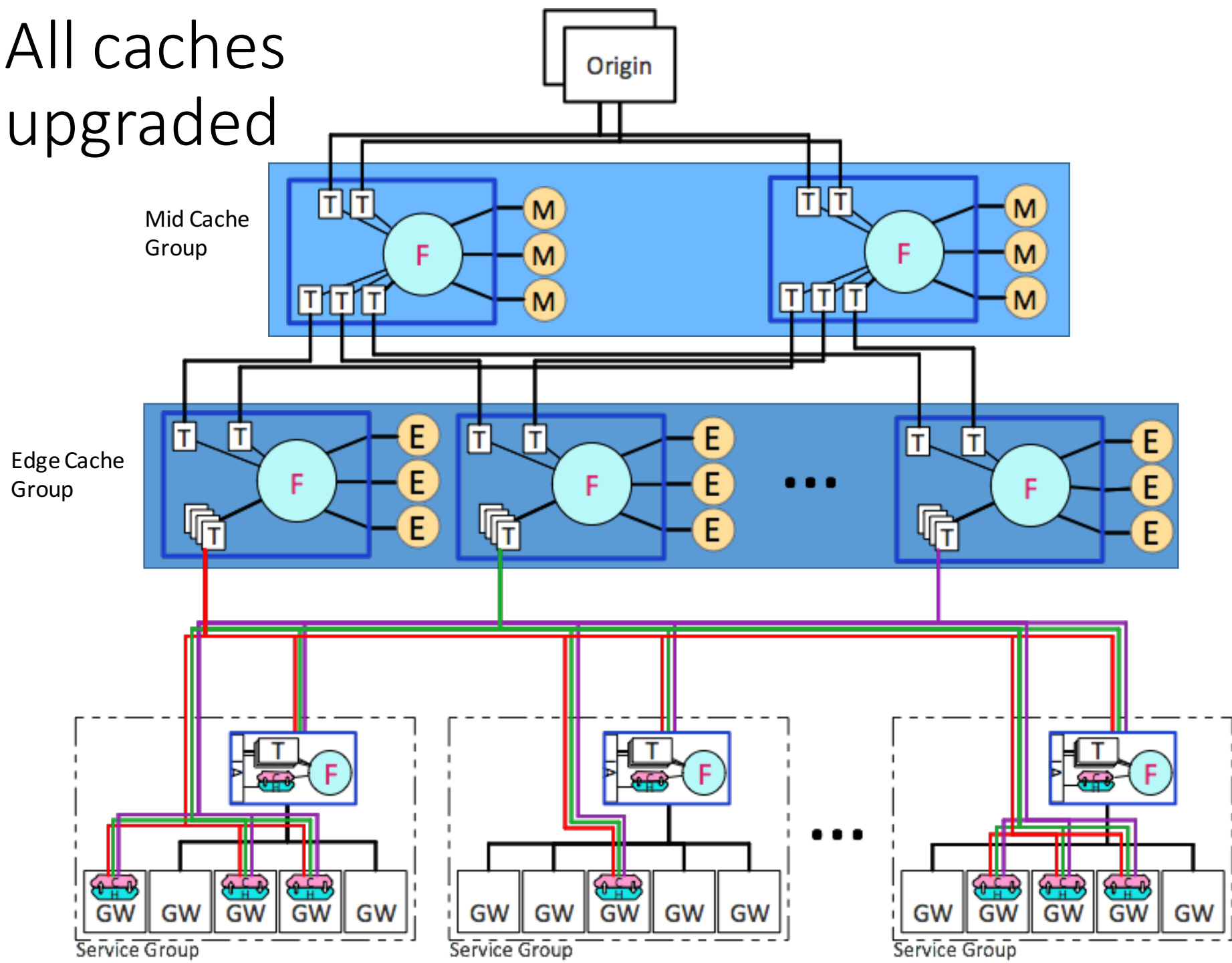
FIB

Ingress Face	Prefix	Egress Face
2	/	hash(3, 4, 5)
3, 4, 5	/	1

Building bridges

- Migrate HTTP->CCN closer to user
 - In home gateway
 - At CMTS
 - IP anycast?
- Proxy Appliances
 - Replace HTTP->CCN and/or CCN->HTTP proxy functions with CCN over IP tunnel faces.
- Eliminate CCN->HTTP proxies
 - Native support for CCN file server at origin

All caches upgraded



Biggest Open Issues

- Proxy Implementation and Scalability
- Cache control & semantics
- Tracking & Monetizing 3rd party traffic