



Making the Internet fast, reliable and secure

ICN – Akamai's Backbone

HKNOG 6.0

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Brief Akamai Overview

- Akamai is a highly distributed platform across 130+ countries
- Server clusters on this platform are 'islands'
 - Built for a specific purpose such as on-net, IX, etc.
 - Use the Internet to fill the cache or talk to other clusters
- Over time our cluster-to-cluster traffic aka 'midgress traffic' was growing
- ISP routing issues such as tromboning, filtering, de-peering were affecting inbound cache fill
- Our cluster-to-cluster communication was constrained by the existing feature set of the Internet i.e. latency, MTU, IPv6 deployment

What did we do?

Akamai built a multi-service backbone

- ICN (Inter City Network) connects Akamai's deployments together
- Similar to Facebook, Microsoft, Google, it transports Akamai's traffic between its own clusters
- It will transport as many Akamai services as technically and commercially viable

ICN and IEN

What does the IEN do?

- Old concept of connecting Akamai's devices together on a Metro level
- Brings new mapping features
- Increases performance as traffic stays in the Metro
- Traffic that previously over transit boundaries up to 7x now served as one-time fixed cost for the fiber

What does the ICN do?

- Basically the same as IENs but between cities
- And in the future, the same between continents

Together form Akamai's multiservice backbone

Why & Not Why

To save \$, ¥, €, and £

- Business case made sense with the cost optimizations and performance gains justifying investment
- Growing internal demands for traffic
- Further localized end-user traffic
- Optimize cache fill over network links we control

Not to be an ISP

- Akamai is not going to sell IP transit or L3VPN, L2VPN and related products
- Nor compete with our Partners and Peers
- Or become a Tier-1

.....We won't sell you voice minutes or fractional STM1

Keep It Simple and Stupid...

- Greenfield - starting from scratch
- Minimize technical debt from the beginning
- Utilize proven and commonly available building blocks
- Limiting experiments and feature overload
- Maintain efficiency in deployments and operation
- Put all the features into the existing CDN System

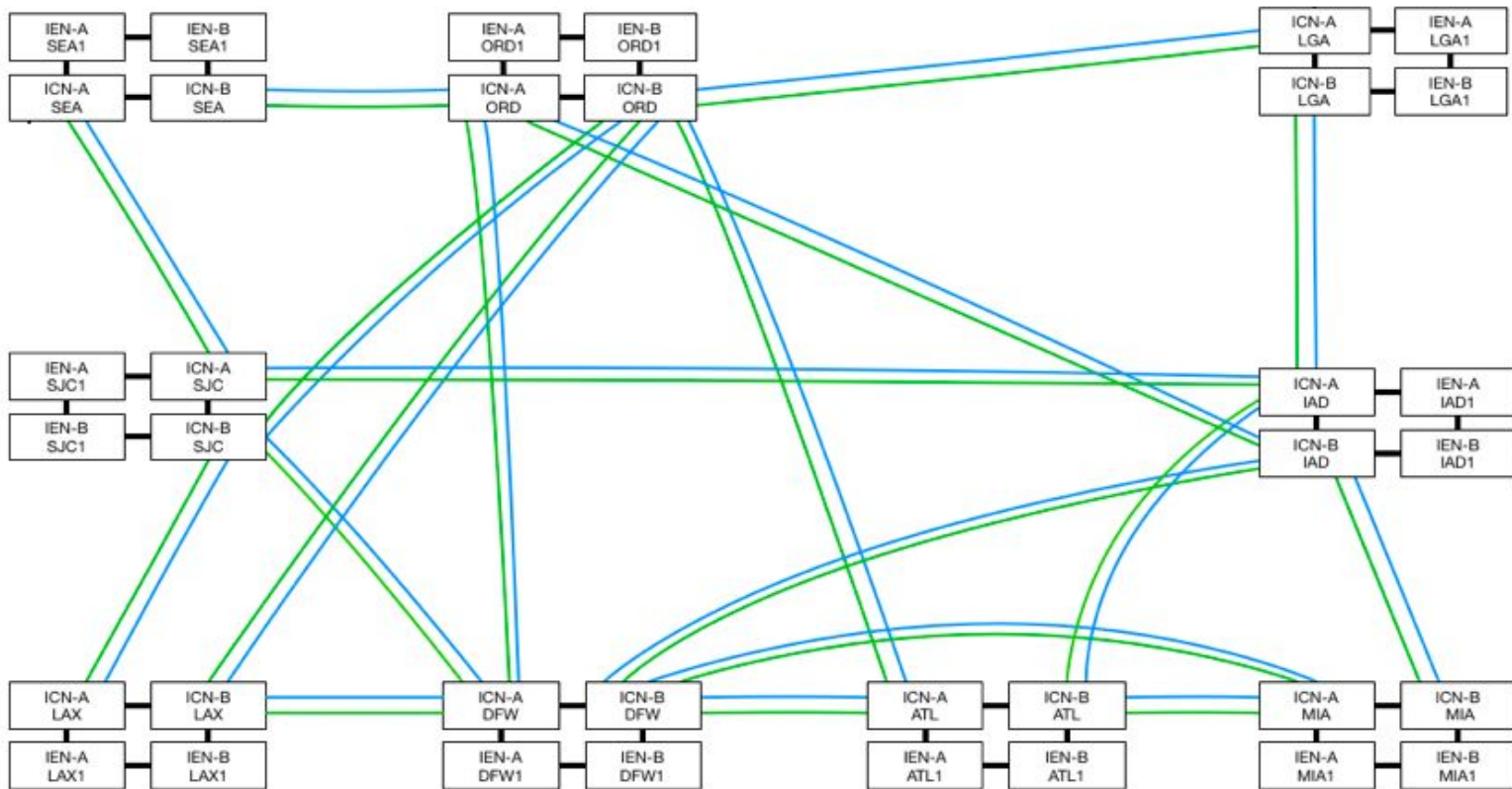
2017 ICN Phase 1 Completed

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- A world map with a blue background and white landmasses. Orange dots representing network nodes are placed in North America, Europe, and East Asia. Lines connect these nodes, forming a network structure. A semi-transparent blue box is overlaid on the map, containing a bulleted list of achievements.
- 3 Tbps of midgress traffic optimized
 - ICN online in 15 cities
 - IEN online in 22 global cities

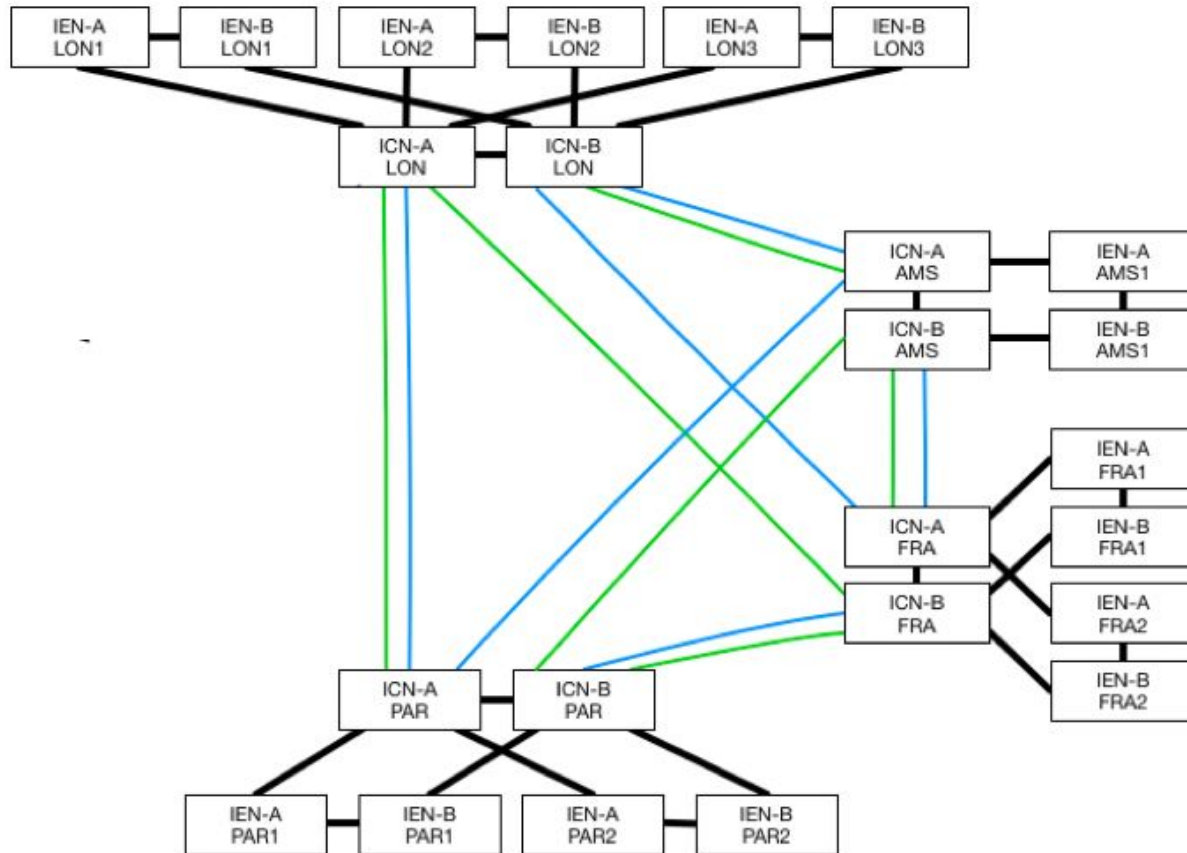
2018 ICN Phase 2 Plans (Draft)

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- A world map with a blue background and white landmasses. Several orange dots representing nodes are placed across the map, primarily in North America, Europe, and Asia. Thin grey lines connect these nodes, illustrating a global network backbone. The map is partially obscured by a semi-transparent blue box containing a list of plans.
- Add more bandwidth and new fiber providers to the existing backbone.
 - Add 10 additional global cities
 - Connect North America, Europe & Asia Pacific
 - Deliver Akamai Direct Connect
 - Add cache fill and peering to the platform afterwards

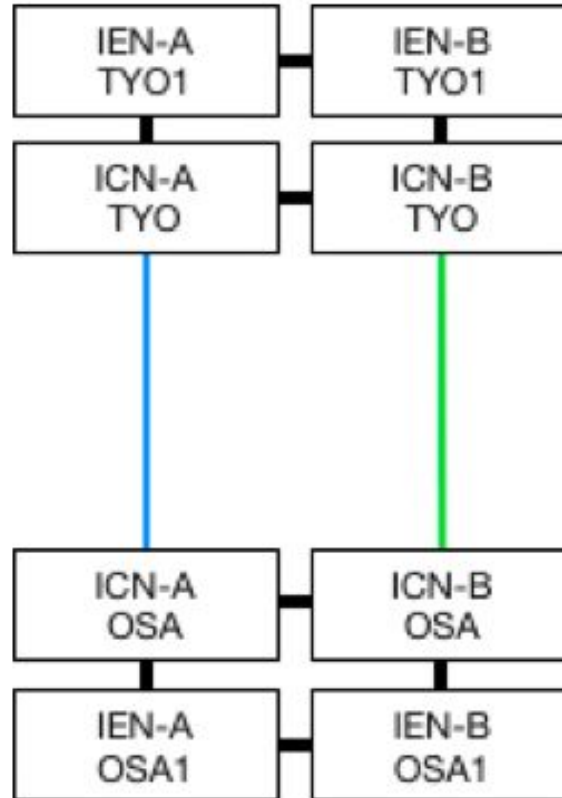
City Views – North America



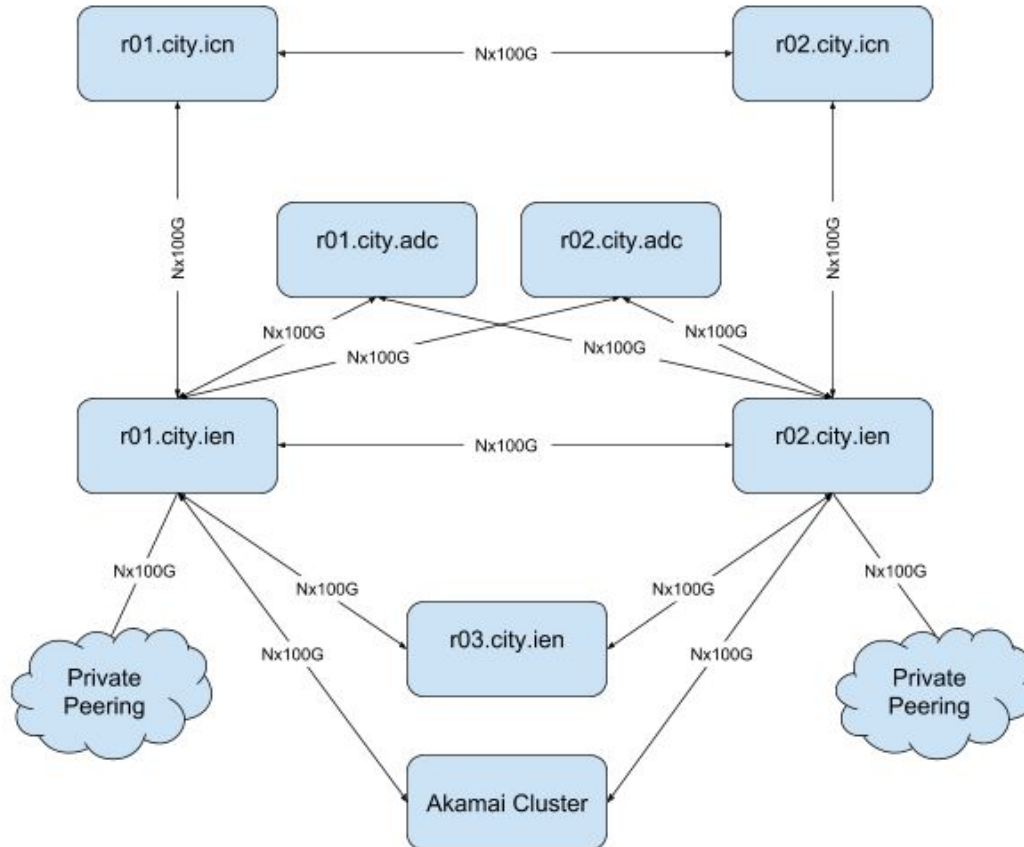
City Views – EMEA



City Views – APJ

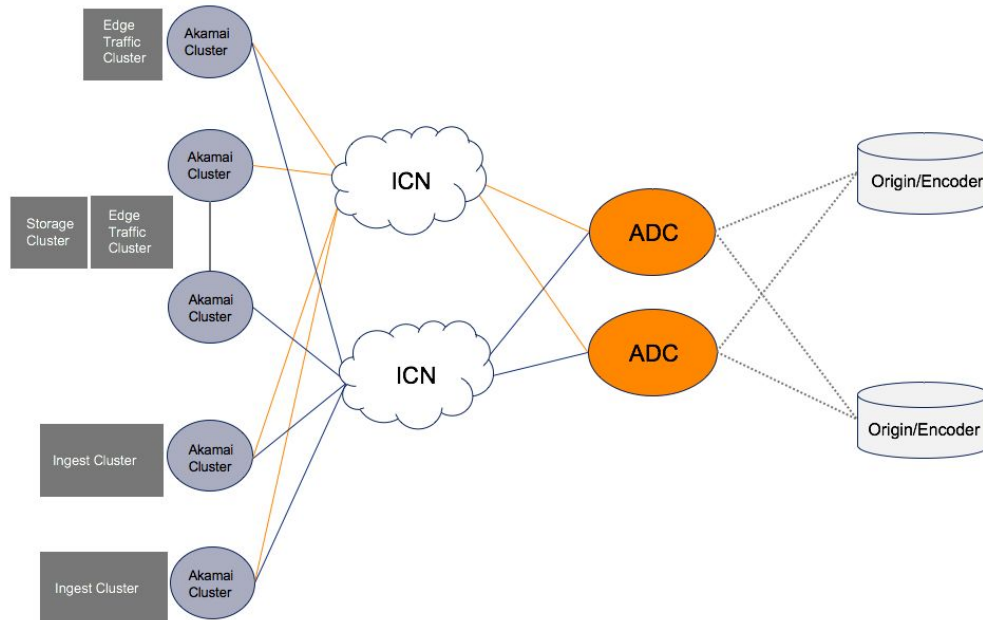


Backbone Plan for 2018



ADC - Akamai Direct Connect

- Customers can directly connect for ingest to the Akamai Platform
- Redundant, reliable, scalable & cost effective solution
- Network will support IPv6 and Jumbo Frame





Technology Used

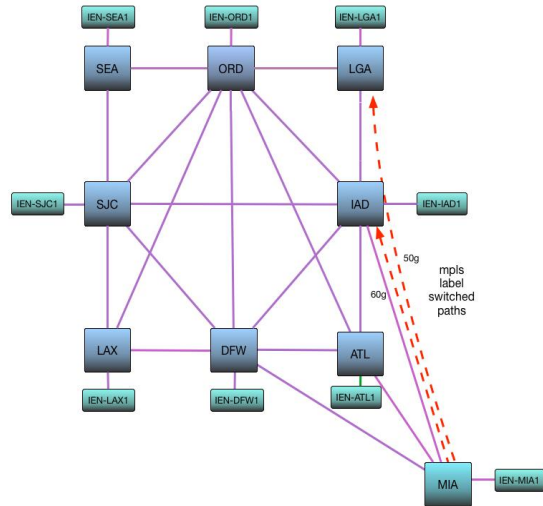
- Industry standard ISIS, BGP, MPLS
- Common building blocks: nothing overly fancy or complicated
- Easy to operate and scale
- Special features are done with the Akamai CDN system

ISIS and BGP

- The IGP (ISIS Level2) will run on both ICN and IEN routers
- All ICN routers part of iBGP and MPLS LSP mesh
- ICN routers will be BGP route reflectors for IEN routers
- IEN routers will be BGP route reflectors for ADC routers

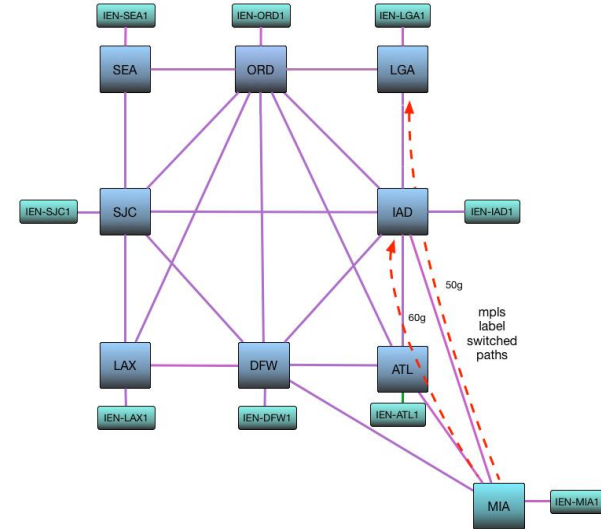
MPLS - Auto-Bandwidth

Primary



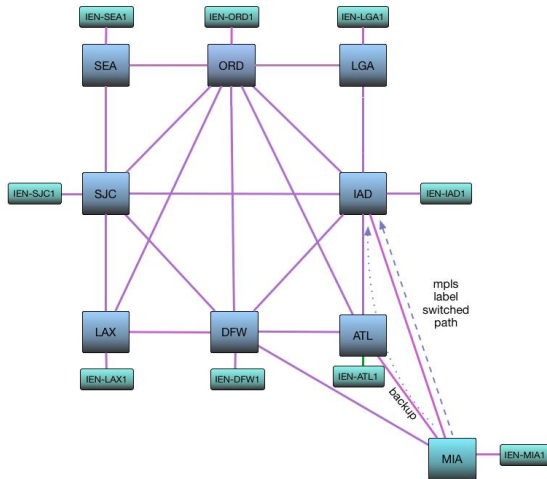
- Mitigates congestion
- Router monitors traffic going over LSPs in 5 minute intervals
- Automatically pushes traffic to second path prior to reaching circuit limit

Backup



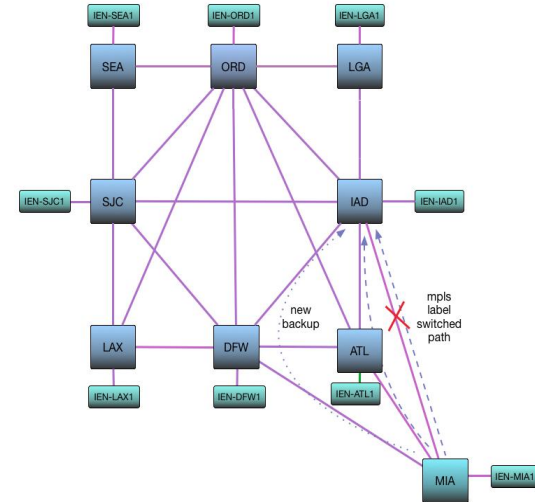
MPLS - Fast Reroute

Primary



- Primary with backup path readied in idle state
- Third path stood up when backup path is activated
- Traffic stays within Akamai network

Backup





Future Plans and Research

- Higher degree of router, config and provisioning automation
- Controlling more of the software and hardware stack ourselves
- Looking into new technologies like Segment Routing, for example
- See how our Anti-DDOS Prolexic services could benefit from ICN

Questions?



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