Optimizing Traffic Flow with Akamai

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Peering Asia 6.0

Peering Tutorial

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Agenda

Akamai Introduction

- Who’s Akamai?
- Akamai Global Cloud Infrastructure
- Akamai network deployment in Indonesia

How Akamai map traffic (and why most of the BGP Traffic Engineering doesn’t work with Akamai)

- AS Path Prepending
- MED
- More Specific Route

Best practices and recommendations

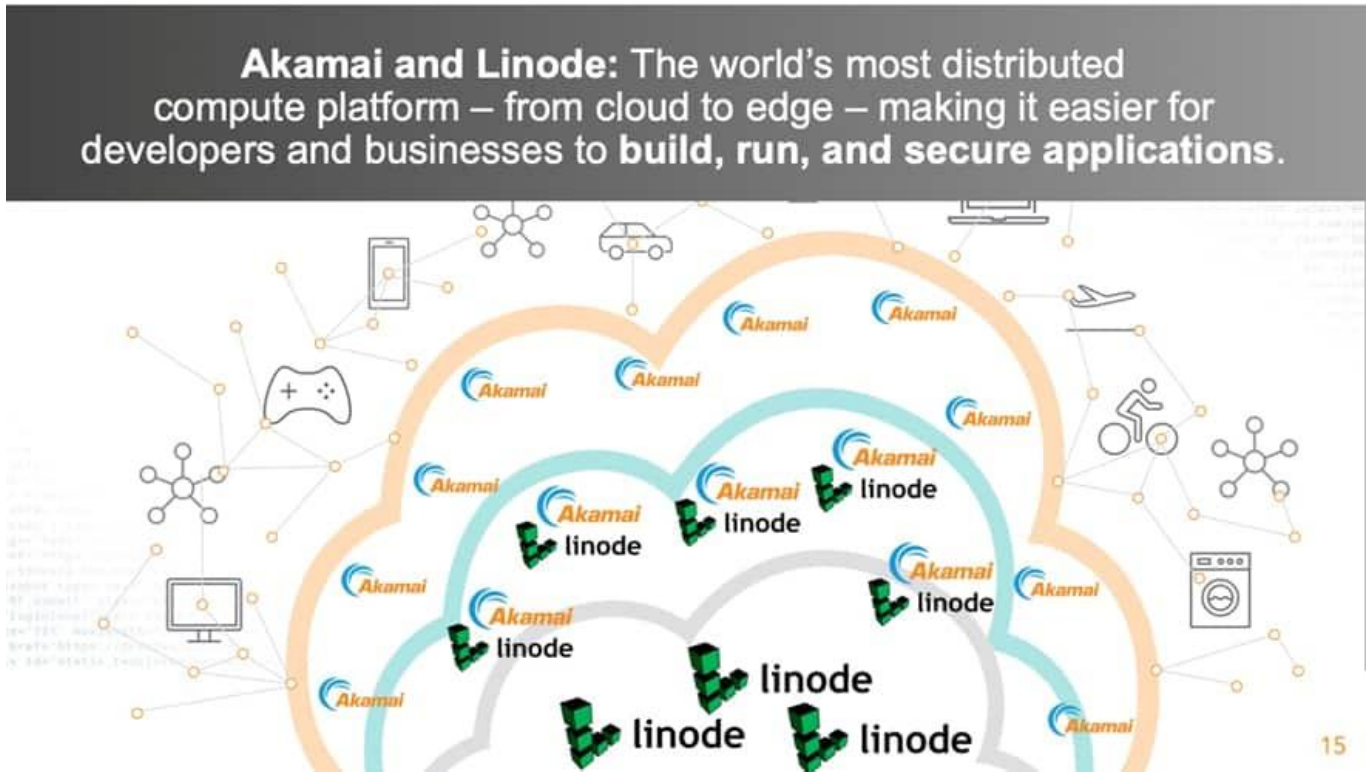
- Setup own DNS resolvers
- Maintain complete and consistent route announcements
- Do not filter traffic
- Avoid CGNAT and enable IPv6

Akamai Introduction

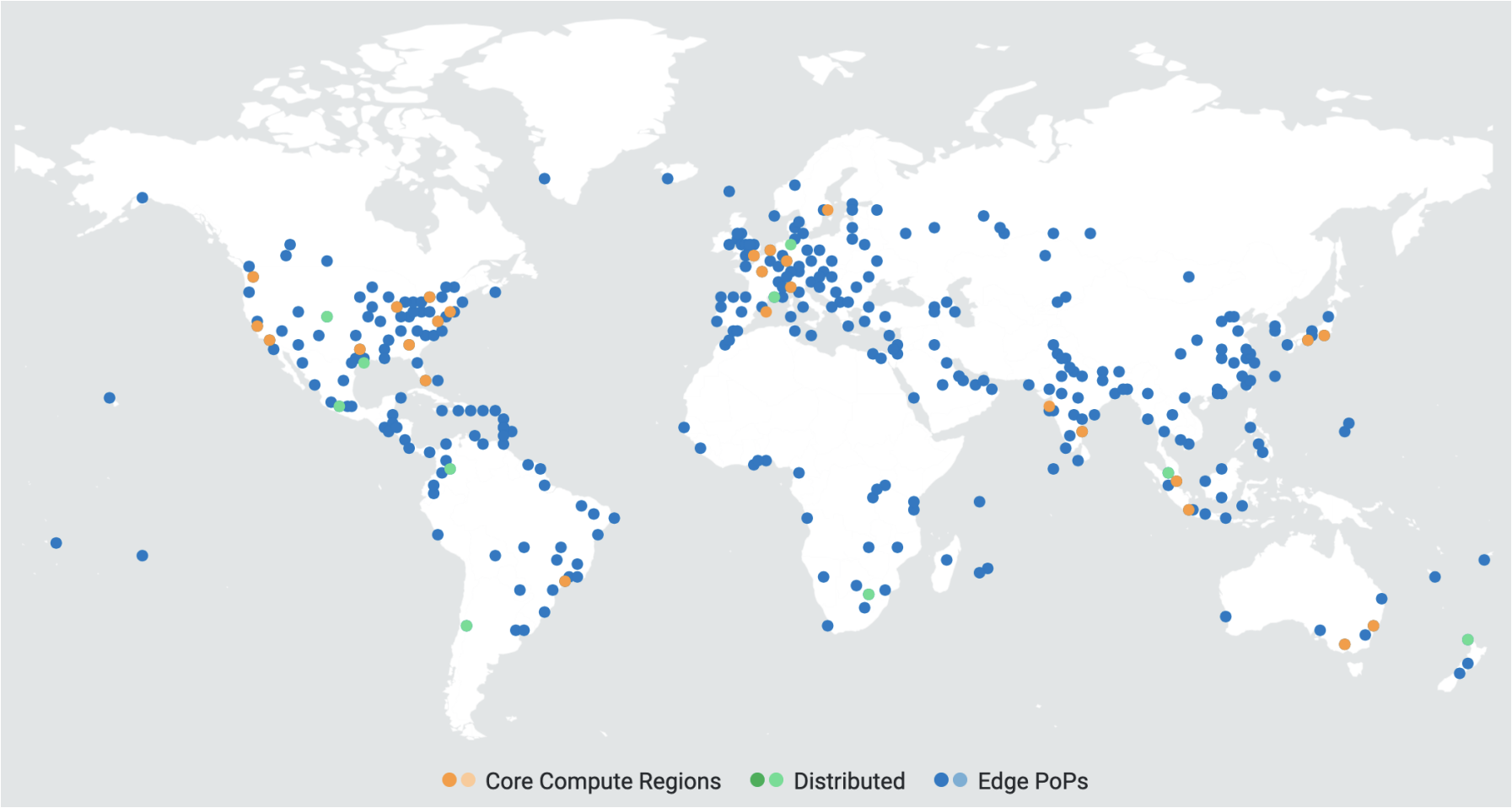
25 YEARS
ONE AKAMAI

Who is Akamai?

Akamai Connected Cloud is a massively distributed edge and cloud platform that keeps experience close to users – and threats farther aways



Akamai Global Cloud Infrastructure



Core sites

A full set of cloud computing services designed for scale.

Distributed sites

Compute capabilities in difficult-to-reach locations.

Edge sites

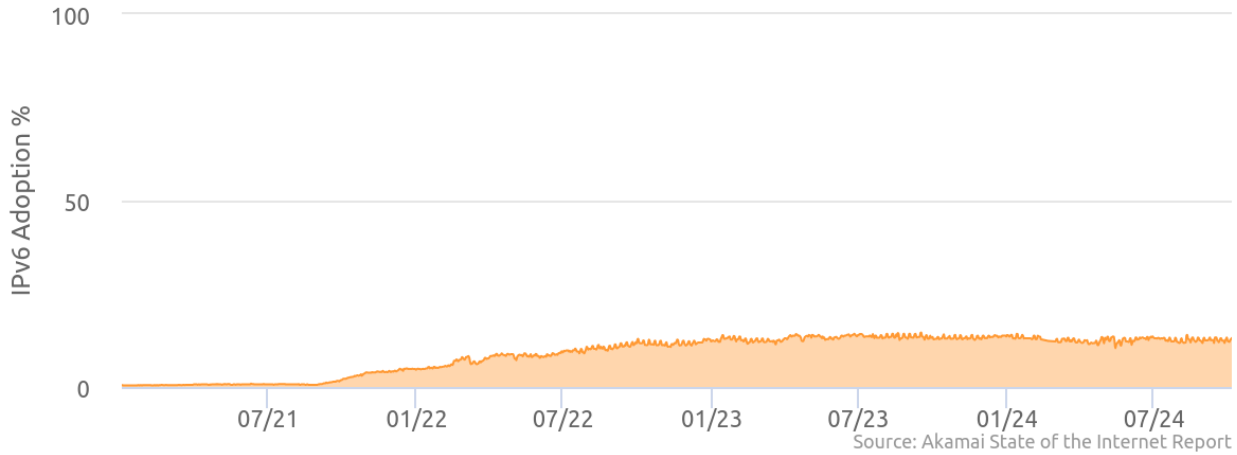
The world's largest network edge platform and content delivery network.

4,200+ edge POPs
1,200+ networks
130+ countries
1+ Pbps edge capacity
250+ Tbps CDN traffic

Akamai Experience the Edge

Akamai Connected Cloud deployment in Indonesia

- Inside major ISP networks
- 2 public clusters
  - EDGE1 (EDGE DC EG1) – Jakarta
  - NTT Jakarta 2 Data Center (JKT2)
- Connected to 5 IXes
  - OpenIXP / NiCE
  - IIX-Jakarta
  - JKT-IX
  - Digital Edge EPIX Jakarta
  - CXC Jakarta
- Upcoming IX connections
  - DCI Indonesia DCI-IX
  - DE-CIX Jakarta



- Indonesia IPv6 adoption: 13.1%

How Akamai works?

- Some facts
- Cluster types – Private and Public
- Cluster roles – Edge and Mid-tier

How Akamai works: some facts

Are Akamai clusters connected to each other?

Most of the Akamai clusters are operated independent, and not talk to each others

-> Peer with Akamai in one single cluster would not get all the content

Where does the content Akamai serve come from?

Akamai operates a caching infrastructure

Some content customers uses multi-tiers cache layer

Each cluster has different Internet connectivity to obtain content from the origin

How does Akamai direct users to its cluster?

Akamai maps users based-on client's DNS, various network factors and other attributes

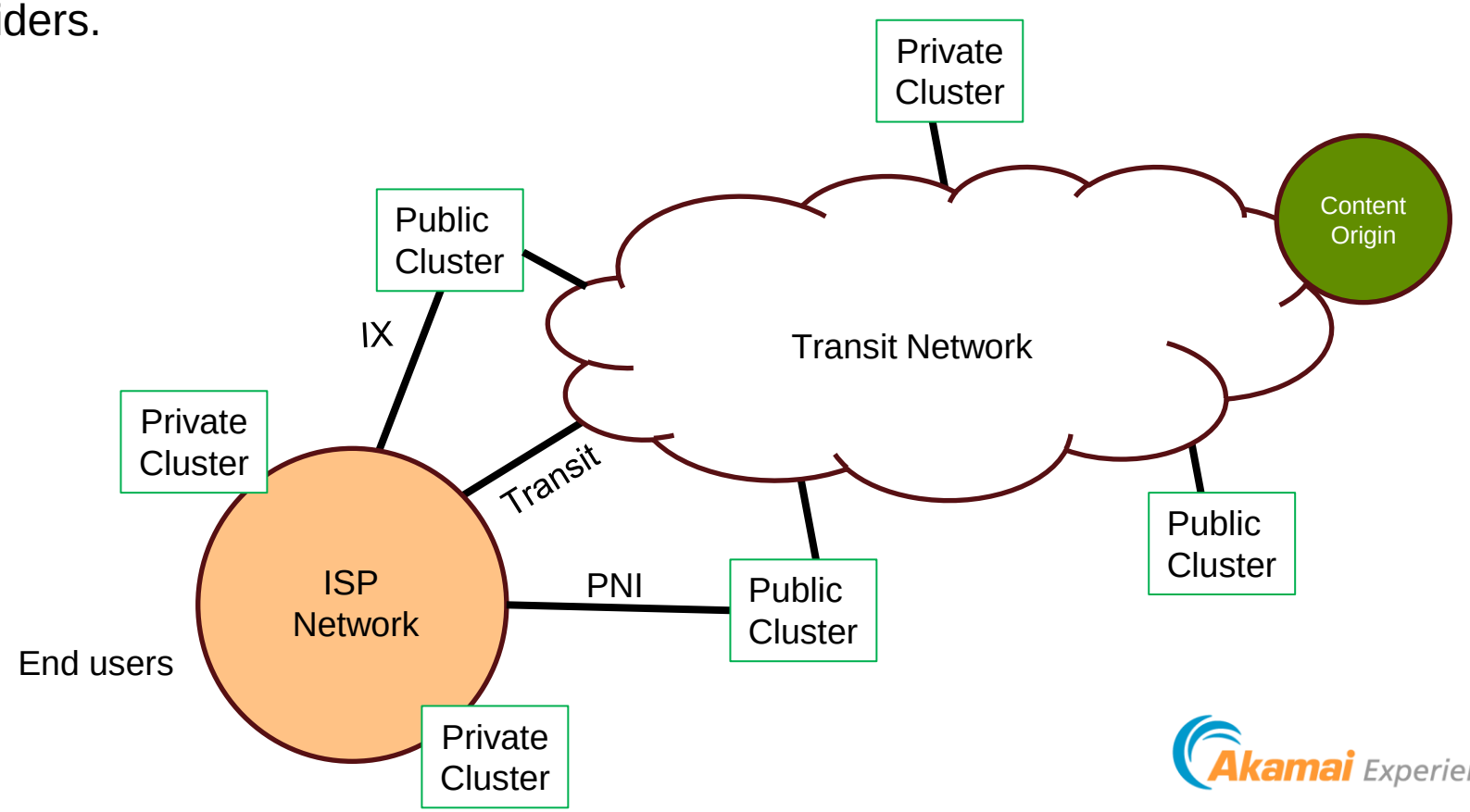
How Akamai works: Cluster types

Private: Clusters dedicated to specific networks or their downstream ISPs. Role: Edge

Clusters inside the network partners: AANP - Akamai Accelerated Network Partner

Public: Clusters shared by multiple networks. Role: Edge, Mid-Tier and Infrastructure

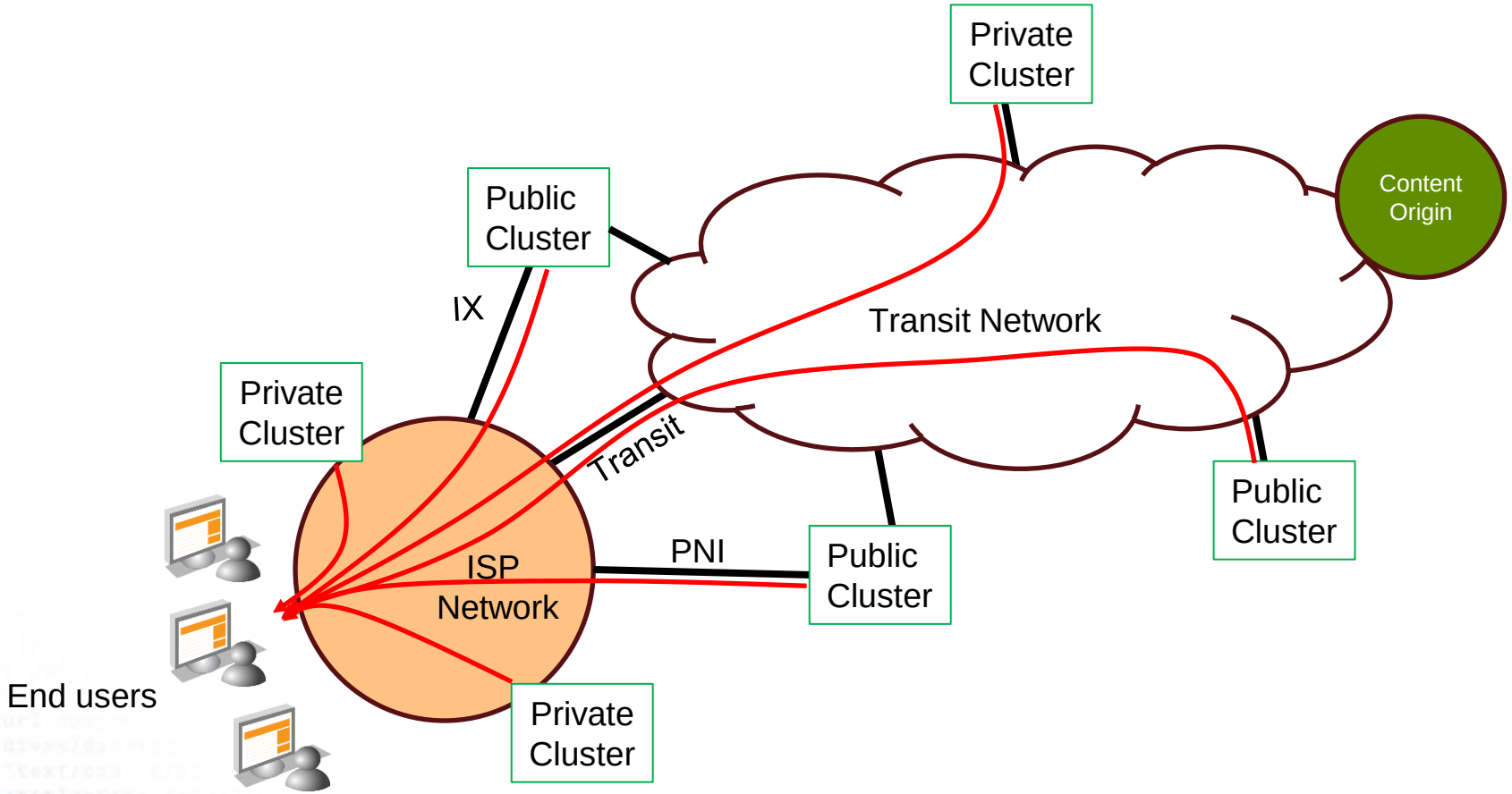
Clusters inside some public facility (e.g., EDGE DC EG1, NTT JKT2), connecting to multiple networks via PNI, IXs and Transit providers.



Akamai Experience the Edge

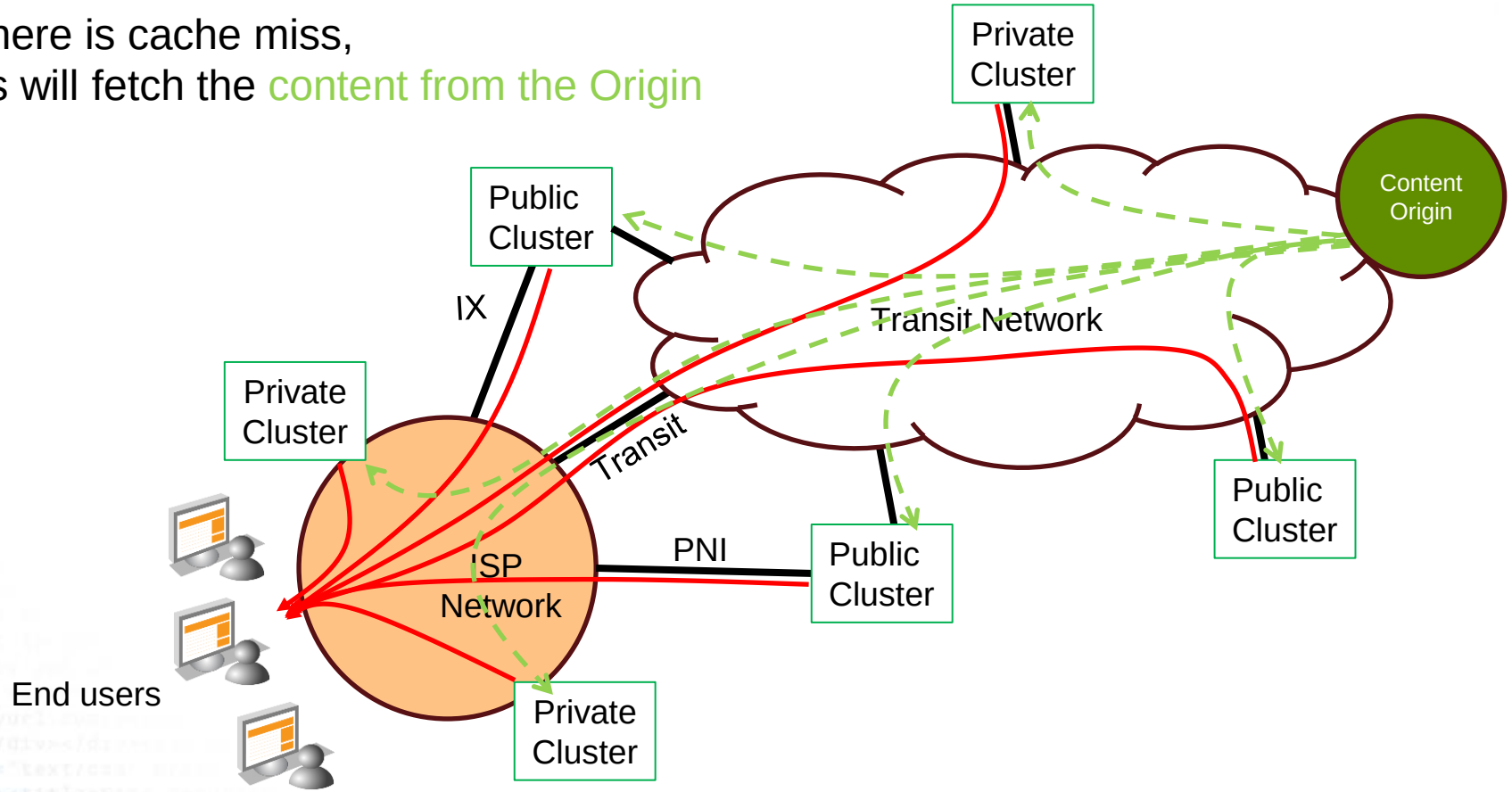
How Akamai works: Cluster roles - Edge

1. Edge: Cache the content and distribute to the end users



How Akamai works: Cluster roles - Edge

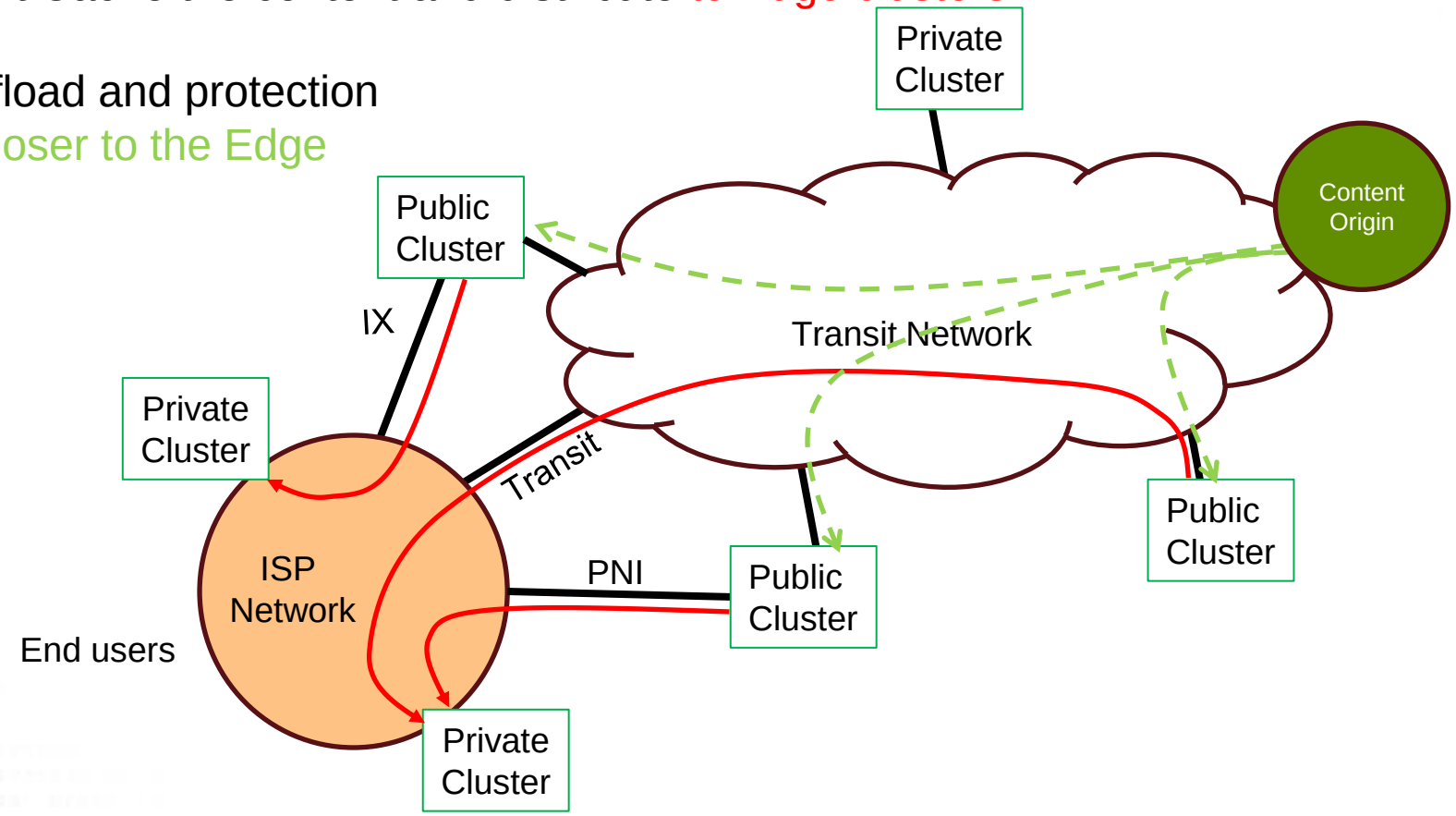
1. Edge: Cache the content and distribute to the end users
   when there is cache miss,
   clusters will fetch the content from the Origin



How Akamai works: Cluster roles – Mid-Tier

2. Mid-Tier: Parent Cache the content and distribute to Edge clusters

Improve origin offload and protection
Bring the origin closer to the Edge

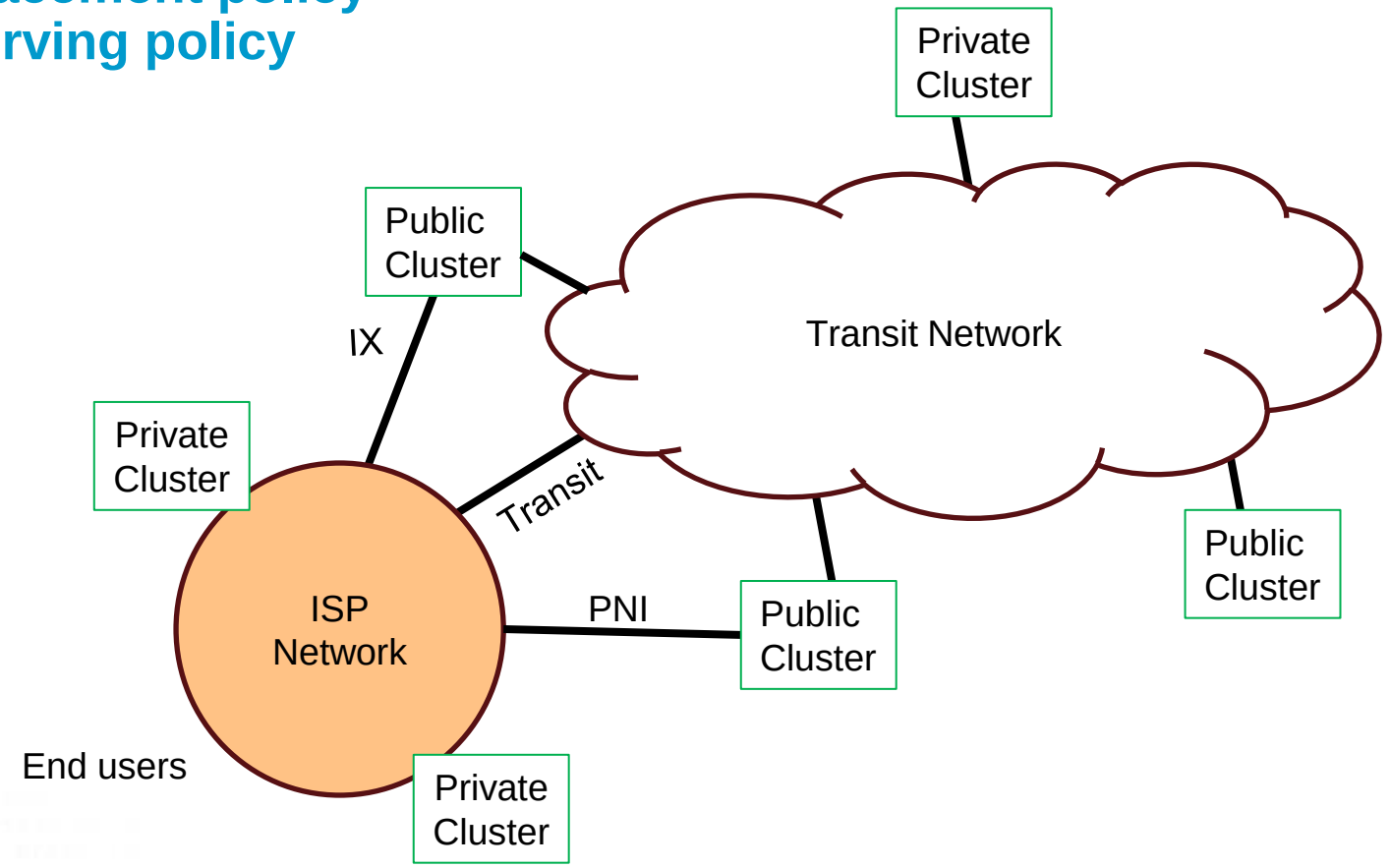


Why most of the BGP Traffic Engineering techniques don’t work with Akamai?

- AS Path Prepending
- MED
- More/less Specific Route advertisement

Akamai maps end users demand based on …

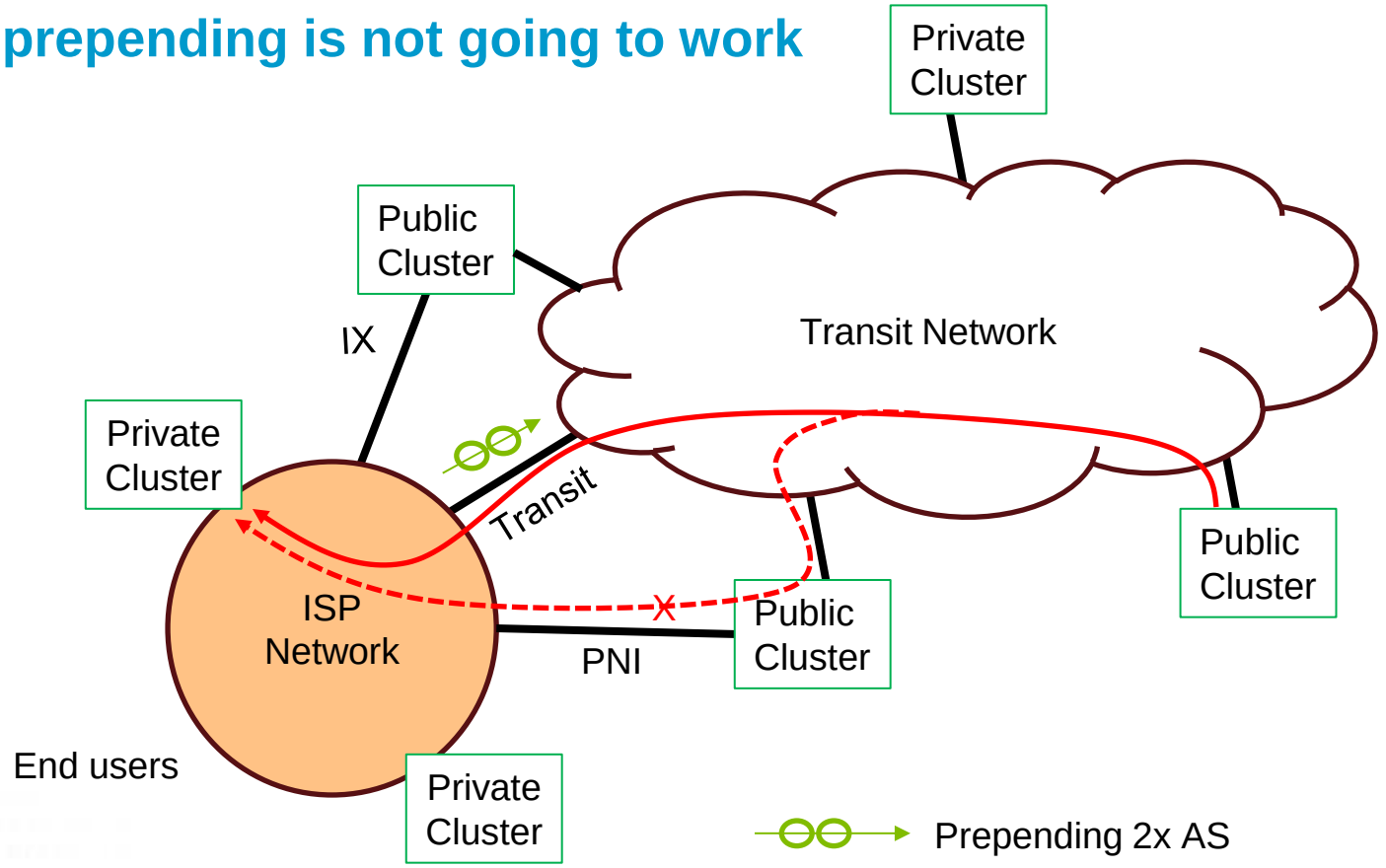
1. Network performance (Latency, packet drops, link utilizations)
2. Server capacity
3. Cache placement policy
4. Cache serving policy



Akamai map end users demand based on …

but not AS path length

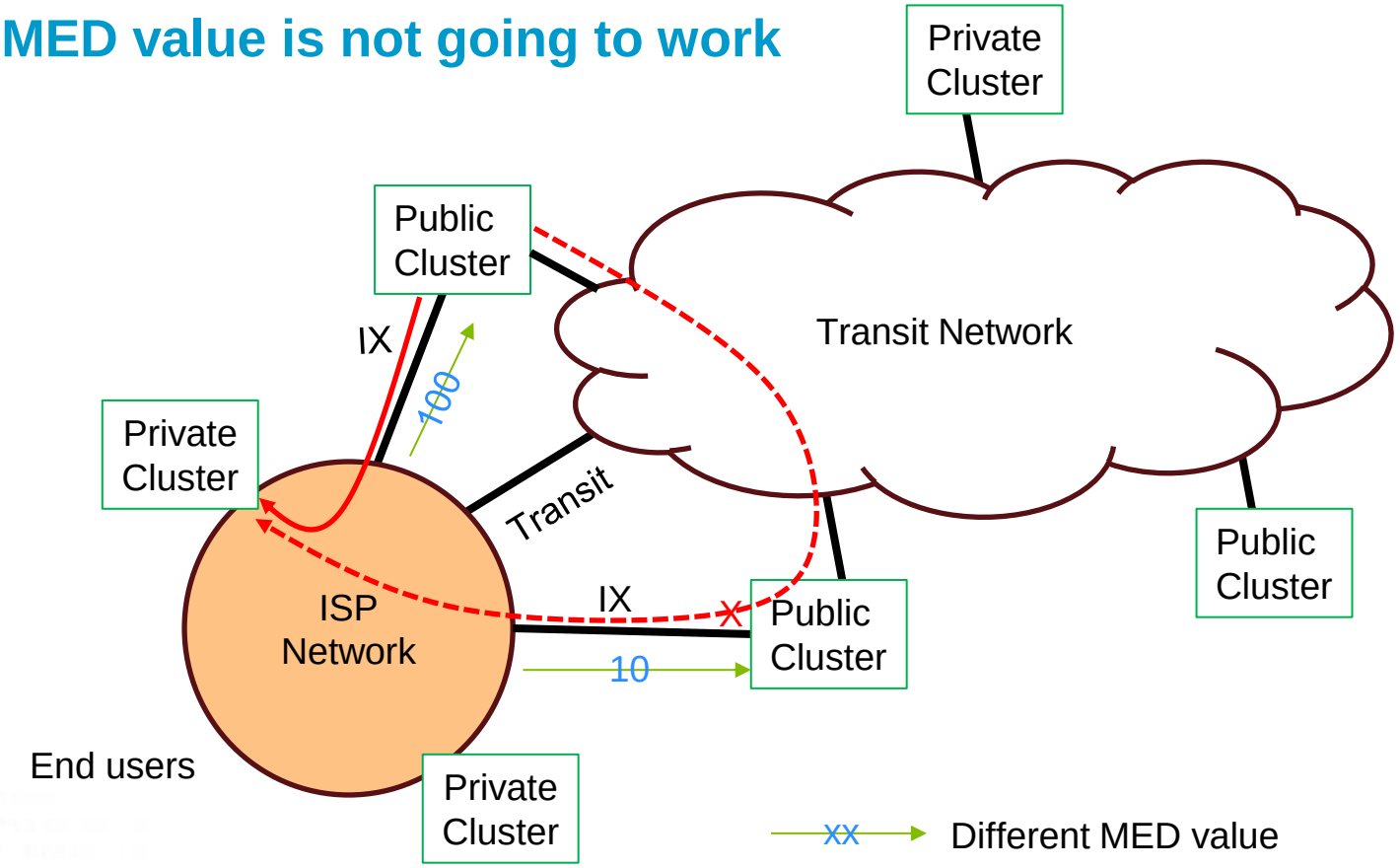
So AS Path prepending is not going to work



Akamai map end users demand based on …

but not MED value

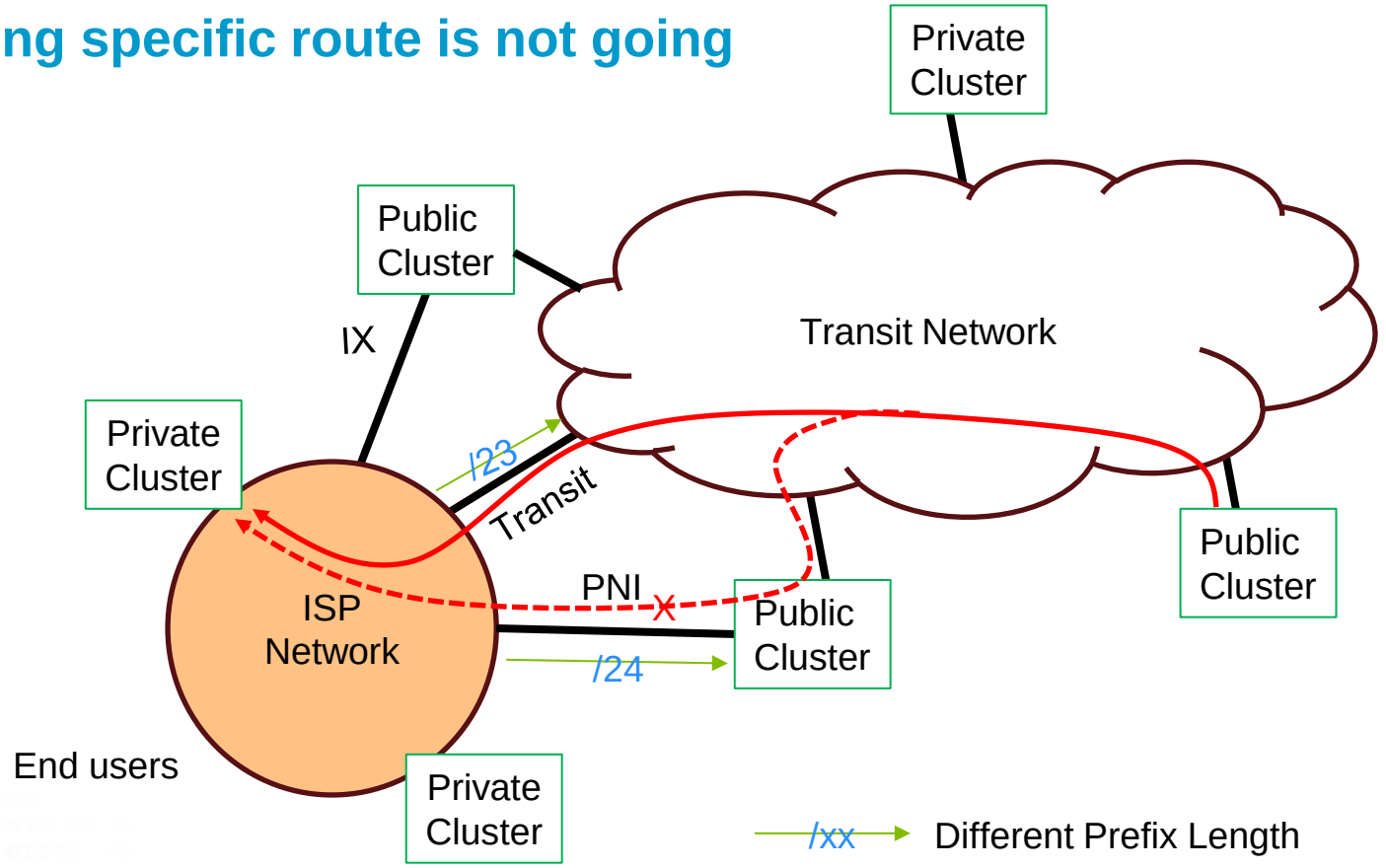
So change MED value is not going to work



Akamai map end users demand based on …

but not prefix length

So advertising specific route is not going to work



Why doesn’t these have the usual effect?

- Akamai uses Mapping, on top of the BGP routing
- Akamai Mapping is different from BGP routing
- Akamai nodes are mostly islands, there are no backbone between them
- Akamai uses multiple criteria to choose the optimal node / server
- These include standard network metrics:
  - Latency
  - Throughput
  - Packet loss

Our suggestions

- Talk to us if we are sending too much / too few traffic on your preferred link(s)
- Accommodate our best practices and recommendations
- We can work together for traffic engineering

Best Practices and Recommendations

- Setup own DNS resolvers
- Maintain complete and consistent route announcements
- Do not filter traffic
- Avoid CGNAT and enable IPv6

Setup own DNS resolvers

Akamai CDN map traffic based-on DNS resolvers external IPs

- Use anycast IPs for user-facing DNS resolver IPs
- Use different external IPs for users in different locations
- Setup ACL to only allow your own users to use your DNS resolvers
- Do not modify Akamai hostnames TTL value

If not possible to setup your own DNS resolvers, then

- Use Google DNS (8.8.8.8 / 8.8.4.4, 2001:4860:4860::8888 / 2001:4860:4860::8844)
- Use OpenDNS (208.67.222.222 / 208.67.220.220, 2620:119:35::35 / 2620:119:53::53)
- Akamai support EDNS Client Subnet (ECS) for Google DNS and OpenDNS
- Publish GeoFeed IP location information in RFC8805 format

Maintain good Internet connectivity to your DNS resolvers

- Akamai may use your DNS resolvers external IPs for performance monitoring
- Alternatively, you may provide Akamai with your desire IPs for performance monitoring

Maintain Complete and Consistent Route Announcements

Announce complete prefixes to Akamai

- Includes both DNS and end user IPs
- Akamai map traffic based-on DNS to the optimal node, then send user traffic from there
- Discuss with your downstreams to announce all prefixes to you

If not possible to announce all prefixes, then

- Akamai may block your whole ASN prefixes, to avoid suboptimal performance

Maintain consistent route announcement to your peers / upstream providers

- Akamai may send overflow traffic from your upstream providers

Do not filter traffic

Carry traffic that you announce

- If you promised to carry the traffic of an IP block (e.g., /20), you should not have any holes (e.g.,/24) or drop any part of the traffic
- Akamai routers may not have the full Internet routing table
- The end user's connectivity will be impacted!!!

Performance monitoring

- Akamai uses IPs in your network as performance monitoring
- If possible, do not filter / rate-limit ICMP to your network
- Send return traffic to Akamai closet location to maintain lowest latency

Avoid CGNAT and enable IPv6

Avoid the use of CGNAT

- When possible, try to avoid using CGNAT, this will improve performance
- If necessary
  - Use the standard CGNAT IP address block 100.64.0.0/10 [RFC 6598]
  - Place Akamai nodes outside of CGNAT
- Akamai uses client IPs for different purposes, e.g., global traffic management

Enable IPv6

- If you have an Akamai cache node
  - assign IPv6 address block to Akamai clusters
  - send your IPv6 prefixes to Akamai BGP collectors
- If you have peering with Akamai, enable both IPv4 and IPv6 sessions
- Akamai has made IPv4+IPv6 dual-stack the default for new customer configurations

Summary

Akamai Connected Cloud

- Highly distributed edge servers
- DNS-based mapping CDN

Traffic Engineering

- Typical BGP traffic engineering techniques doesn’t work
- Collaborate with Akamai for traffic engineering

Best practices and Recommendations

- Setup your own DNS resolvers
- Maintain complete and consistent route announcements
- Do not filter traffic
- Avoid CGNAT and enable IPv6

Questions?

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More information:

Peering: https://as20940.peeringdb.com

Terima Kasih!

(Thank You!)

