



Peering Trends and Challenges

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VNIX-NOG 2025, Nha Trang

October 17, 2025





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- New IXes, remote IXes, Interconnect between IXes

03 Peering Challenges

- Peering with incumbents, peering disputes and change of peering policy

- Lack of neutral Data Centers and IXes choices

04 IPv6

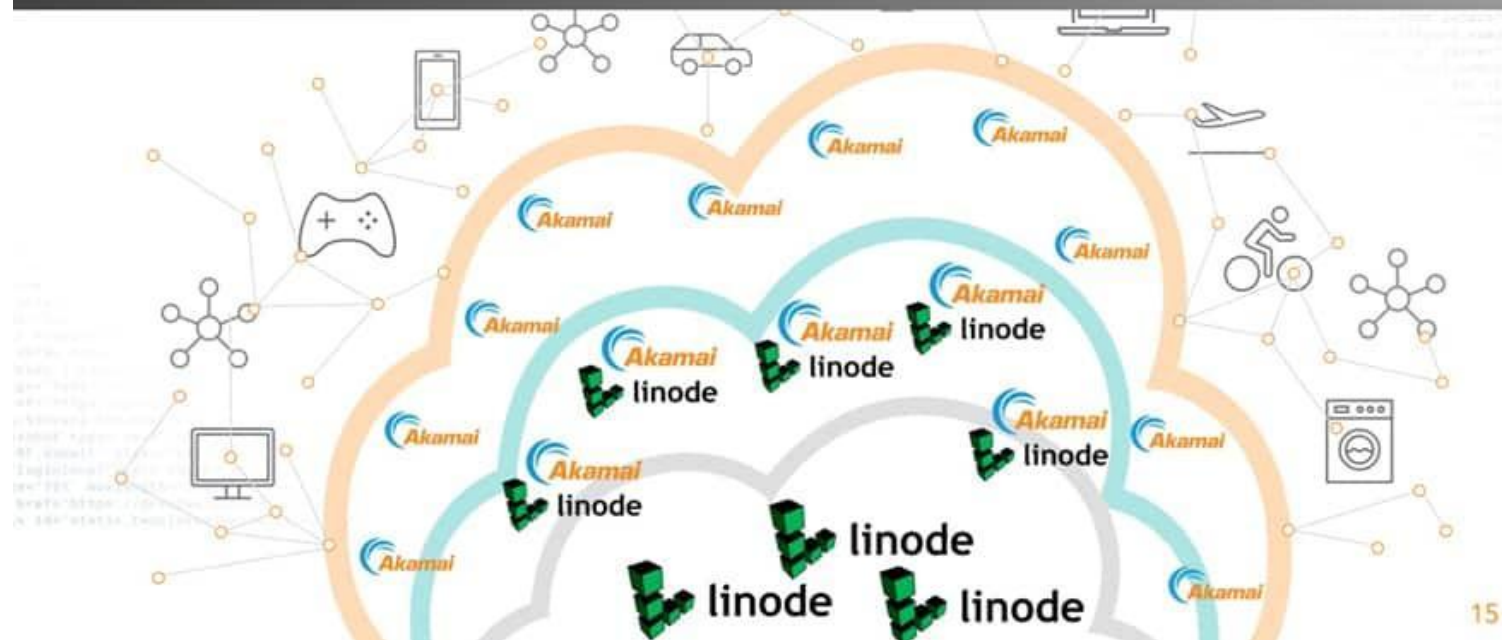
- IPv6 Adoption and IPv6-only network

Akamai Introduction

Who is Akamai?

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

Akamai and Linode: The world's most distributed compute platform – from cloud to edge – making it easier for developers and businesses to build, run, and secure applications.



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The Akamai Connected Cloud

The world's largest on-demand, distributed computing platform delivers all forms of web content and applications

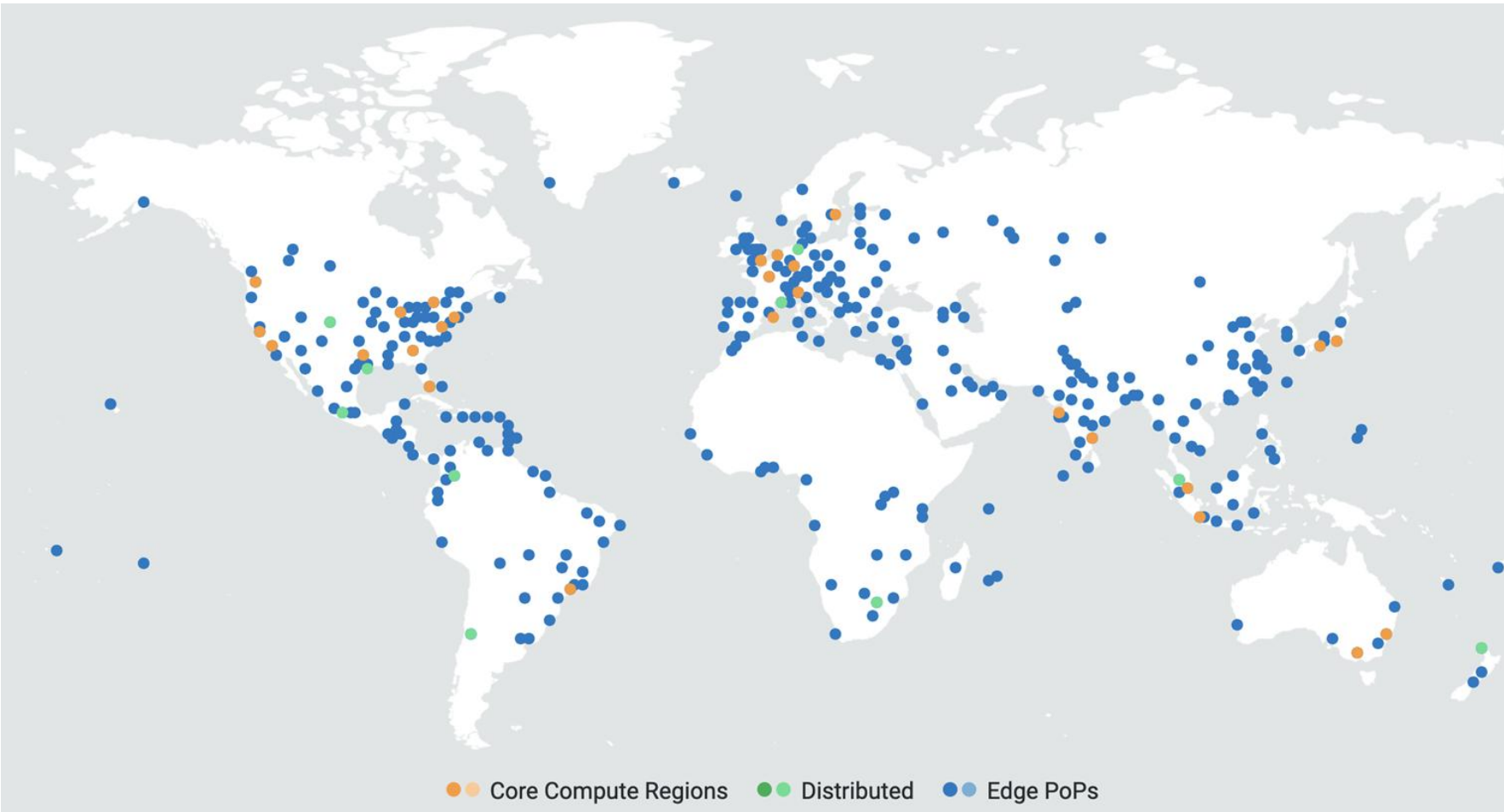
Akamai Global Cloud Infrastructure



Typical daily traffic:

- More than **3 trillion** requests served
- Delivering over **250 Terabits/second**

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.

4,400+ edge PoPs

1,200+ networks

130+ countries

1+ Pbps edge capacity

250+ Tbps CDN traffic



Peering Trends

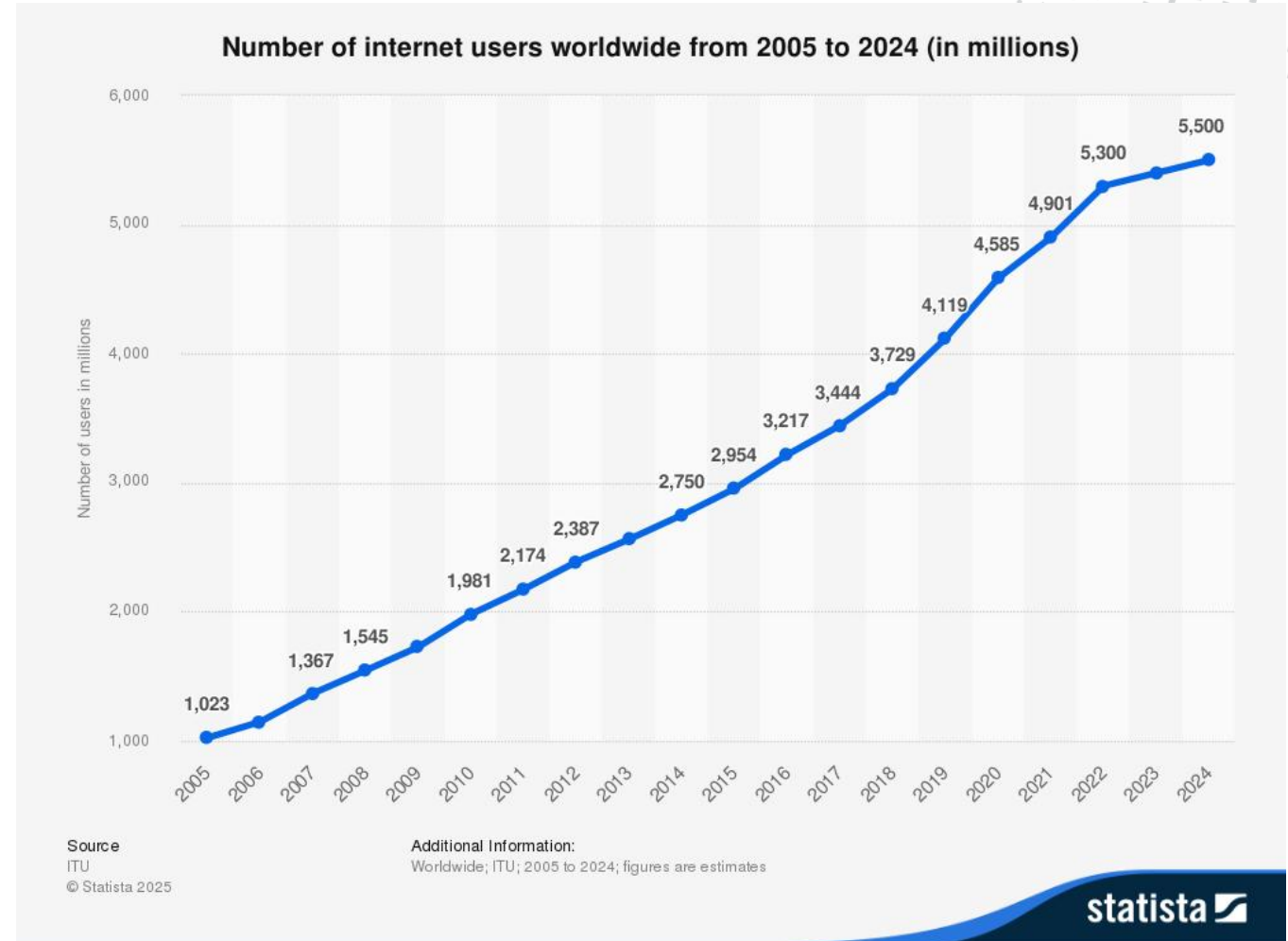
- Port Speed
- 100G Optics
- IX Route Servers
- Automation
- New IXes
- Remote IXes
- Interconnect between IXes

Port Speed (fading out 1G / 10G ports)

Internet traffic is keep growing,
peering port speed would have to
keep increasing

IX and PNI interfaces:

1. Akamai and some Hyperscalers are fading out 1G / 10G ports
2. 100G port as minimum



Port Speed (Hyperscalers)

Examples of Hyperscalers Peering Policy: 100G port is the minimum

1. Google

- Google only supports 100G Ethernet LR4, and 400GBASE-LR4

2. Microsoft

- Interconnection must be over 100-Gbps single-mode fiber

3. AWS

- PNI peering is only supported using 100 Gbps port speed or greater over single-mode fiber

4. ByteDance

- ASNs exhibiting more than 10Gbps of ByteDance traffic at peak, in either direction, can request private peering via a bilateral BGP session over dedicated port(s). We require either 100G or 400G ports for such private peering.

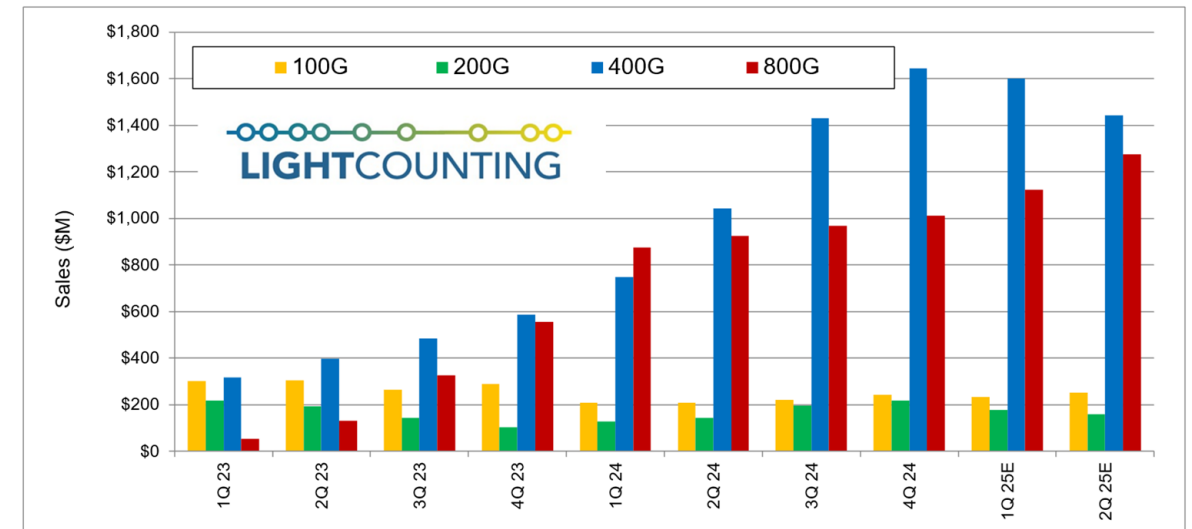
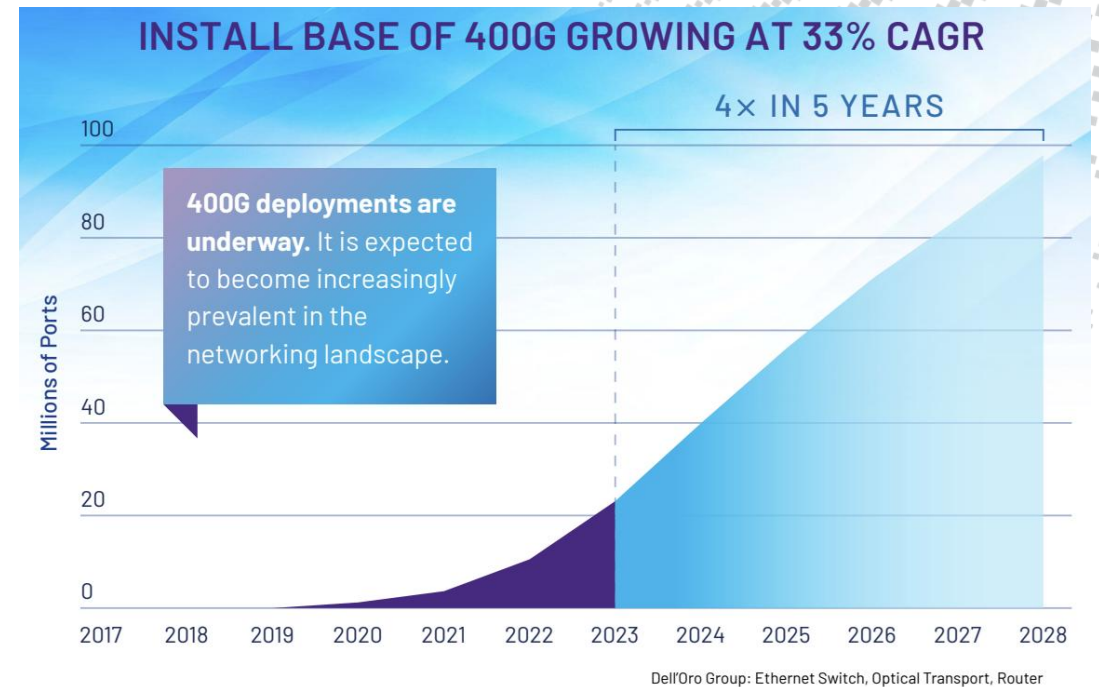
Port Speed (400G)

400G Benefits:

- Lower cost per Gig
- ~30-40% reduction in capex
- ~25% reduction in IX port charge
- Headroom for redundancy and burst traffic, future-proof

Networks that support 400G:

1. IXes - EIE, BBIX, JPNAP, JPIX, etc.
2. Hyperscalers - Google, AWS, Microsoft, etc
3. Transit providers - Arelion, Lumen, Colt, Zayo, etc



Source: LightCounting proprietary vendor survey and estimates

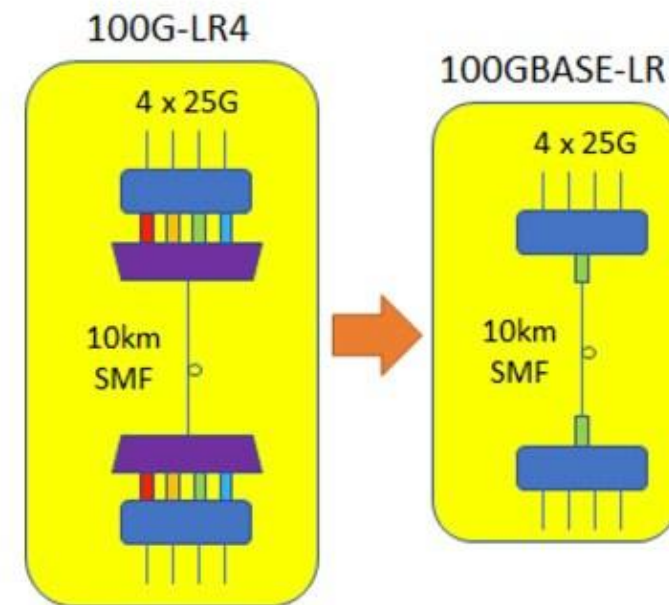
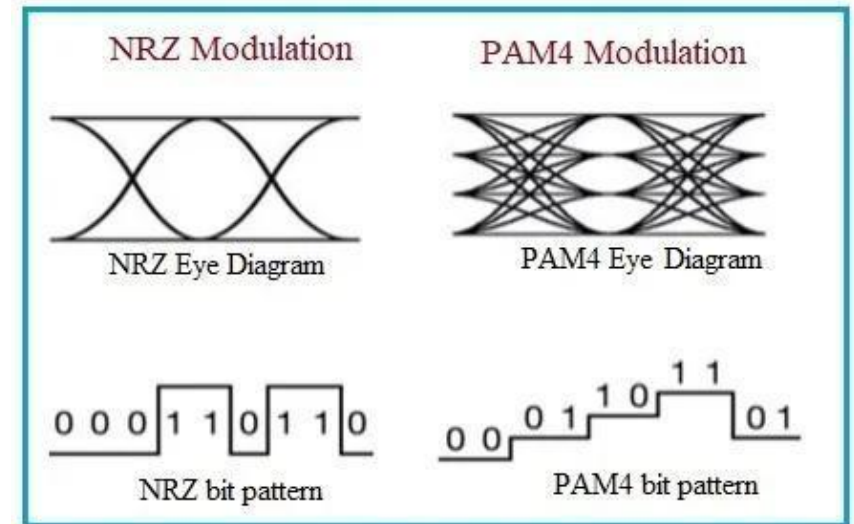
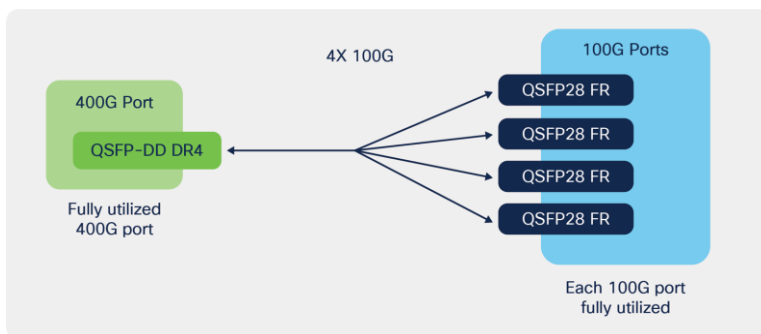
100G Optics

1. Current: 100G-LR4

1. Non-return-to-Zero (NRZ) modulation
2. Four 25G wavelength transmission
3. 4 lanes -> 4 optical components

2. Trend: 100G-LR/LR1

1. Compatible with FR/FR1 (2km)
2. Pulse Amplitude Modulation with 4 levels (PAM4)
3. Single-wavelength transmission -> 1 optical component
4. Lower cost (less optical components)
5. Higher port density for 400G breakout
 - 2 x 100G-LR4 vs. 4 x 100G-LR1



Peering Policy towards IX Route Servers

Akamai peering policy towards route servers:

1. Selective peering with route servers
2. Do not announce anycast prefixes to route servers
3. Pros and Cons
 1. Pros: Simple operations, single BGP session
 2. Cons: Routing security and management
4. Trends:
 1. Selective route announcements (e.g. Tencent CDN, etc)
 2. Not to peer with route servers (e.g. Amazon and Microsoft, etc)

Google:

2023: Route Server Depeering – More control over inbound IX traffic, mitigate BGP Hijack Risk

2025: Selective peering policy – Ended IX peering; now only 100G ports for 10G+ traffic. Verified Peering Partner (VPP) now open to any ISP to join.

Peering Automation

Automate peering requests and provisioning

1. Requests via portal / online form
2. Integrate with PeeringDB (keep your PeeringDB records up-to-date!)
3. Simplify operations
4. Trend: Automate peering process

Peering automation examples:

Facebook: <https://engineering.fb.com/2021/05/20/networking-traffic/peering-automation/>

Microsoft: <https://learn.microsoft.com/en-us/azure/peering-service/azure-portal>

Gcore: <https://gcore.com/blog/how-we-improve-network-connectivity-with-peering-automation>

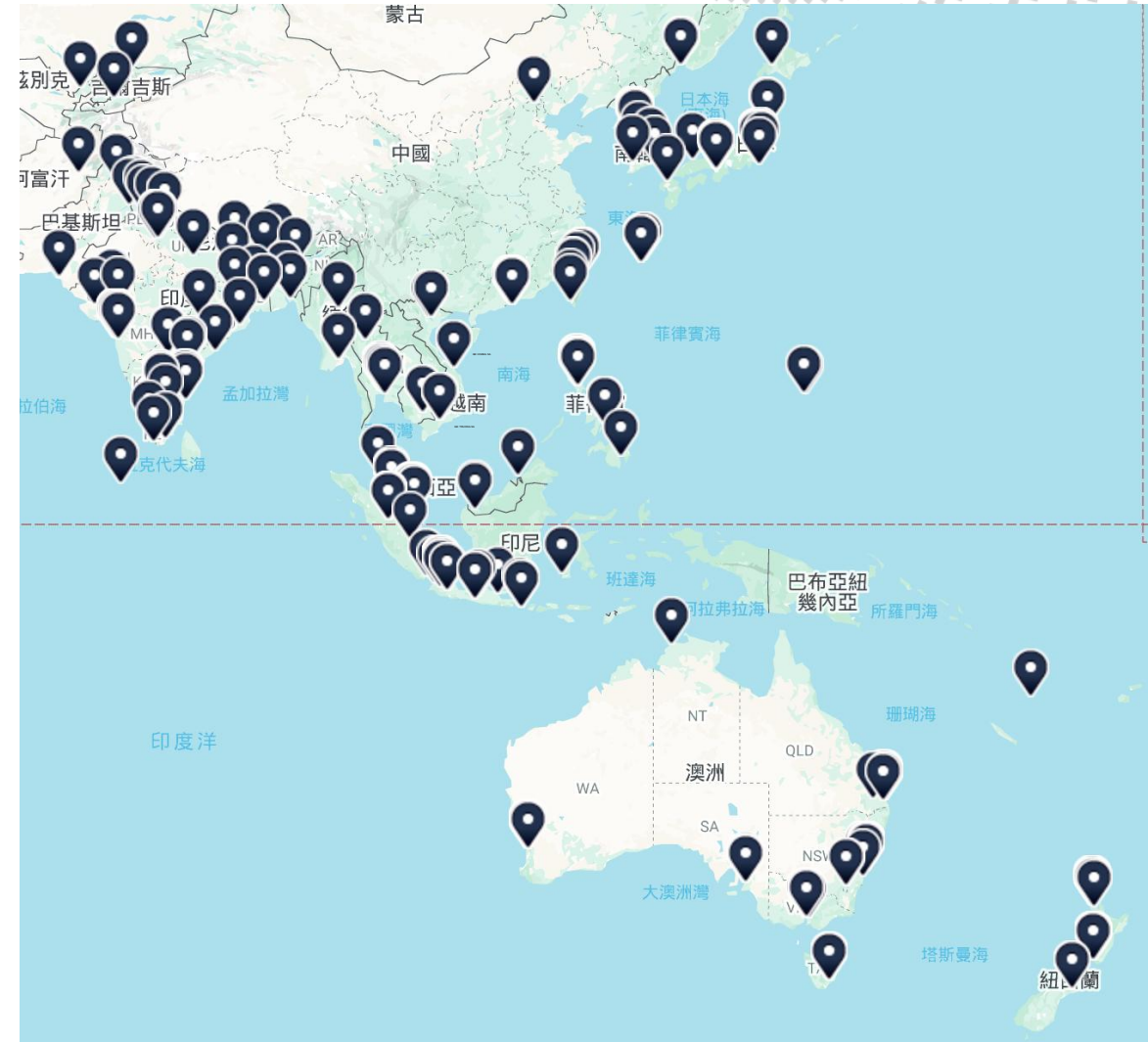
Tencent: <https://peering.tencent.com/request>

Cloudflare: <https://www.cloudflare.com/partners/peering-portal/>

New Internet Exchanges

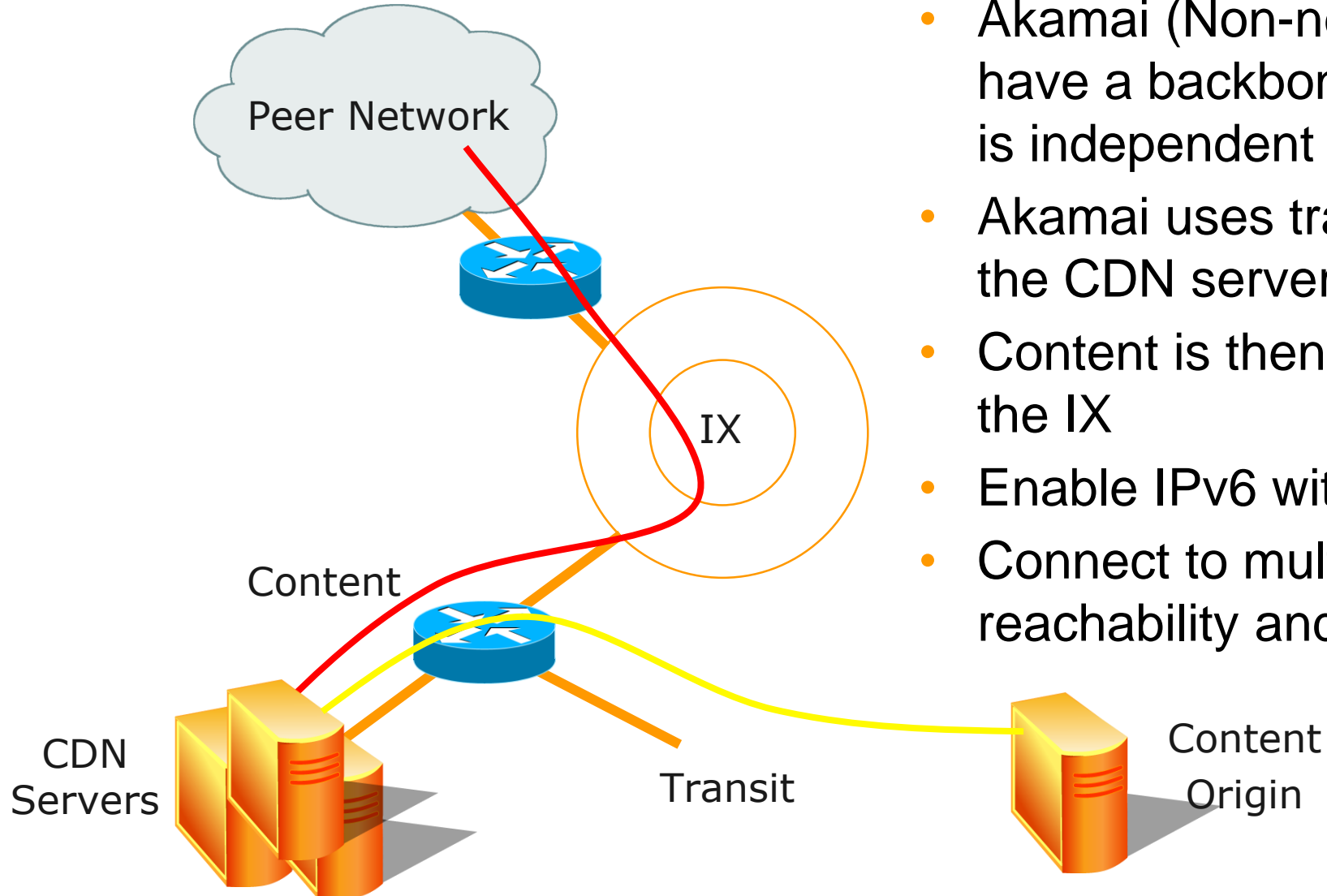
New IXes in Asia Pacific regions

1. Emerging markets / developing countries
2. Tier-2 cities e.g., Penang, Kuching, Surabaya, Cebu, Davao, Chiang Mai, etc.
3. Offer more choices and traffic localization
4. Examples:
 1. Malaysia: EIE Kuala Lumpur, Penang IX
 2. Indonesia: EIE Jakarta, AIX, EPIX, EdgeNXT, DE-CIX Jakarta
 3. Philippines: GetaFIX, BBIX Manila, AMS-IX Manila, MHK-IX, EPIX
 4. Thailand: BBIX Thailand, AMS-IX Bangkok
 5. Taiwan: STUIX, FOX
 6. Vietnam: BBIX Vietnam



Telegeography: Internet Exchange Map

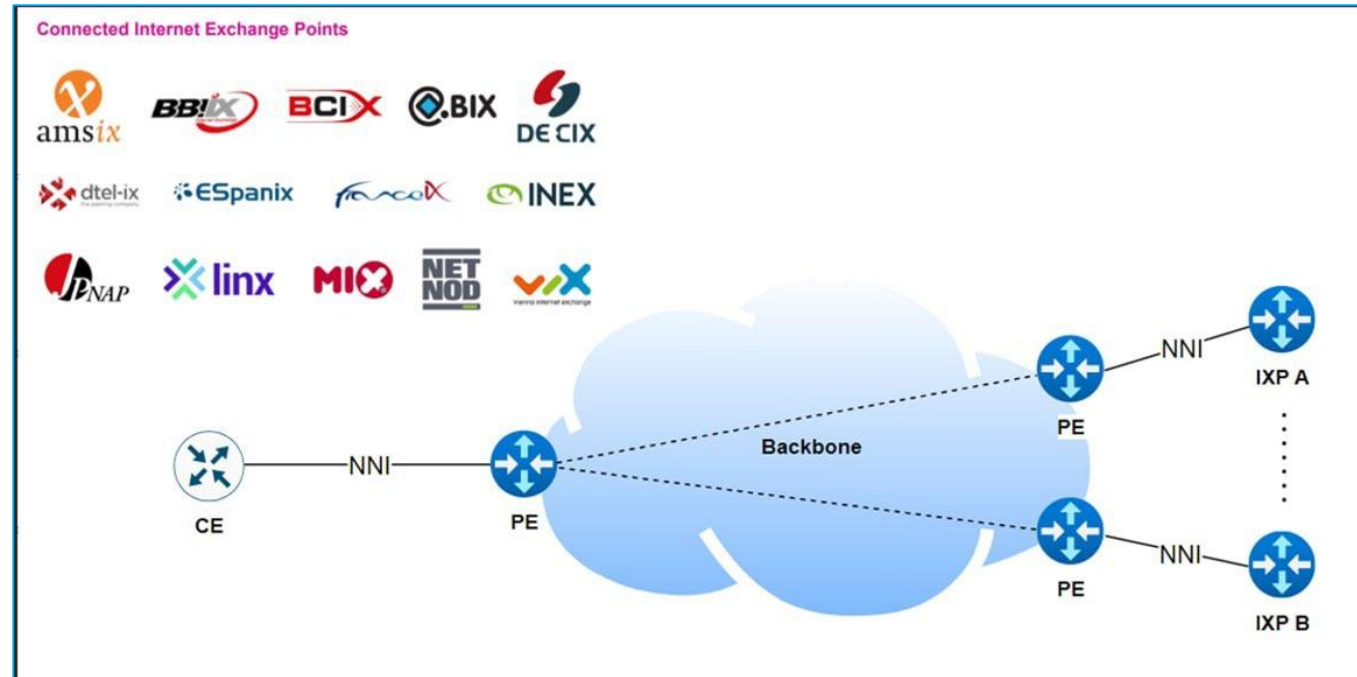
How Akamai use IXes



- Akamai (Non-network CDNs) do not have a backbone, so each IX instance is independent
- Akamai uses transit to pull content into the CDN servers
- Content is then served to peers over the IX
- Enable IPv6 with all IXes
- Connect to multiple IXes to enhance reachability and performance

Remote IX / Resellers

1. Remote IX connections
 1. Enable remote peering, improve network performance
 2. Simple connection: Dedicated Port or VLAN
 3. Flexible bandwidth, pay as you go
 4. Lower setup cost
 1. no need to build infrastructure
 5. Offload operational workload
 6. Evaluate traffic before setup POP
 7. Simple process:
 1. legal, language, currency
 8. Remote peering providers:
 1. e.g. RETN, IPTP, Epsilon, etc



Interconnect between IXes

1. Interconnect between IXes are getting more popular

1. Expand market coverage
2. One-stop-shop for customers

Examples:

1. JPIX and CoreSite Any2West, NYIIX LA, HKIX, LINX, KINX, BKNIX, TPIX
2. TPIX and JPIX, DE-CIX and AMS-IX
3. HKIX and JPIX
4. BBIX and KINX, JKT-IX
5. MHK-IX and BBIX / GetaFIX

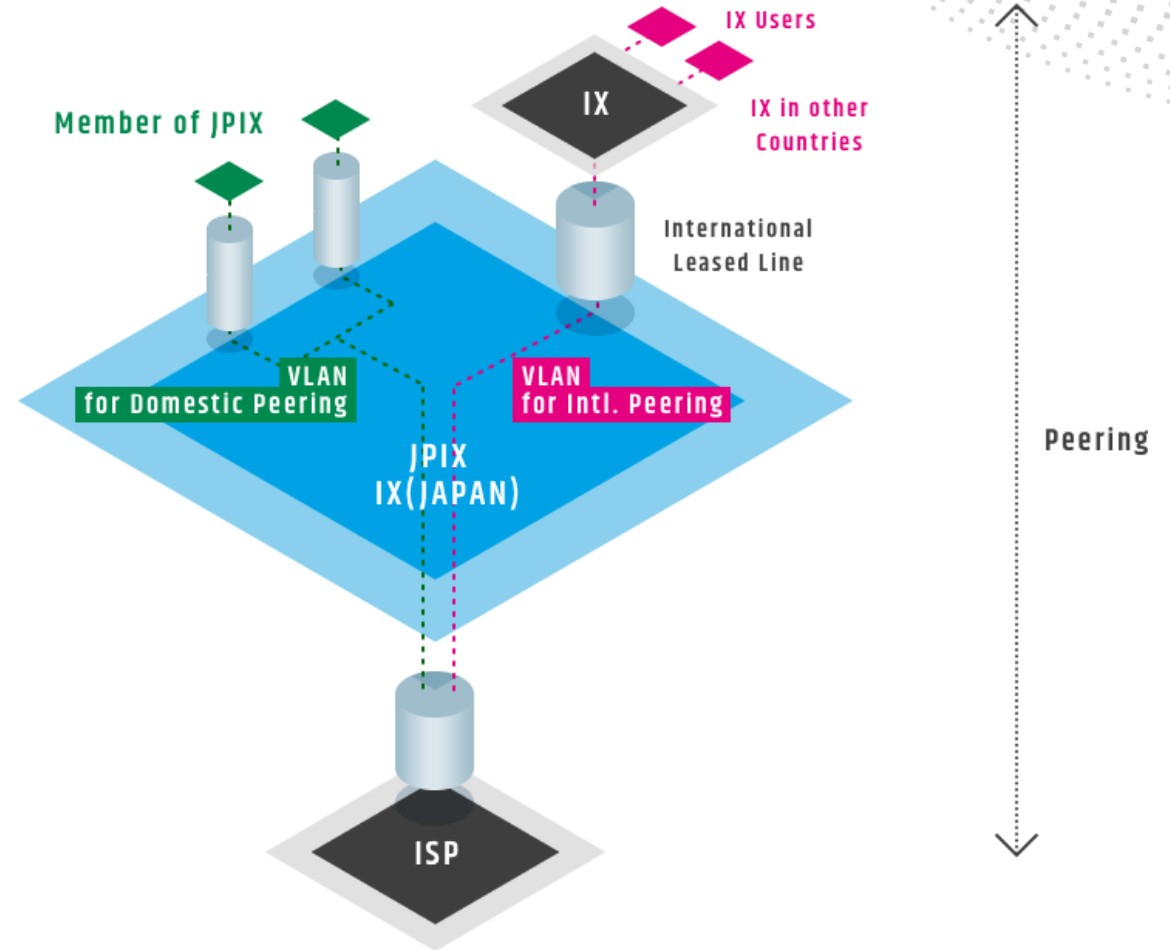


Image source: <https://www.jpix.ad.jp/en/service/?p=3590>



Peering Challenges

- Peering with incumbents
- Peering disputes
- Change in peering policy
- Lack of neutral Data Centers and IXes

Peering with incumbents

Incumbents peering policy:

1. Restrictive peering policy
2. Do not peer in-country
3. Expensive paid peering

Peering Disputes:

1. SK Broadband vs Netflix
2. Deutsche Telekom vs Meta



Change in peering policy

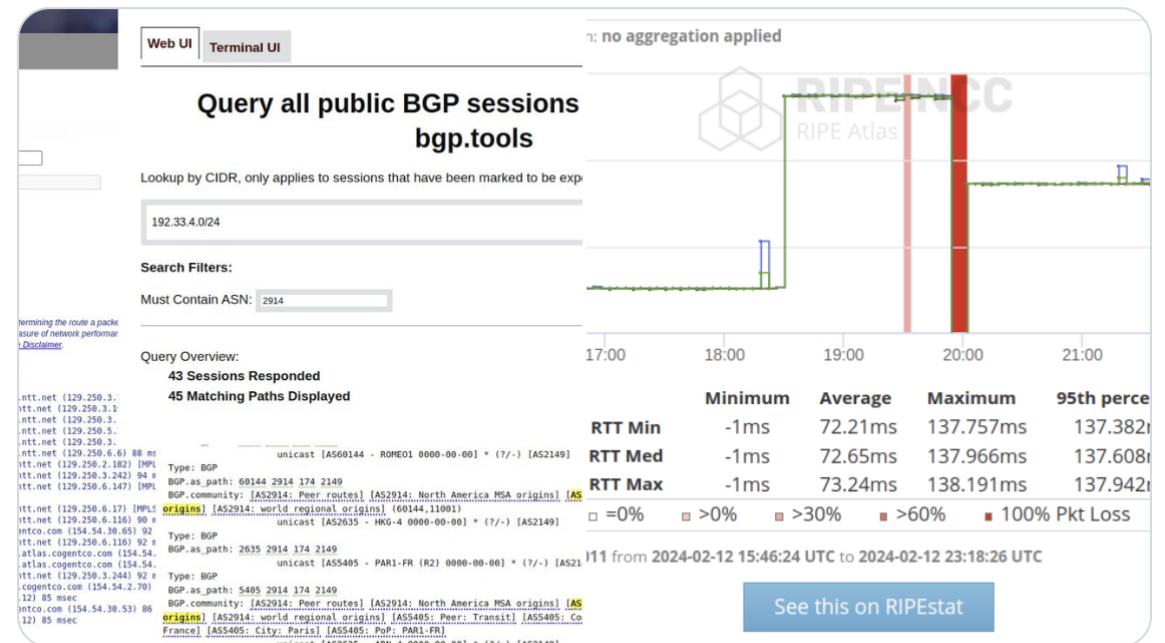
Change in peering policy:

1. Amongst tier-1 transit providers:
 1. Cogent vs NTT
 2. Cogent vs Tata
2. Change from free to paid peering
3. Change from local to out-of-country peering
4. Change from open to selective peering policy
5. Providers leaving some IXes, moving towards PNIs
6. In-metro redundancy
e.g. Amazon, Google
7. Upgrade when > 50% utilization



It would appear that AS174 (Cogent) and AS2914 (NTT) have depeered in Europe. Causing a decent latency spike between single homed customers on both sides in Europe.

This is not Cogent's first de-peering, their wikipedia page has a mostly complete list en.wikipedia.org/wiki/Cogent_Co...



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Lack of neutral Data Centers and IXes choices

Data Center selections:

1. Lack of neutral Data Centers
 1. e.g. Taiwan has mainly only Chief LY and CHT Banqiao Data Centers
2. Success case: Telehouse Bangkok
 1. Ranked #1 within a few years

Name Management	CLLI NPA-NXX	City Country	State Postal Code	Networks
Chief LY Building Taipei Chief Telecom Inc.	-	Taipei TW	- 11491	135
Chief HD Building Taipei Chief Telecom Inc.	-	Taipei TW	TW 114	58
CHT Taipei Banqiao IDC Chunghwa Telecom Co., Ltd.	-	New Taipei City TW	- 220	18
CHT Taipei Aikuo IDC Chunghwa Telecom Co., Ltd.	-	Taipei TW	- 106	8
Academia Sinica Department of Information Technology Services... Academia Sinica Department of Information Technology Services...	-	Taipei TW	- 11529	4
APT Nankang IDC Asia Pacific Telecom	-	Taipei TW	- 115	4

Name Management	CLLI NPA-NXX	City Country	State Postal Code	Networks
Telehouse – Bangkok Telehouse - Global Data Centers	-	Bangkok TH	- 10310	59
TCC Technology Data Center- Bangkok,Thailand (TCC BNDC,T... TCC Technology Co., Ltd	-	Bangkok TH	Bangkok 10260	53
CS LoxInfo Data Center - The Cloud CS Loxinfo Public Company Limited	-	Bangkok TH	- 10230	34
True IDC - North Muang Thong, Thailand True Internet Data Center, Thailand	-	Pakkret TH	Nonthaburi 11120	34
NT Bangrak Tower NATIONAL TELECOM PLC	-	Bangkok TH	- 10500	32
JasTel Data Center (Thailand) JasTel Network (Thailand)	-	Nonthaburi TH	- 11120	21

IXes selections:

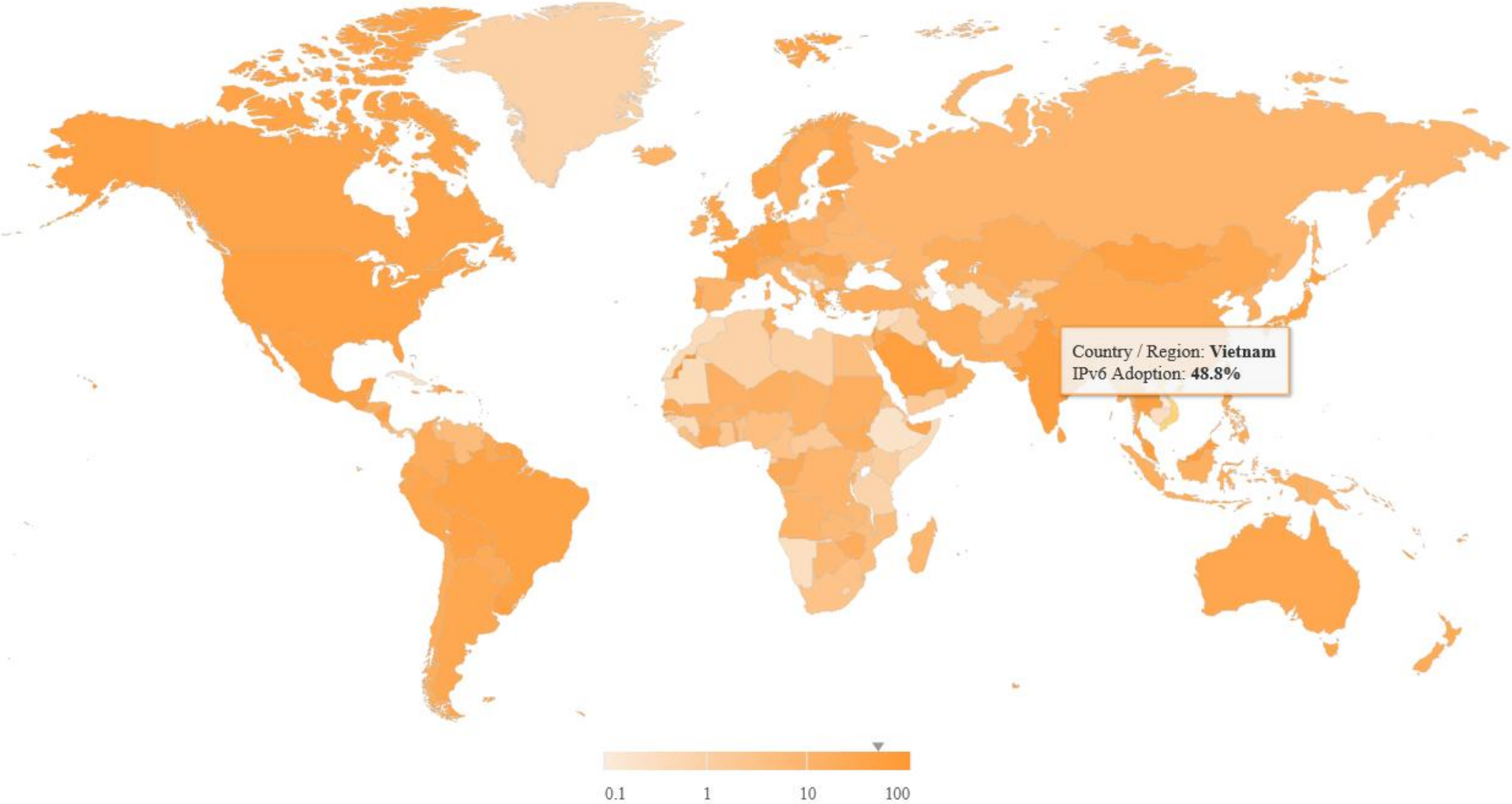
1. Lack of neutral Internet Exchanges
 1. e.g. Taiwan is mainly TPIX and TWIX, but both are under Chunghwa group
2. Akamai support on IXes
 1. Connect to new IXes as initial members
 1. e.g. connected to EIE Jakarta recently, EIE Kuala Lumpur, BBIX Vietnam are under discussions
 2. Connect to multiple IXes in a metro, improve market competitiveness
 1. e.g. EIE Perth, EdgeIX Perth / Brisbane / Melbourne are under discussions



Akamai IPv6

- IPv6 Adoption Visualization
 - Vietnam overall and major Vietnam ISPs
- IPv6-only
 - IPv6-to-origin
 - Internal Infrastructure

IPv6 Adoption by Country / Region



Vietnam: 48.8%

Viettel: 55.7%

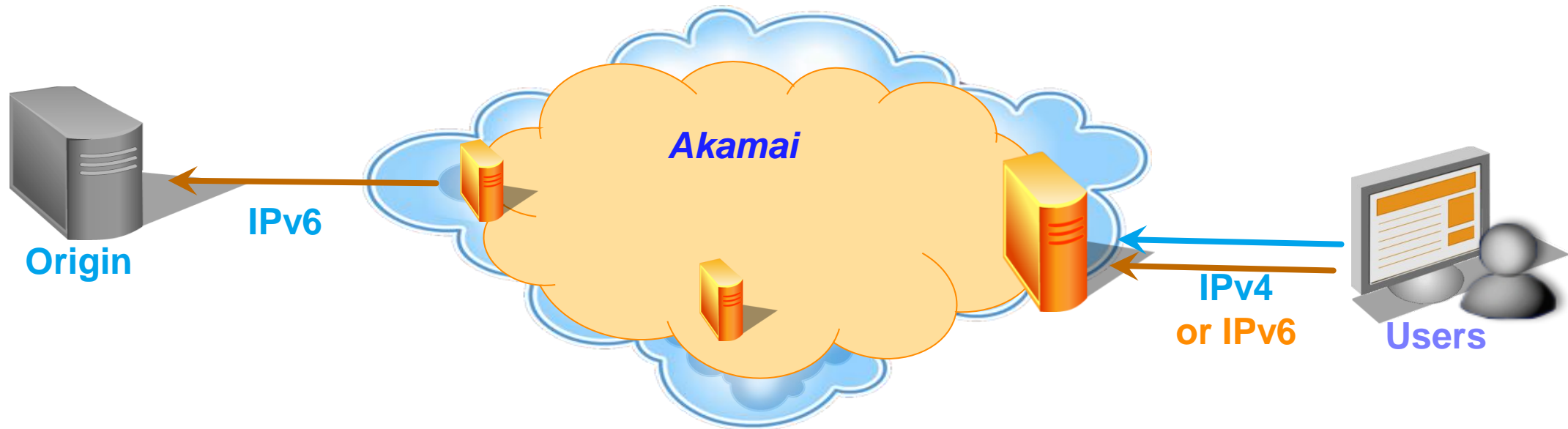
FPT: 50.6%

VNPT: 40.2%

IPv6-only

1. Content Delivery

1. Enable dual-stack for all customer content by default
2. Support IPv6-only origin



2. Infrastructure: IPv6-only for internal point-to-point links

Summary

- **Akamai Connected Cloud**
 - Highly distributed edge servers
 - Akamai Global Cloud Infrastructure
- **Peering Trends**
 - Port Speed, Optics
 - IX route servers, peering automation
 - New IXes, Remote IX, Interconnect between IXes
- **Peering Challenges**
 - Peering with incumbents
 - Peering disputes, change of peering policy
 - Lack of neutral Data Centers and IXes choices
- **IPv6**
 - Vietnam is ~50% IPv6 adoption, Akamai support on IPv6-only infrastructure

Questions?

✉ Kams Yeung kams@akamai.com

↻ Peering Information:

- CDN Peering: <https://as20940.peeringdb.com>
- Prolexic DDoS Mitigation: <https://as32787.peeringdb.com>
- Linode: <https://as63949.peeringdb.com>

🌐 IPv6 Information: <https://www.akamai.com/ipv6>

Cảm ơn (Thank You)!