

# The Role IXPs and Peering Play in the Evolution of the Internet



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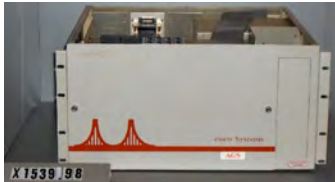


## A Quick Introduction to IX Reach

- › Founded in 2007
- › Global leading provider of wholesale carrier solutions:
  - › IX Remote Peering
  - › Low Latency Global High-Speed Point-to-Point and Multipoint Layer 1 / Layer 2 Capacity
  - › Metro Ethernet and DWDM in Major Cities – London, Amsterdam, Frankfurt, Paris, New York
  - › BGP Transit
  - › Cloud Connectivity (AWS Direct Connect / Azure Express Route / Google Cloud Interconnect)
  - › Colocation
- › Present in 30 major global cities
- › 90+ data centres on-net
- › 26 Internet Exchanges partners globally

## Internet Exchange Points – The Early Days

- › Early Internet evolved in the US
- › In the early to mid 90s everyone bought Transit from Tier 1 ISPs
- › Most content originated within the US, long international circuits
- › This led to high costs for local operators
- › They ultimately gathered together to create local points of interconnections to reduce costs and improve user experience
- › This resulted in more traffic remaining within national borders
- › The earliest IXPs were set up by academic and research networks or by telecom operators



CIX – Cisco Router - Santa Clara



MAE-East 1992



MAE-East home - garage



First Web Server - CERN

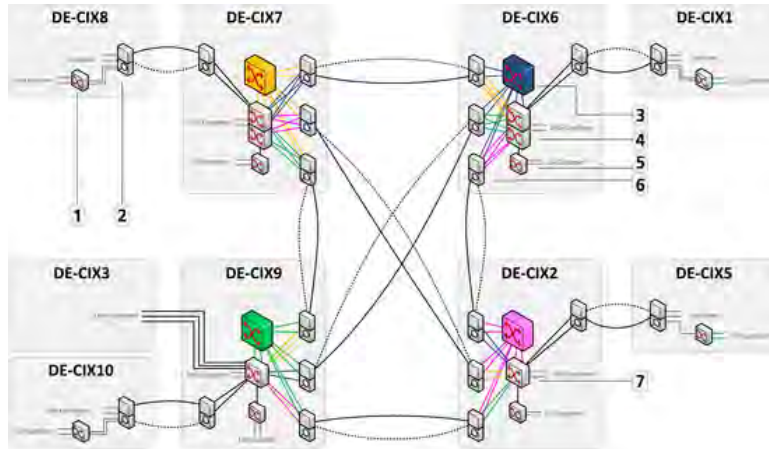


MAE-West

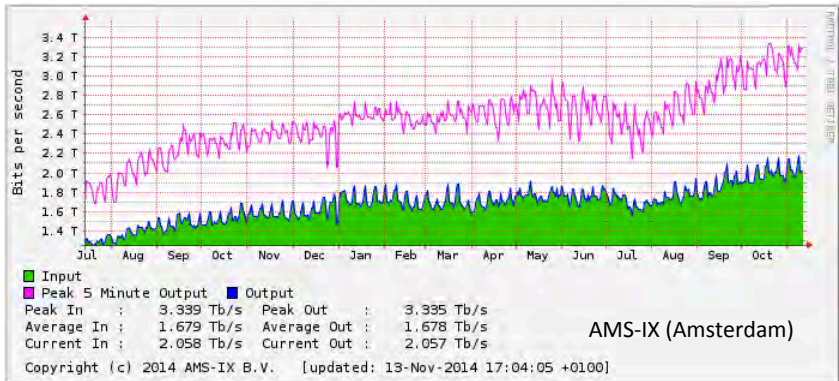
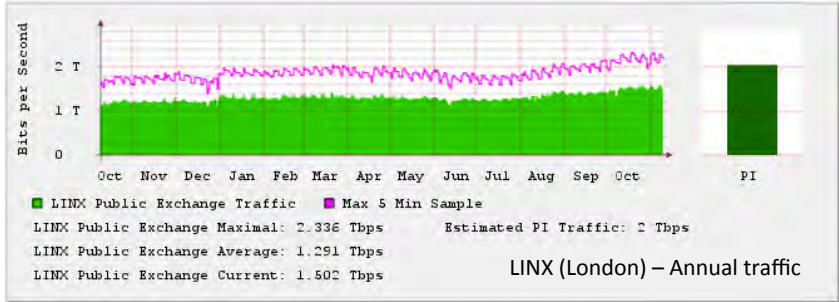
## Internet Exchange Points – The Situation Today

- › 400+ Internet Exchanges around the world
- › The majority, and largest, are concentrated in Europe (now over 50)
- › Daily traffic volumes are comparable to those seen by largest global Tier 1 ISPs
- › The largest are increasing their services and expanding to become multi-site IXPs (or bigger brands)
- › IXPs are widely considered to help develop markets
- › IXPs are critical for understanding how content is distributed in today's Internet and how the different networks are adapting to the changing nature of content distribution
- › Lower costs of peering e.g. resellers drive viable peering over longer distances

# Example Major IXP Infrastructure



- 1 Alcatel-Lucent 7210 SAS-M
- 2 ADVA FSP3000R7 for Remote-Locations
- 3 Alcatel-Lucent 7950XRS20 Core-Node
- 4 Alcatel-Lucent 7950XRS40 Edge-Node
- 5 Alcatel-Lucent 7210 SAS-M
- 6 ADVA FSP3000R7 for Interconnect-Connections
- 7 Alcatel-Lucent 7950XRS20 Edge-Node



## Peering Patterns Geographically

- Lack of local peering infrastructure normally means higher bandwidth pricing in many emerging markets (history repeating itself)
- Traffic is sent internationally that would be more economical to keep local, e.g. as seen in the Middle East and parts of AsiaPac
- The US, historically, didn't have the same commercial drivers being dominated by national Tier1s. IXPs were often commercially operated by these operators e.g. Worldcom and later as a secondary value add service e.g. Equinix and Telehouse
- Expanding IXPs helps keep local traffic local, unburdens expensive inter-regional links and stimulates investment in local networks

## Advantages of peering at an IXP

- › Settlement free interconnect between two networks
- › Additional redundancy in network
- › Distributed capacity (across multiple exchanges)
- › Improved performance / user experience – closer to the eyeballs
- › More control over routing, latency, traffic optimisation
- › Improved resilience to DDOS attacks – esp. for DNS service providers and TLDs
- › Reduced cost
- › Community and Marketing
- › Perception

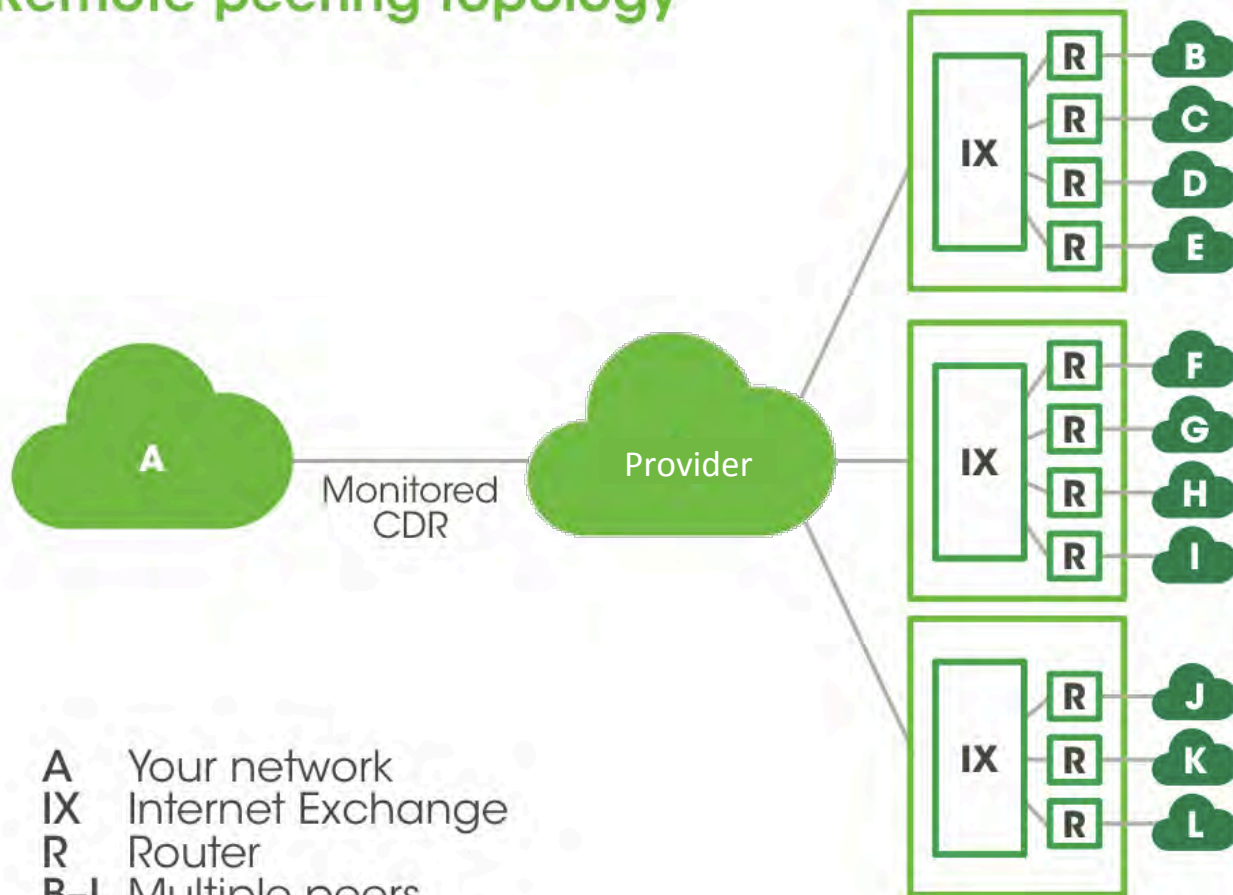
Most of the above are important to the gaming industry!

## Influence from Remote Peering

- › AMS-IX - >75% of new members come from reseller partners (2013)
- › No local infrastructure required adjacent to the IXP
- › One stop solution - Typically bundled pricing and deployment model
- › Lower Opex and Capex costs
- › Fast turn up compared to traditional physical deployment (hours vs weeks)
- › Enables peering to be more accessible to smaller/medium sized networks and developing markets
- › Single point of contact for support
- › Reduced number of supplier contracts



# Remote peering topology



- A Your network
- IX Internet Exchange
- R Router
- B-L Multiple peers

## Trends and Evolution

- Smaller networks become more global as transport costs fall and remote peering becomes more common
- Move of content from being seen as a customer to being a main player in the Internet core
- Increased interconnection between regional networks and major content providers (“donut peering”)
- Shift of traffic away from historical Tier1s towards direct peering between networks and content
- Increasingly content will be delivered directly into a network operator’s network

## More information



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