

Why peering is still relevant in the Middle East?

Peering Forum MENOG 15 - Dubai

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Outline

- Internet topology: transit vs peering
- Setting the scene in the Middle East
- To peer or not to peer (APBDC)
- Where and how to start peering?

- Internet exchange world update
- Why do IXP matter? Benefits and dimensions
- Internet carrier interconnection agreements
- MENA update

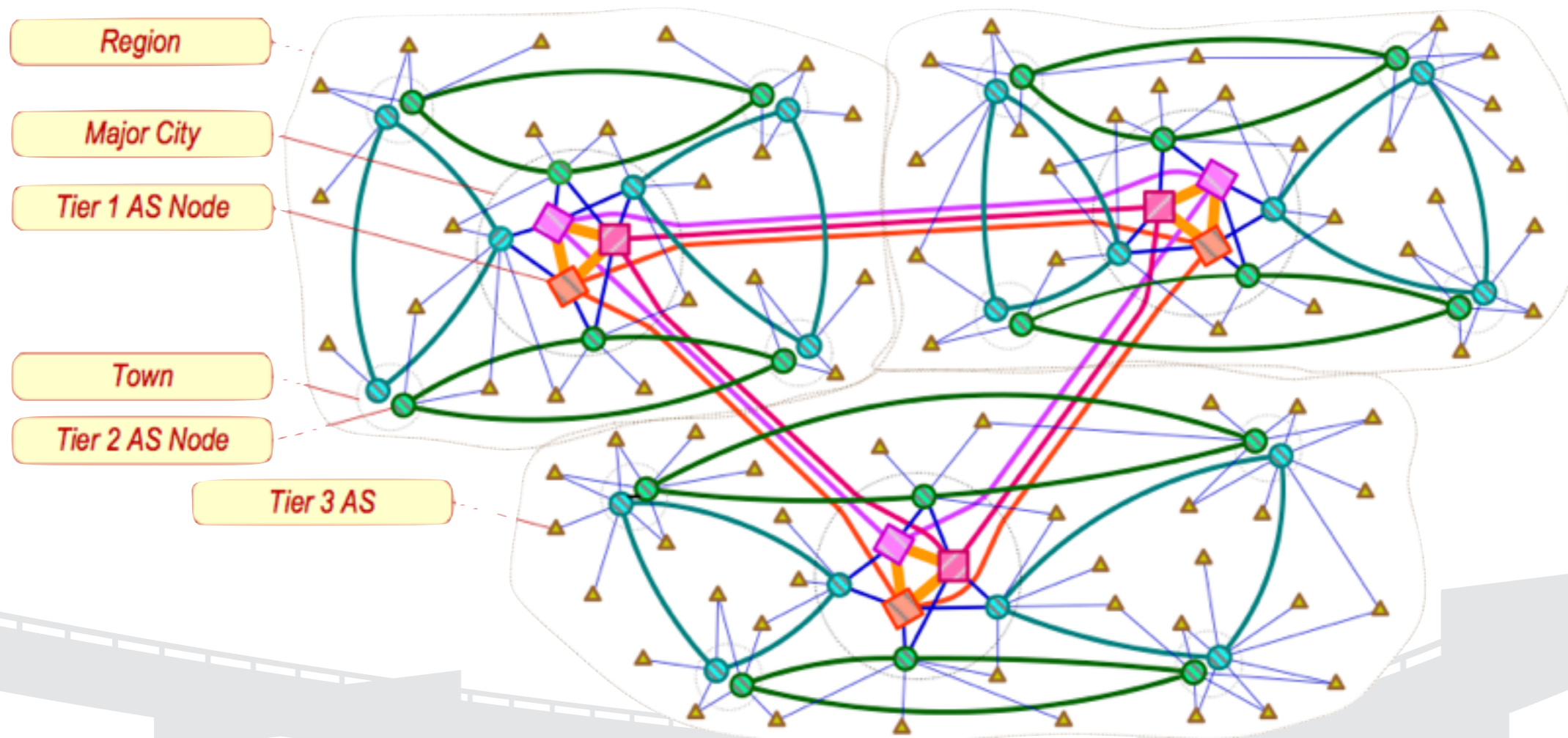
Internet topology

- The Internet consists of *thousands* of Internet Service Providers (ISP) or carrier networks, **interconnected** with one another in a sparse mesh.
- Each of the interconnecting links between networks takes one of two forms:
 - **Transit** agreements
 - **Peering** agreements.
- Depending on the agreements, each network defines routing policies which determine which links will packets follow.

Transit vs Peering

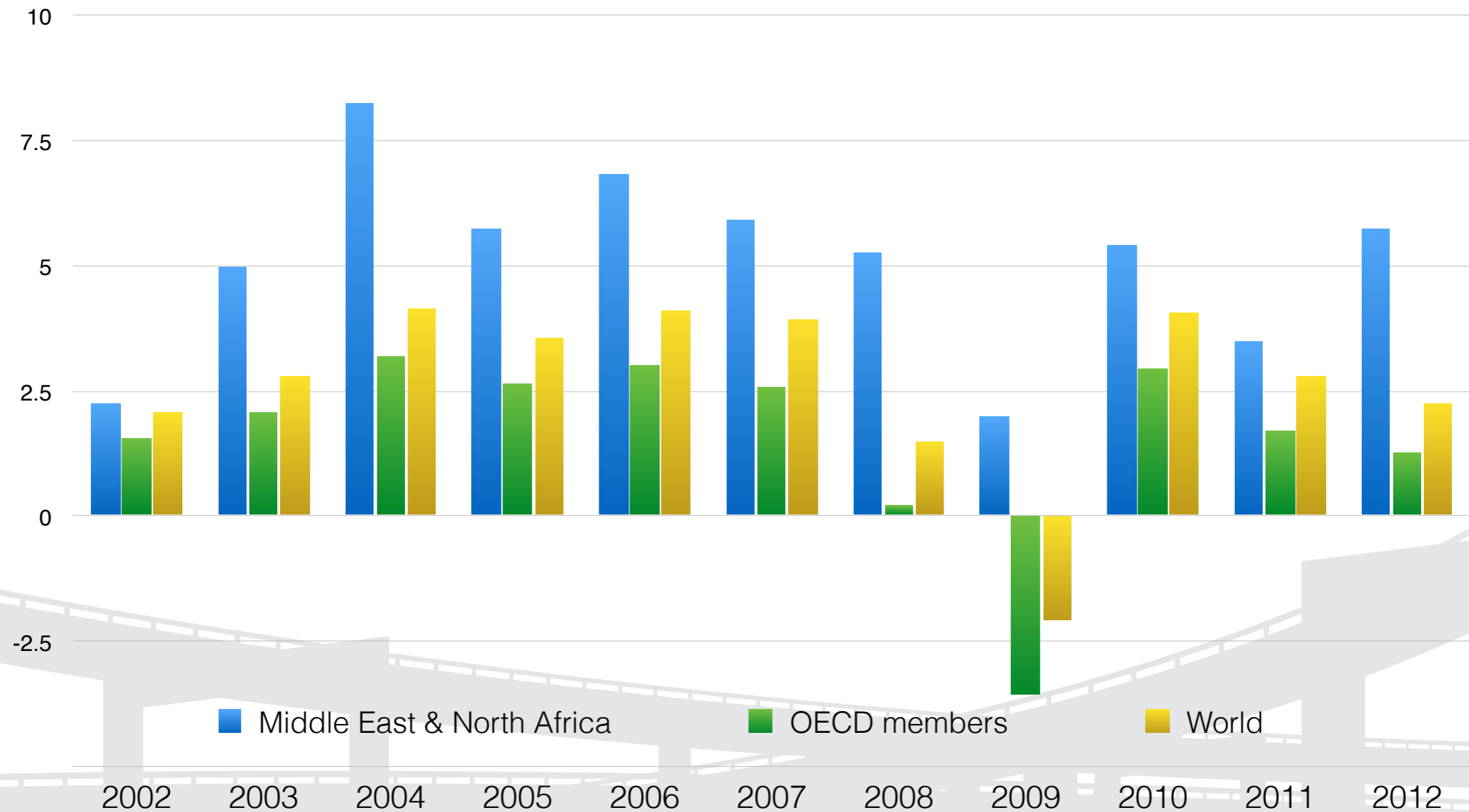
- **Transit agreements** are commercial contracts in which a customer pays a service provider for access to the entire Internet. Transit agreements are most common at the edges of the Internet.
- **Peering agreements** are the carrier interconnection agreements that allow carriers to exchange traffic bound for one another's customers; they are most common in the core of the Internet and are the true creators of value of the Internet.

Core and edge ISP interconnections



Setting the Middle East scene

Gross Domestic Product growth (2002 - 2012 period)



Availability of physical infrastructure

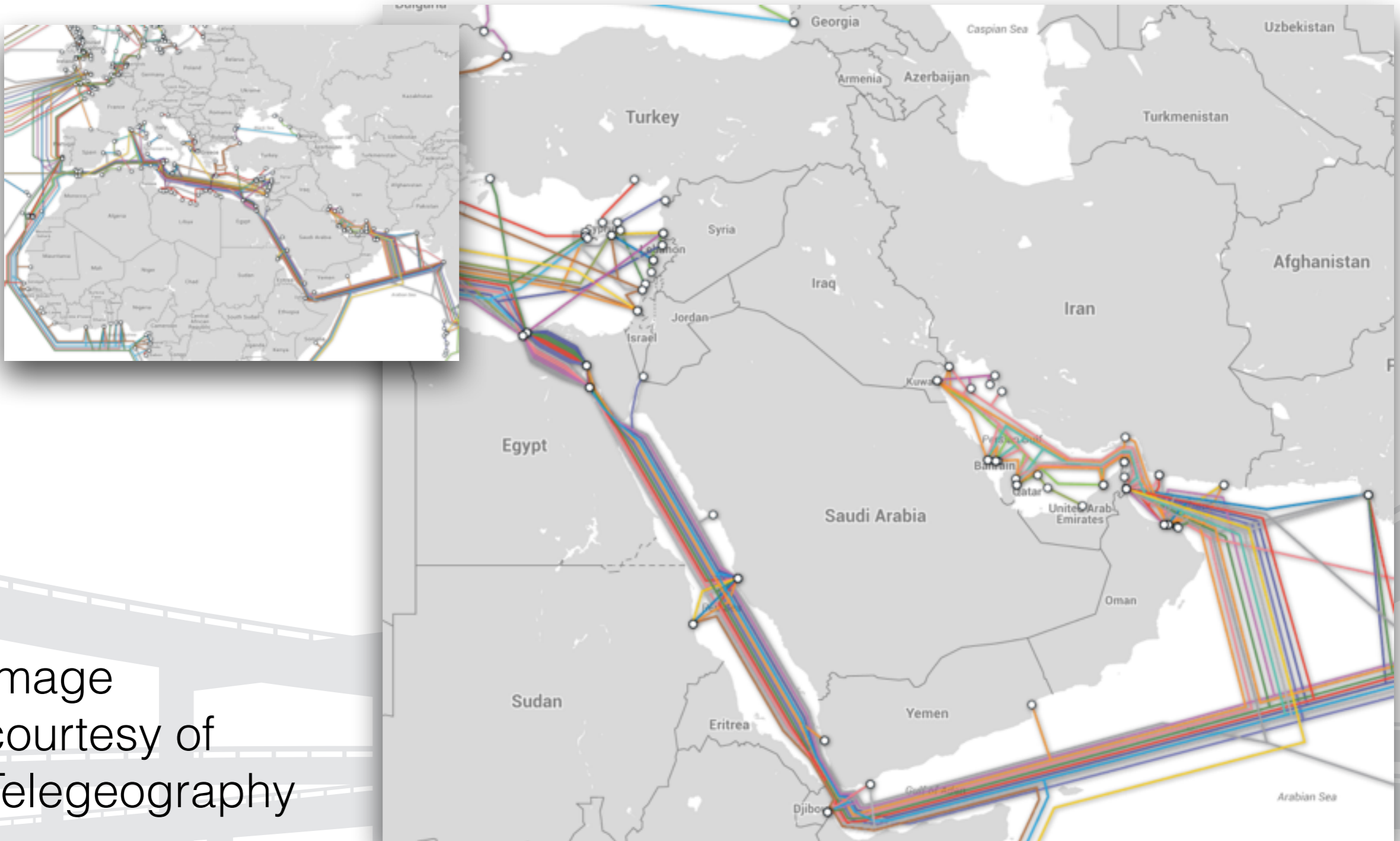


Image
courtesy of
Telegeography

Visualisation of BGP sessions

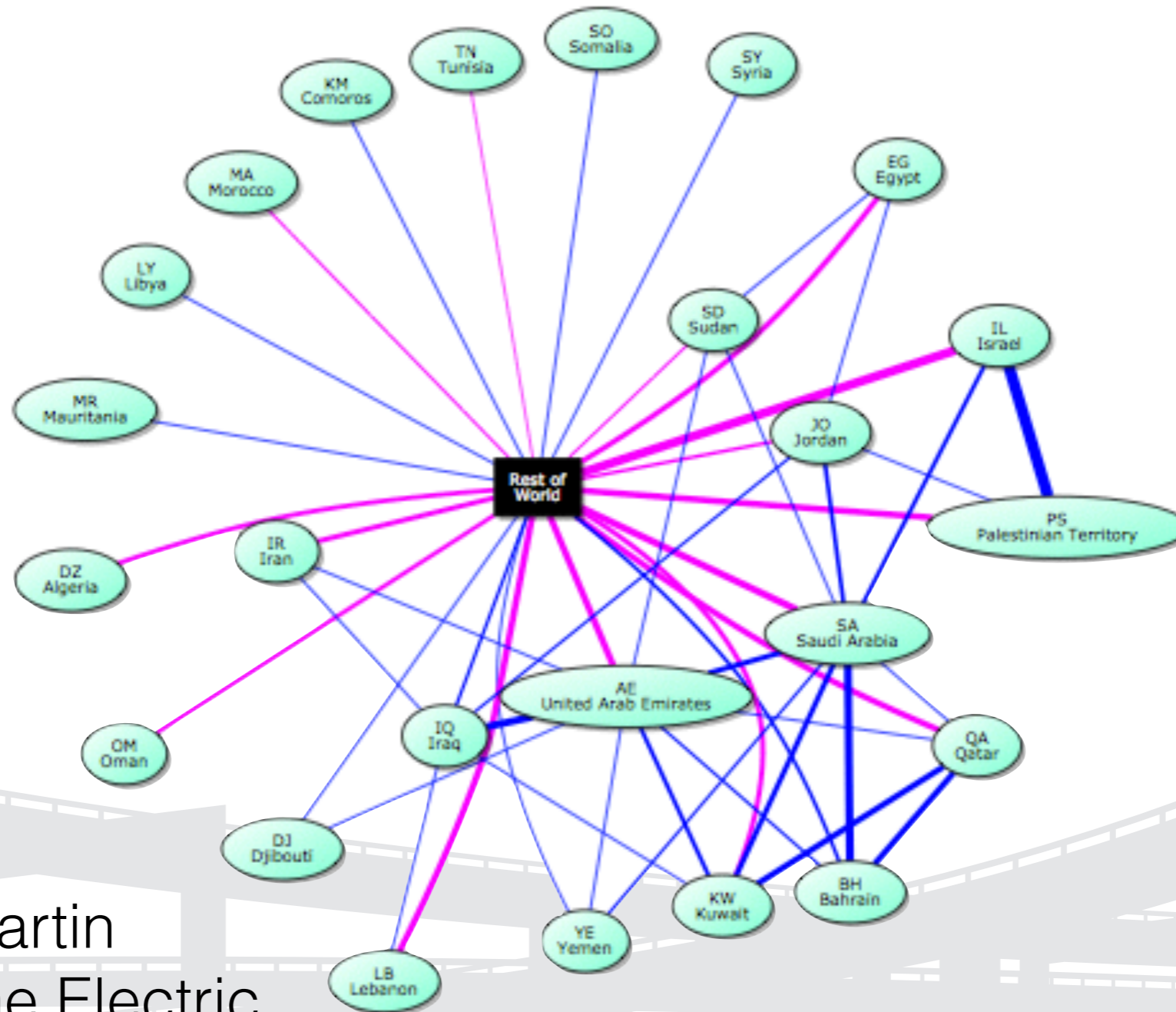


Diagram
courtesy of Martin
Levy/Hurricane Electric

Example of traffic routing

Routing between Sudan and Jordan shows absence of cross-country logical adjacency

```
traceroute to amra.nic.gov.jo (193.188.66.103), 30 hops max, 60 byte packets
 1  41.67.17.1 (41.67.17.1)  2.764 ms  2.785 ms  2.767 ms
 2  196.1.197.233 (196.1.197.233)  1.467 ms  1.916 ms  1.791 ms
 3  196.202.137.33 (196.202.137.33)  13.795 ms  13.768 ms  13.736 ms
 4  196.202.137.22 (196.202.137.22)  14.734 ms  14.701 ms  14.552 ms
 5  212.0.131.2 (212.0.131.2)  14.409 ms  14.427 ms  14.457 ms
 6  84-235-111-160.igw.com.sa (84.235.111.160)  17.388 ms  17.332 ms  17.231 ms
 7  84-235-94-113.saudi.net.sa (84.235.94.113)  33.683 ms  32.248 ms  32.141 ms
 8  so-3-1-0.mrs13.ip4.gtt.net (77.67.76.21)  285.508 ms  291.614 ms  291.451 ms
 9  et-2-1-0.lon25.ip4.gtt.net (141.136.110.229)  291.221 ms  291.062 ms  290.889 ms
10  jordan-mobile-gw.ip4.gtt.net (141.136.97.86)  170.955 ms  170.809 ms  170.754 ms
11  IP93-191-177-221.mada.jo (93.191.177.221)  172.267 ms  172.120 ms  172.152 ms
12  IP93-191-177-30.mada.jo (93.191.177.30)  173.235 ms  173.099 ms  172.022 ms
13  193.188.70.250 (193.188.70.250)  172.334 ms  172.299 ms  172.580 ms
```

**To peer
or not to peer?**



Arguments against peering

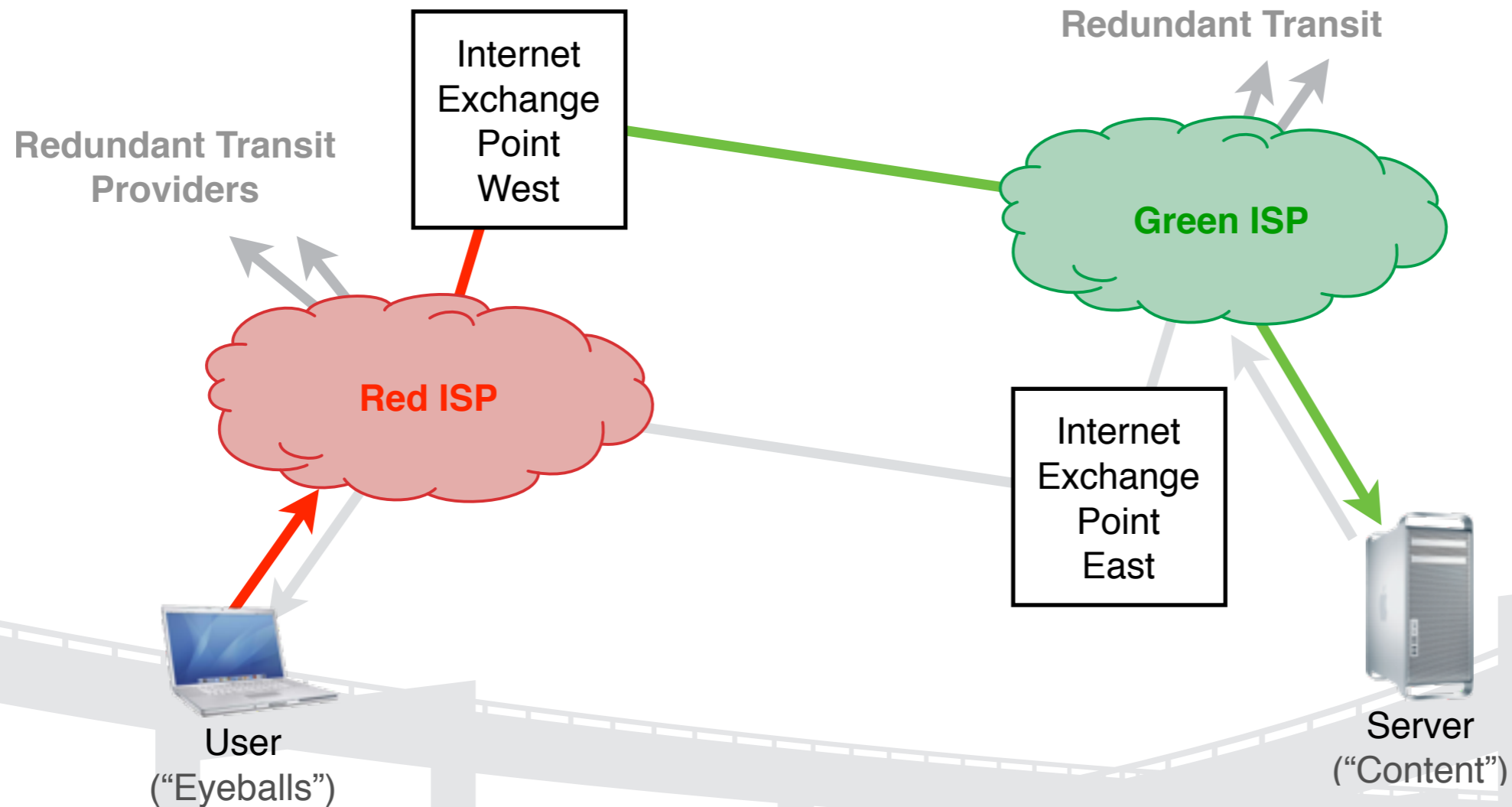
- Peering introduces network complexity that my network just doesn't need
 - Peering circuits, BGP engineers, peering manager
- Easier to pay for transit, which is getting cheaper all the time
 - Price drops 30% (\$3/Mpbs > \$2/Mbps)
 - Volumen increases 60% (6Gbps > 10 Gbps)
 - Y2T cost +\$20,000

Benefits of peering

- Economic
 - Improve the average per-bit delivery cost of your network, optimising your overall connectivity costs.
- Non-financial
 - Network performance benefit from direct connections.
 - Improvement in network resiliency because of more paths are available.
 - Peering improves the reach of your network
 - Snowden revelations: NSA and GCHQ

Hot potato routing and IXPs

Packets from the user are routed by Red ISP via IXP West



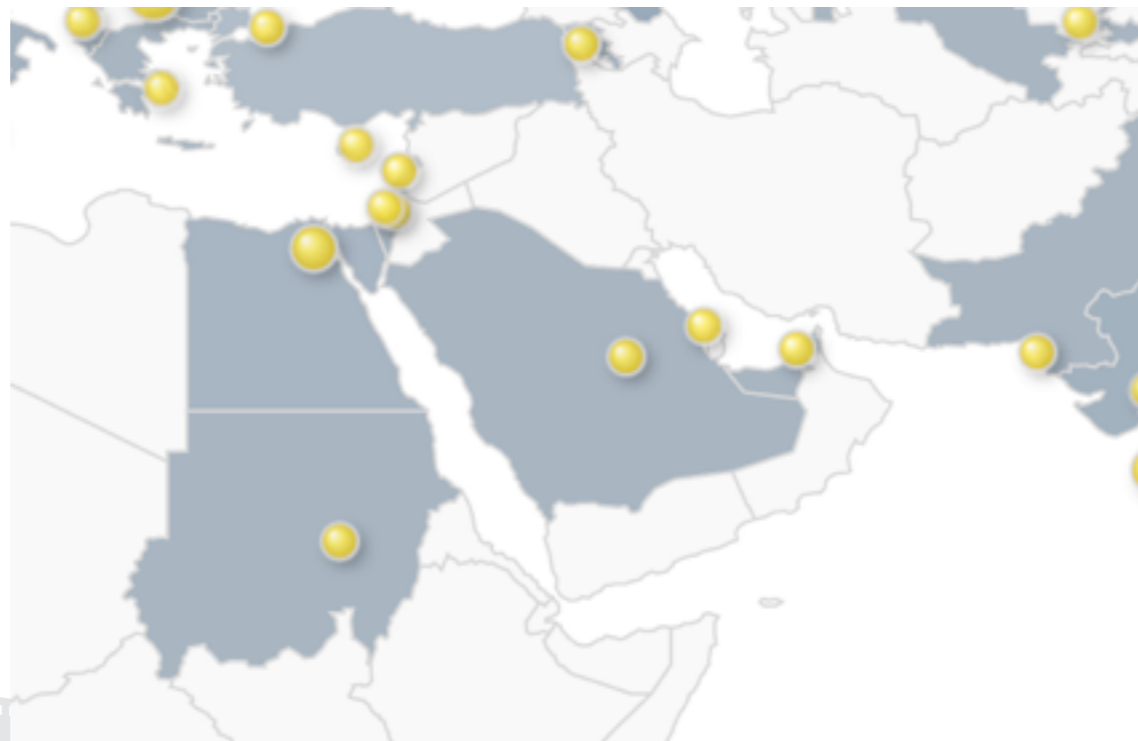
Green ISP backhauls from distant IXP and delivers to customer

Where and how to start peering?

- Peer nationally (at least once inside your home country) to save on international transit costs.
- Peer regionally (across cities) to save on cross-country transit.
- Internet exchange points are the most common meeting point for public peering.

Find your Internet exchange...

- PCH's global directory of Internet Exchanges, or Euro-IX, or PeeringDB.



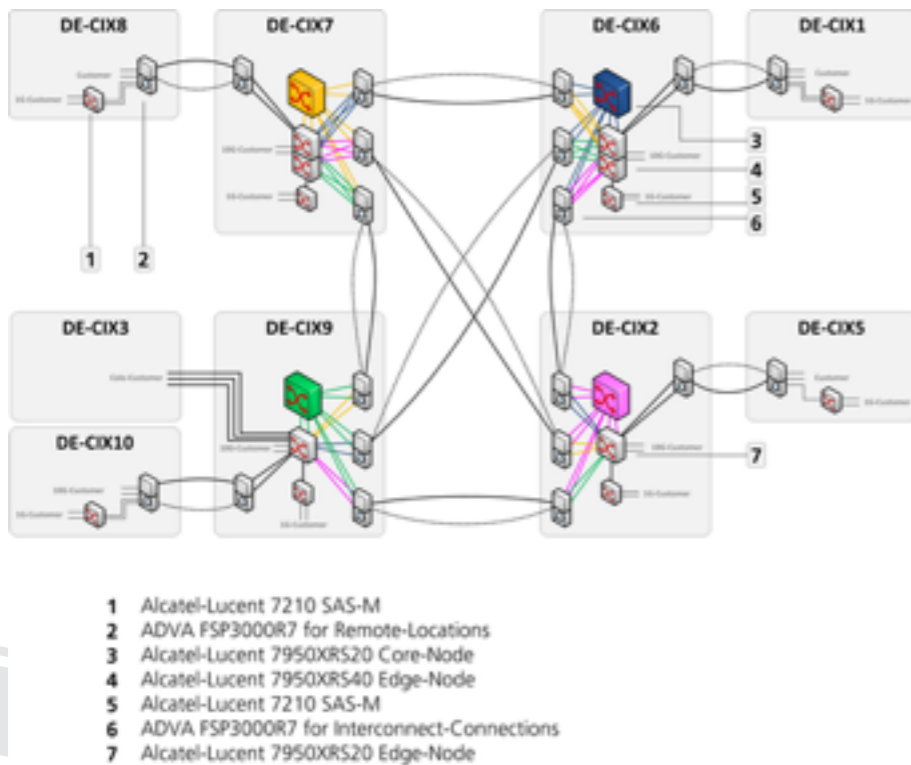
... or build your own!

Why do IXPs matter?

- Physical infrastructure (layer 2 switching) that facilitates network interconnection.
 - Cost and performance benefit.
 - Natural ecosystem for content driven systems to develop.
 - Improved skills and knowledge
 - Increases autonomy as a region.
 - Privacy and cyber security advantages

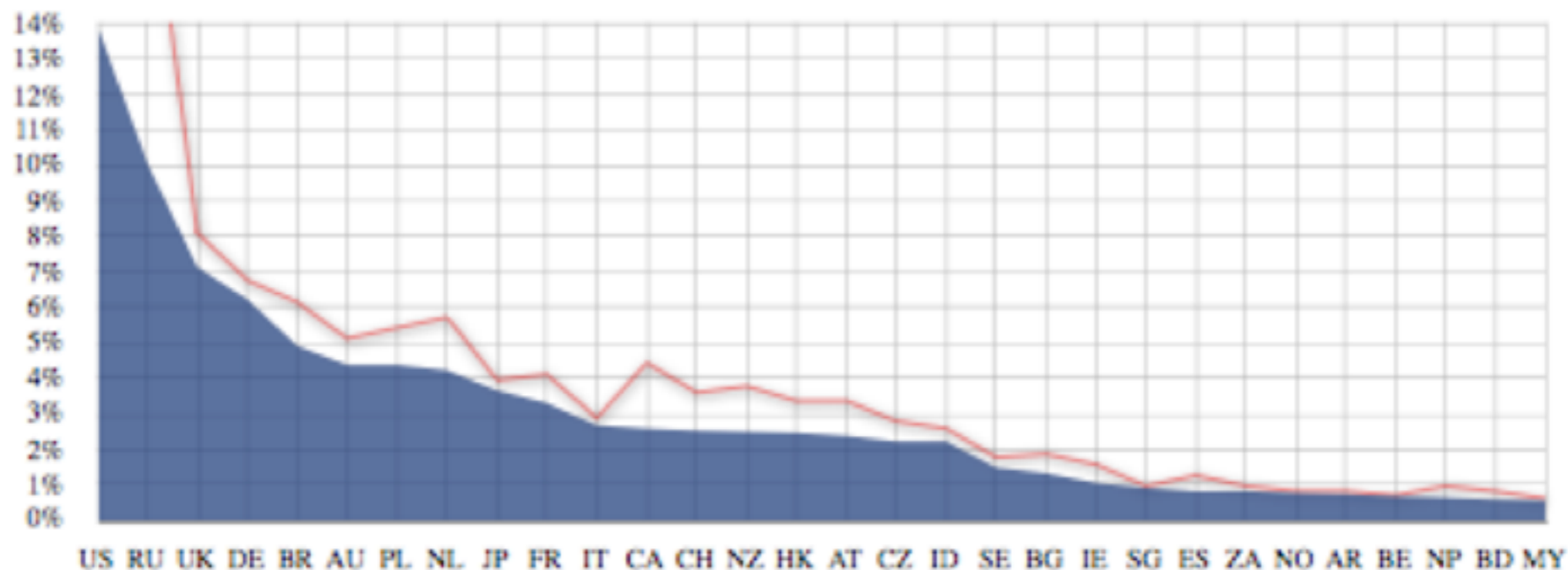
The dimensions

- Follows 90/10 rule: 90% is human engineering and 10% is technical work.



Survey of Internet carrier interconnection agreements

- PCH conducted a survey in 2011 to understand the nature of Internet carrier interconnection peering agreements
 - 142,210 agreements collected and analysed.
 - 4,331 ISP networks represented in the survey (86% of the world's Internet carriers) and incorporated in 96 countries.

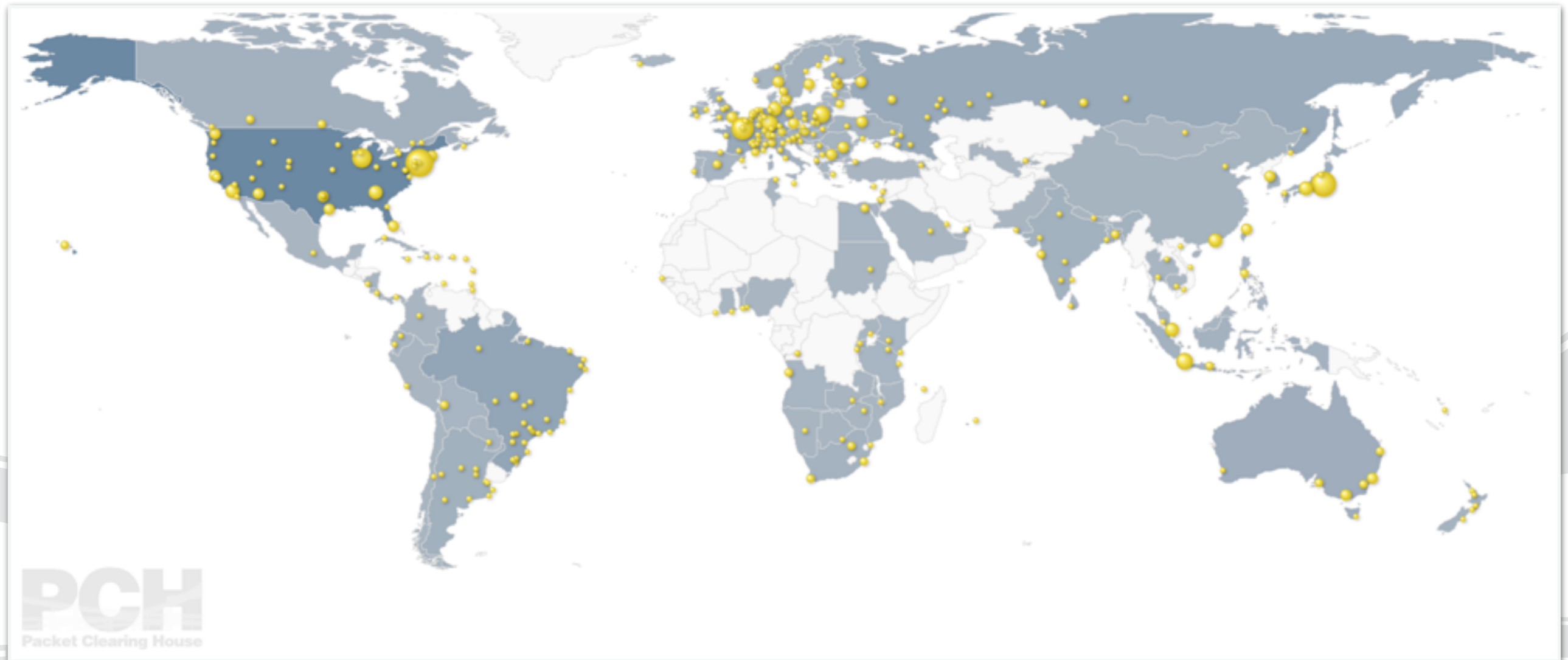


Survey of Internet carrier interconnection agreements

- Peering agreements are **informal** and **symmetric** by nature:
 - 141,512 agreements (99.51%) were “handshake” agreements and 698 (0.49%) were formalised in written contracts.
 - 141,836 agreements (99.73%) had symmetric terms and 374 (0.27%) had asymmetric terms.
- Internet carriers have a **common understanding** of the rules of the game and **voluntarily** agree to exchange traffic at no cost because its beneficial to them.

World update

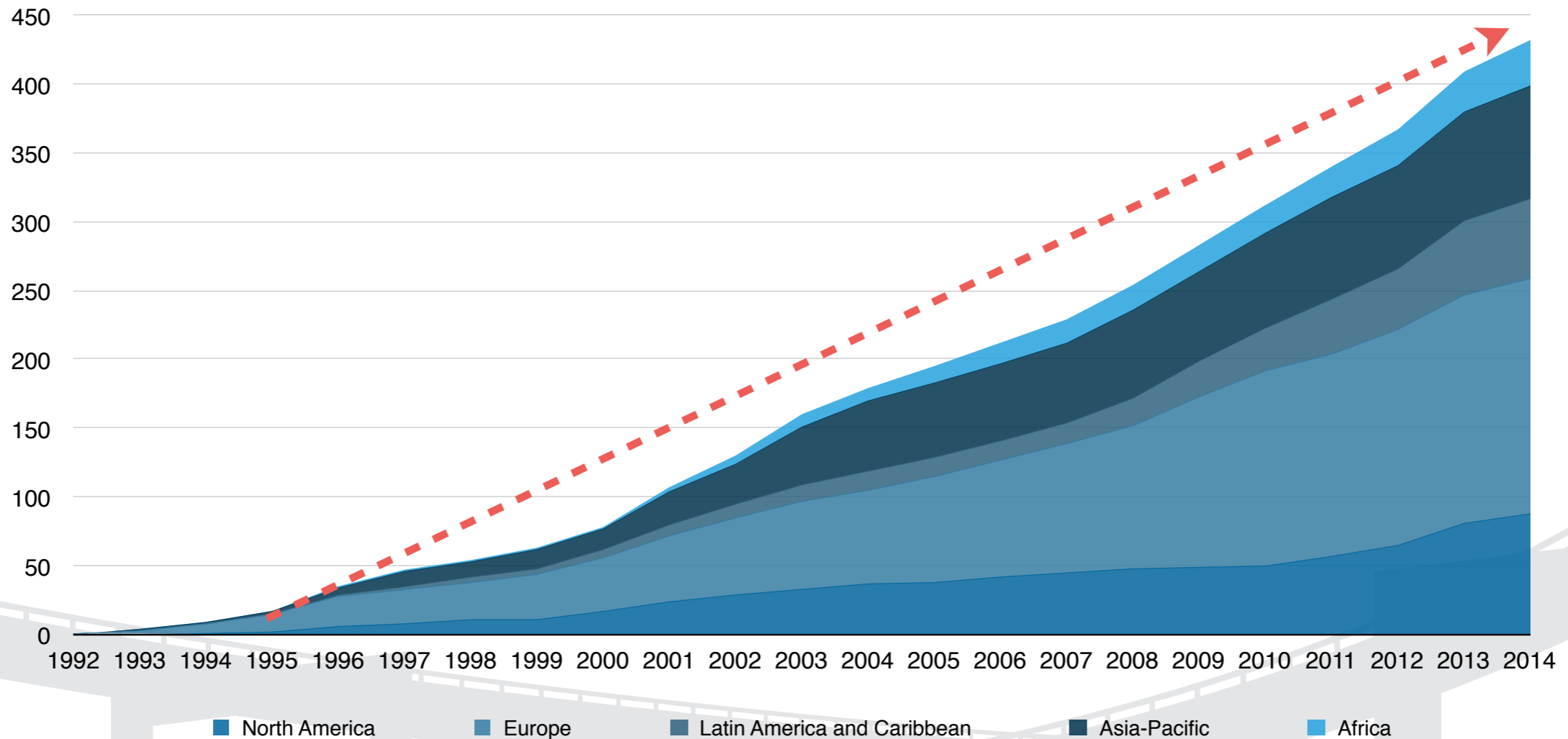
- Internet exchange points largely follow population density patterns and economic activity (Internet/digital economy). The policy and regulatory environment also influences their existence.



World update (ii)

- 440 active IXPs. An average of one new IXP every three weeks.

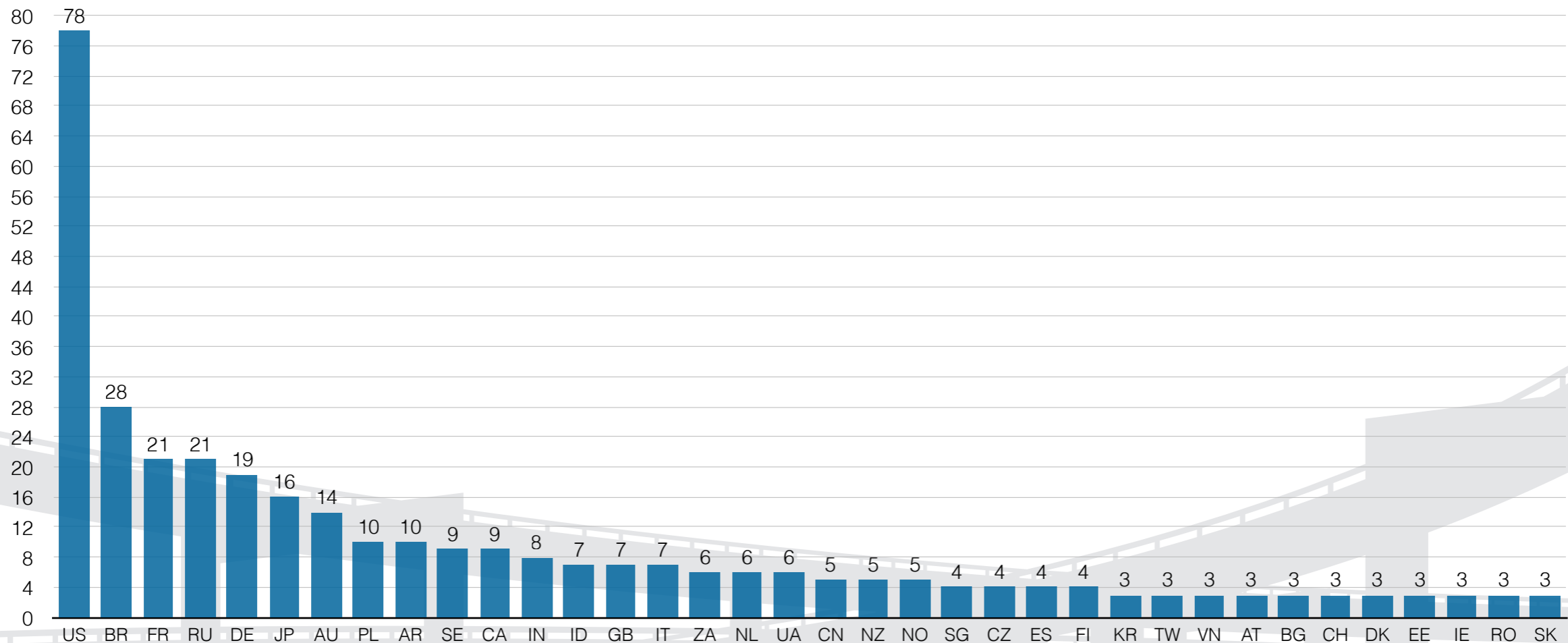
Active Internet exchange points by region (1992-2014)



World update (iii)

- Half of the total number of IXPs are located in 8 countries only.
- The US, Brazil, France, Russia and Germany are the top five countries.

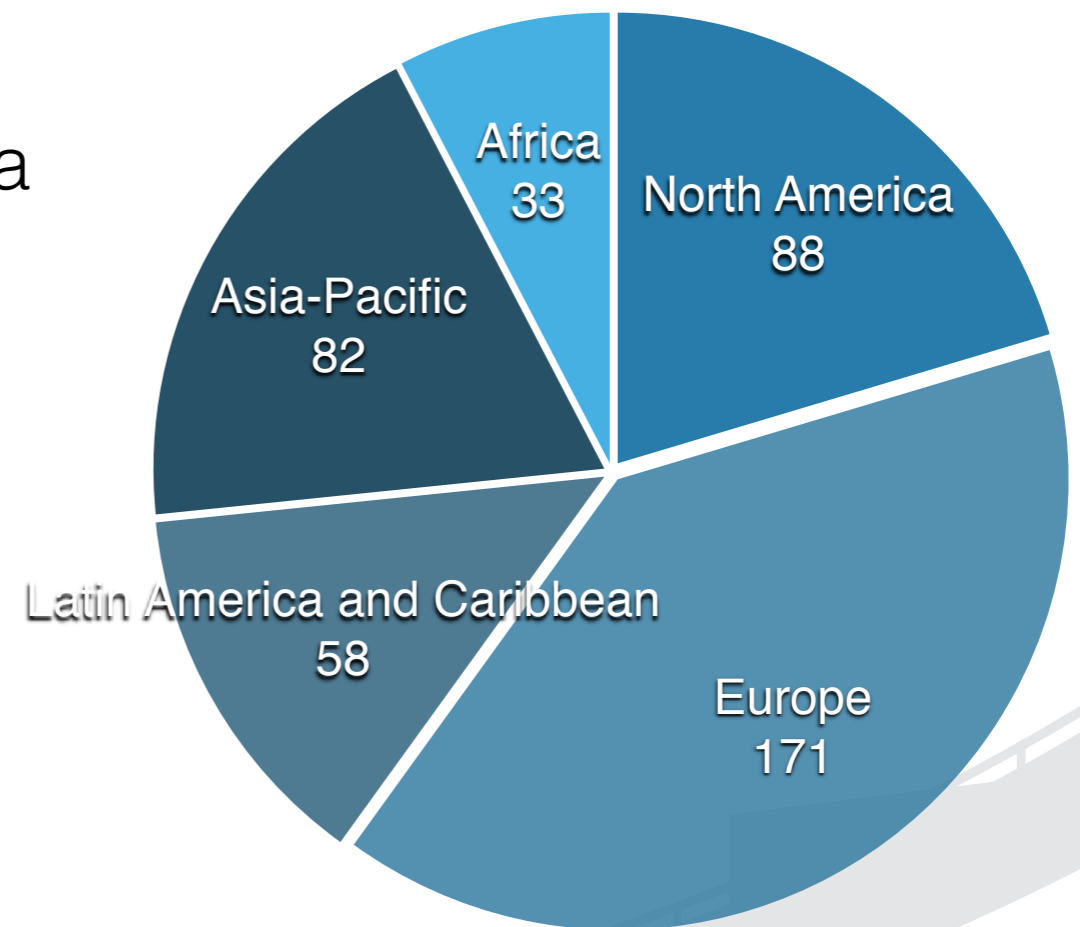
Distribution of active IXPs worldwide, per country



World update (iv)

- Current distribution of active IXPs per Internet region *
- Important increase in Latin America and the Caribbean.
- Africa is increasing its efforts but still remains behind.
- 10 IXPs in the MENA region

Distribution of Active Internet exchange points by region

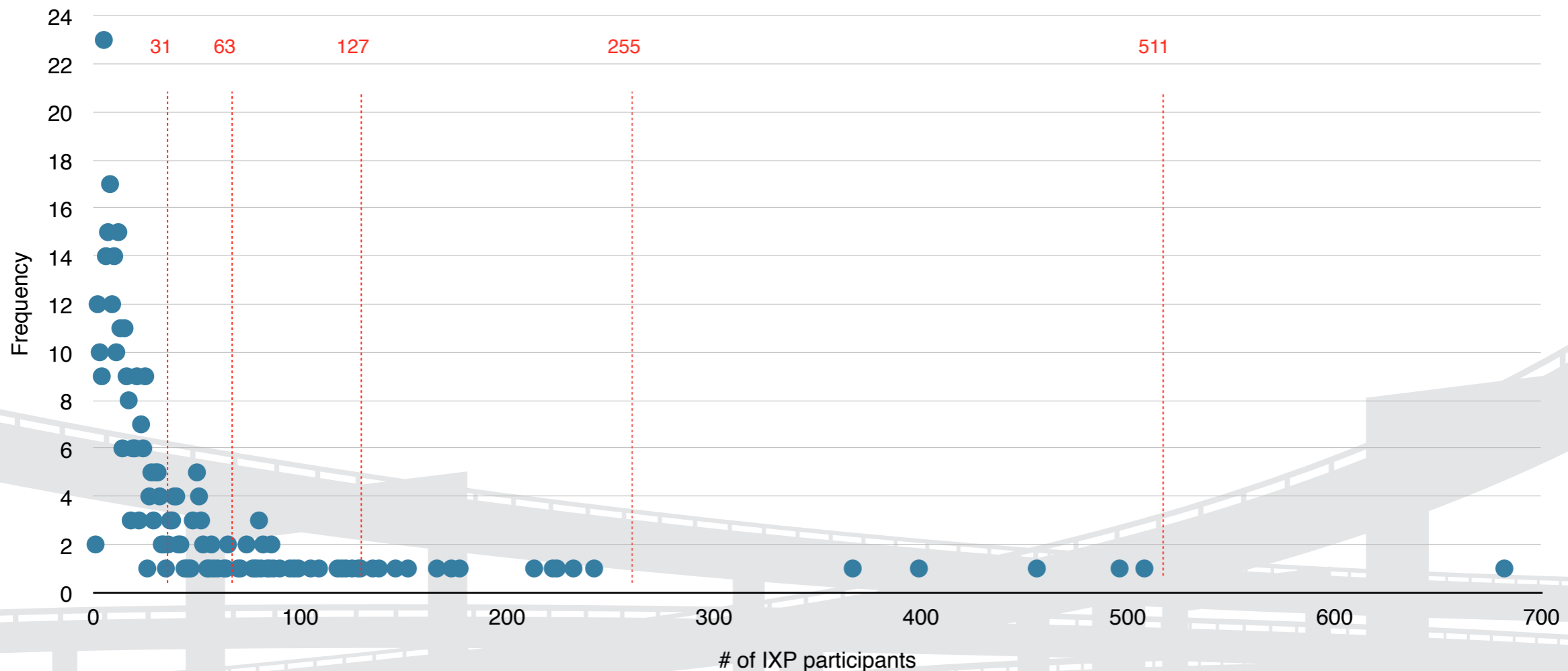


* MENA region is divided between the Europe region (Middle East and Western Asia) and the Africa region (North Africa).

World update (v)

- The number of members at IXPs follows a typical exponential distribution curve with a large amount of small IXPs (<50), a few medium sized ones (<250) and very few large exchanges with more than 300 members.

Distribution of IXP membership size worldwide (N = 432)



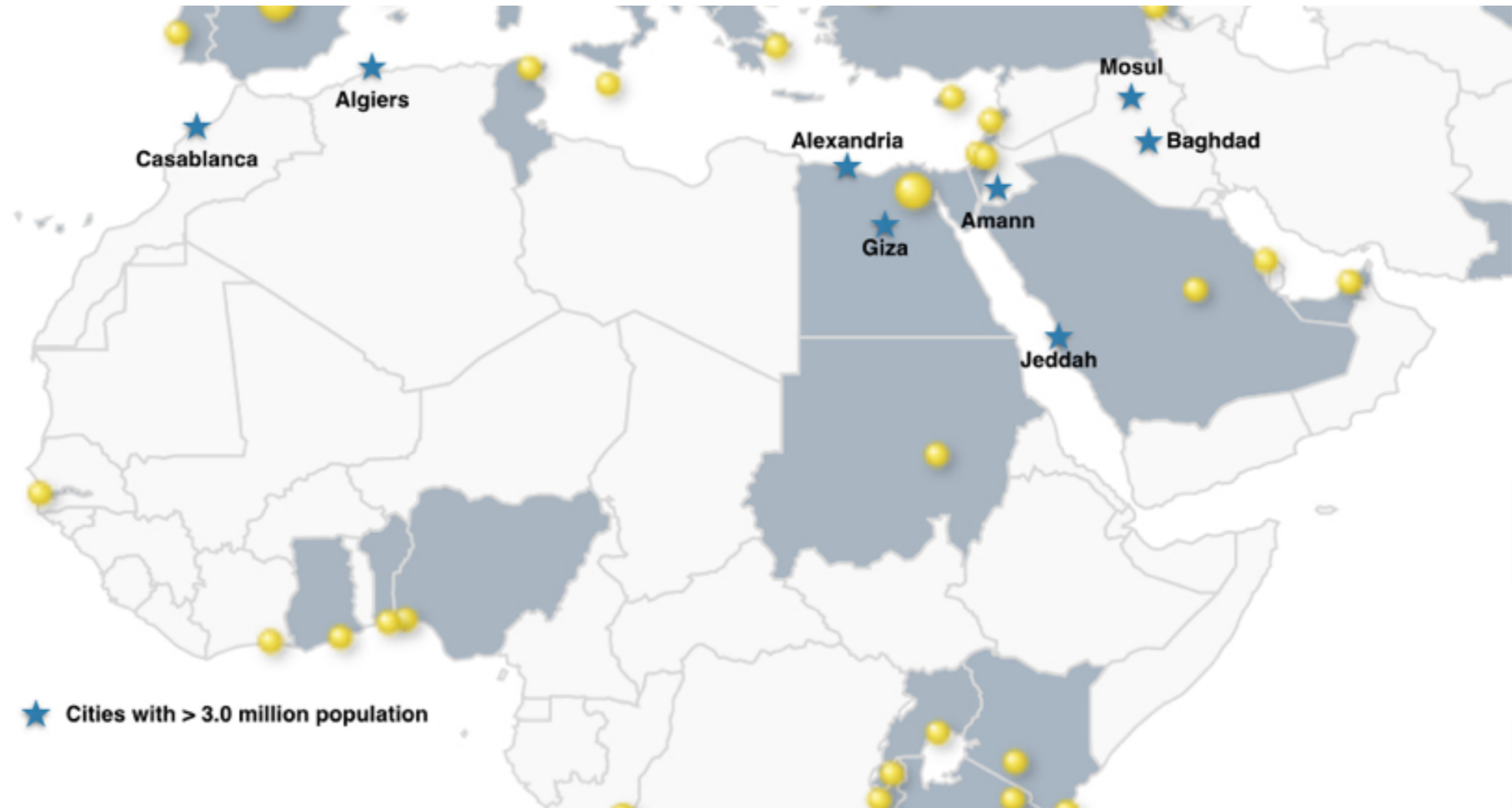
Update MENA region

- Currently, 10 Internet exchange points are operating in a region with a population of 430 million across 22 countries.

Country	City	IXP Name	Year
Bahrain	Manama	Gateway Gulf Internet Exchange Bahrain	2009
Egypt	Cairo	Cairo Internet Exchange	2002
Egypt	Cairo	Middle East Internet eXchange	2007
Lebanon	Beirut	Beirut Internet Exchange	2007
Palestine	Ramallah	Palestinian Internet Exchange	2012
Saudi Arabia	Riyadh	Internet Exchange of Saudi Arabia	2009
Sudan	Khartoum	Sudan Internet Exchange Point	2011
Tunisia	Tunis	Tunisian Internet Exchange Point	2011
United Arab Emirates	Dubai	UAE-IX	2012
Iran	Tehran	Tehran IX	2014

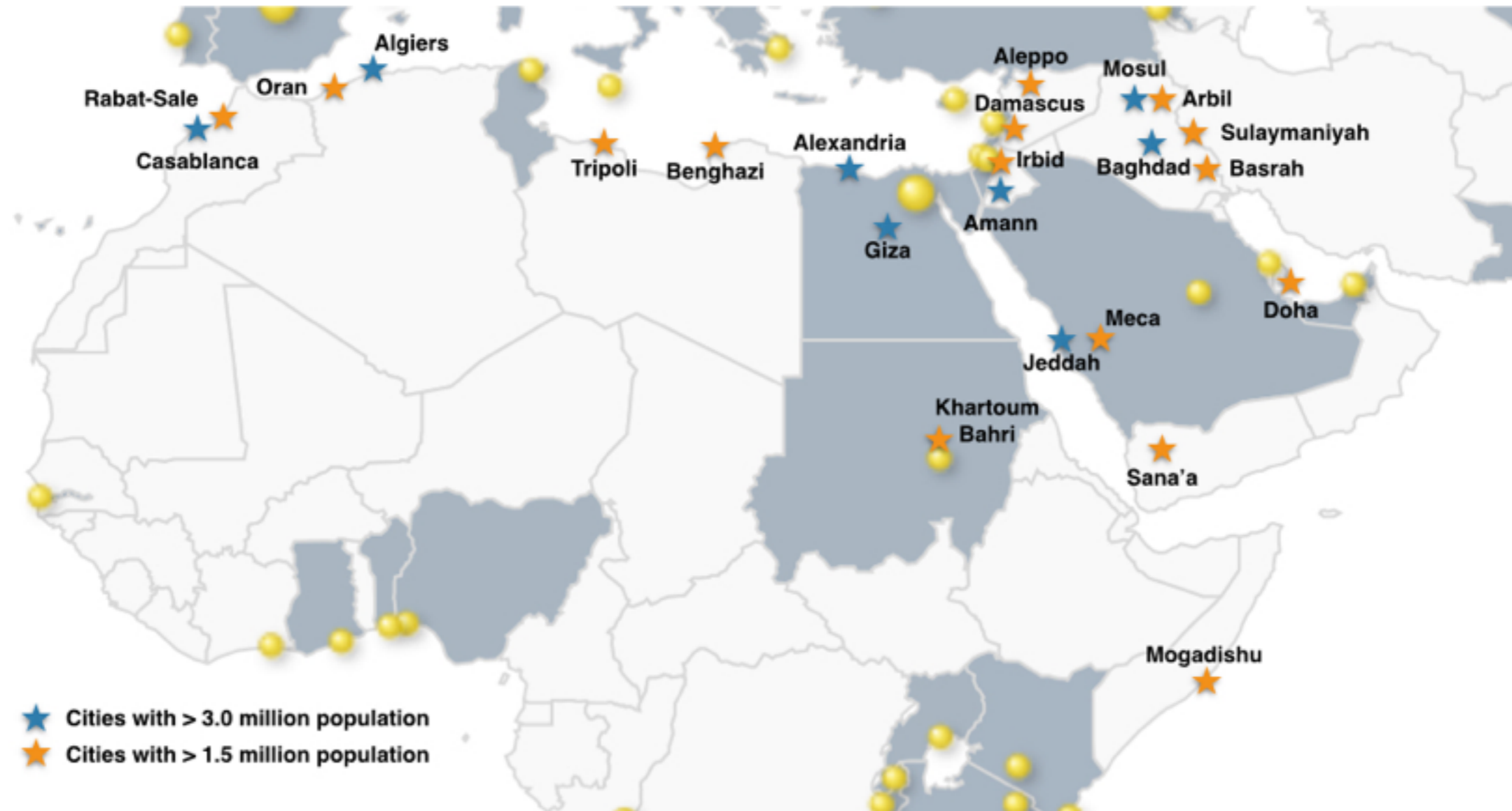
Potential in the MENA region

- 8 cities with > 3 million population don't have an Internet exchange.



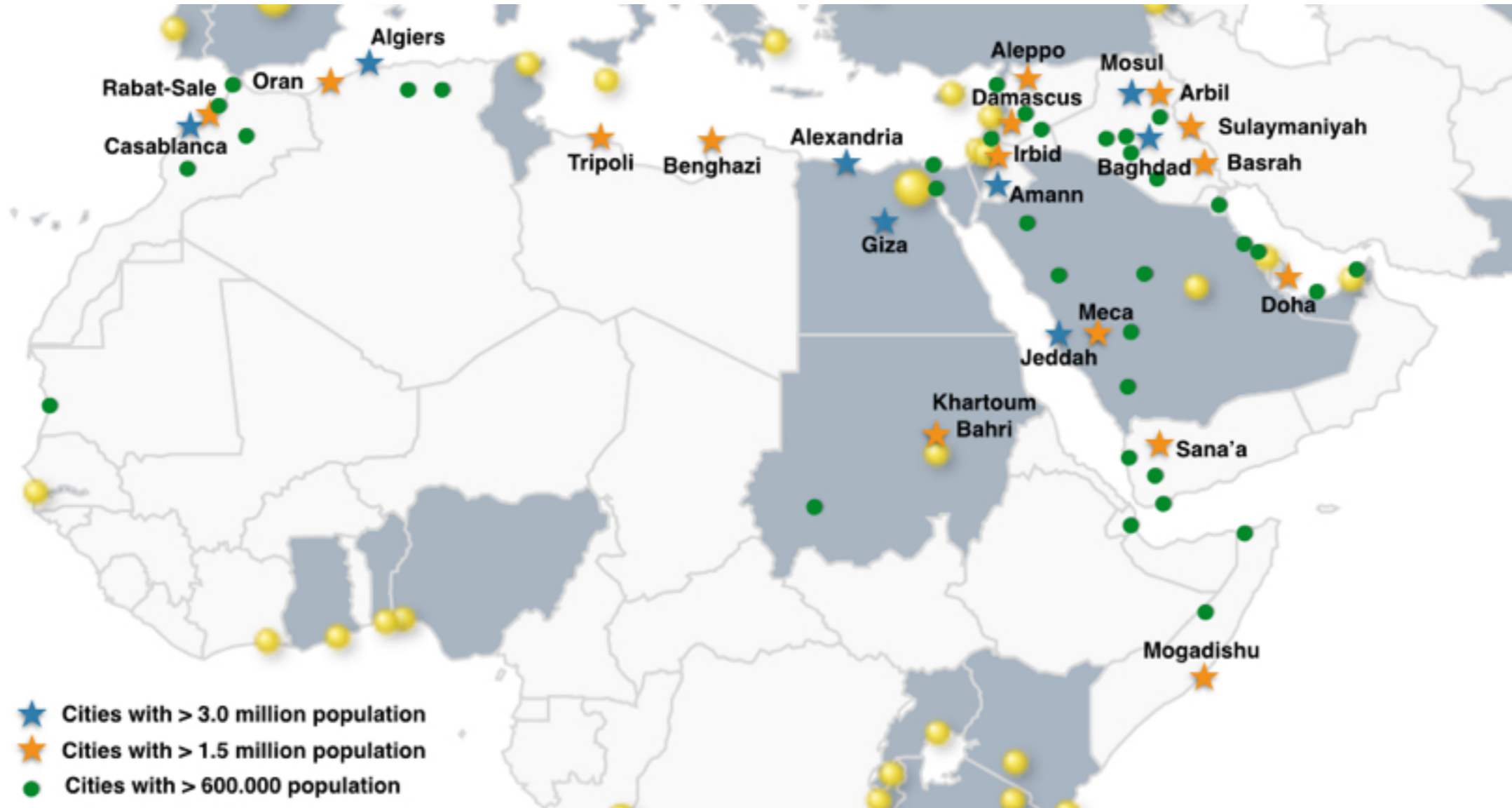
Potential in the MENA region (ii)

- 15 cities with > 1.5 million population don't have Internet exchange.



Potential in the MENA region (ii)

- Very high density of large and medium sized cities along the Mediterranean coast and the Arabian peninsula.



Questions?

Thanks for your attention

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Packet Clearing House is the global non-profit organisation providing operational support and security to Internet critical infrastructure.

Check out the Global Directory of Internet Exchanges at
<http://www.pch.net/ixpdir>