

Economics of Peering

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Economics of Peering Topics

- Peering in 2019
- When peering is worth the investment
- Developing a peering strategy
- Being a good peering partner

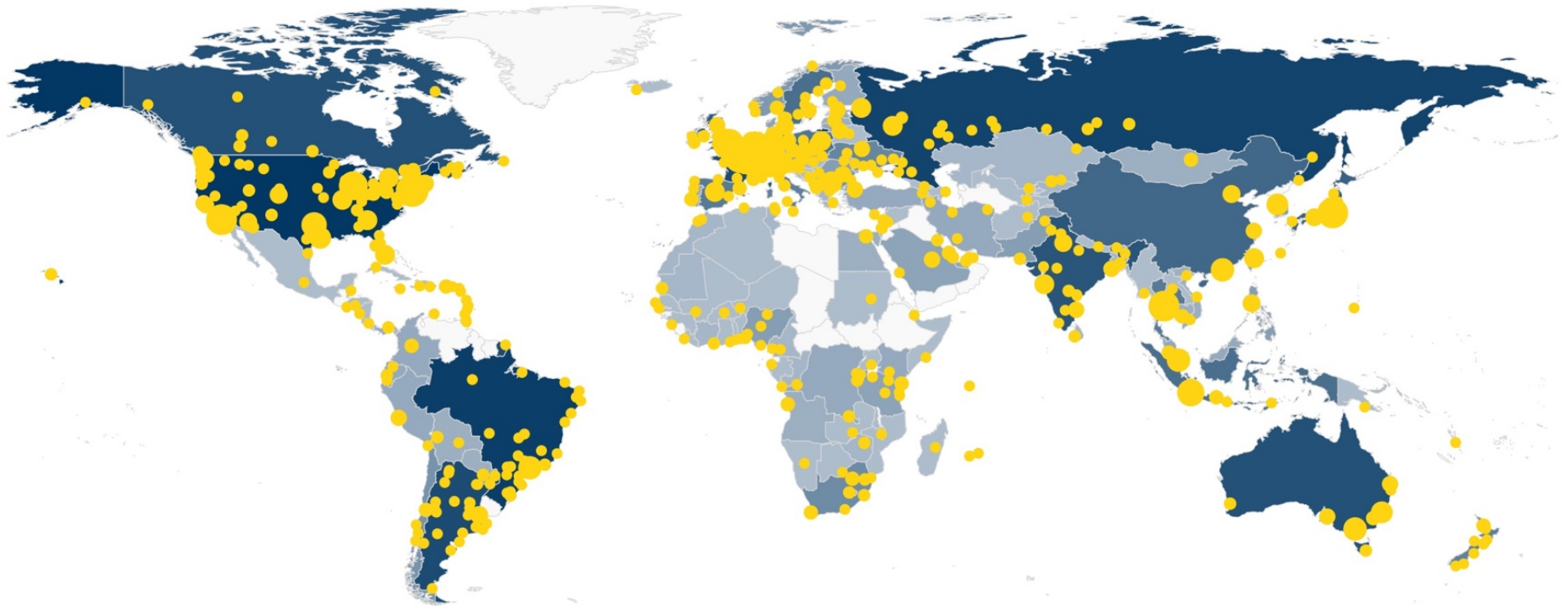
Peering in 2019

The Internet is almost 50 years old, so why peer? The Internet Exchange has not changed much over the last few decades.

- Most exchanges started forming in the early 1990s.
- Some of the pioneers, like Finnish Communication and Internet Exchange Helsinki (FICIX), are still here today.
- As of today, 606 Internet exchanges are active and operating today.

So why should anyone join one?

Peering in 2019



PCH
Packet Clearing House

965 IXPs shown - Number of IXPs by Country

Source: pch.net

Peering in 2019

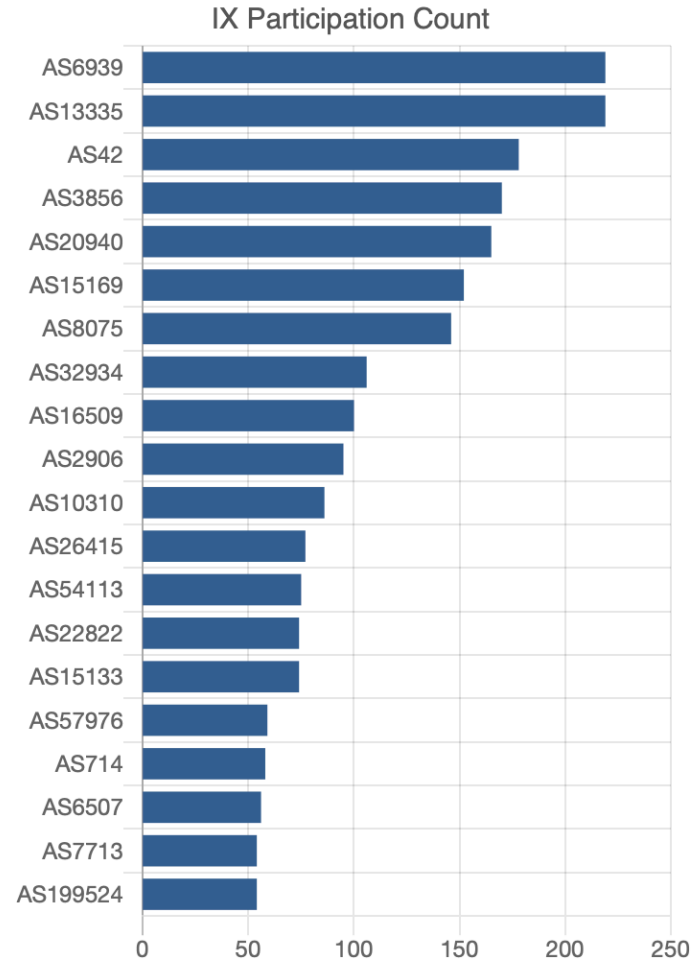
Internet Exchange		Members	Data	CC	City	Website
<u>PTT São Paulo</u>		1,496		BR	São Paulo	ix.br
<u>AMS-IX</u>		917		NL	Amsterdam	www.ams-ix.net
<u>DE-CIX Frankfurt</u>		881		DE	Frankfurt	fra.de-cix.net
<u>LINX Juniper LAN</u>		802		GB	London	www.linx.net
<u>Data IX</u>		578		RU	Frankfurt	www.dataix.ru
<u>EPIX Katowice</u>		512		PL	Katowice	www.epix.net.pl
<u>MSK-IX Moscow</u>		456		RU	Moscow	www.msk-ix.ru
<u>NL-IX</u>		416		NL	Amsterdam	www.nl-ix.net
<u>France-IX</u>		405		FR	Paris	www.franceix.net
<u>Equinix Paris</u>		382		FR	Paris	www.equinix-ix.fr
<u>NAPAfrica IX Johannesburg</u>		372		ZA	Johannesburg	www.napafrika.net

Peering in 2019

Internet Exchanges

Exchange Participants

IX Participation Count		
ASN	Name	IXes
AS6939	Hurricane Electric LLC	219
AS13335	Cloudflare, Inc.	219
AS42	WoodyNet	178
AS3856	Packet Clearing House	170
AS20940	Akamai International B.V.	165
AS15169	Google LLC	152
AS8075	Microsoft Corporation	146
AS32934	Facebook, Inc.	106
AS16509	Amazon.com, Inc.	100
AS2906	Netflix Streaming Services Inc.	95
AS10310	Oath Holdings Inc.	86
AS26415	VeriSign Global Registry Services	77
AS54113	Fastly	75
AS22822	Limelight Networks, Inc.	74
AS15133	EdgeCast Networks, Inc. d/b/a Verizon Digital Media Services	74
AS57976	Blizzard Entertainment, Inc	59
AS714	Apple Inc.	58
AS6507	Riot Games, Inc	56
AS7713	PT Telekomunikasi Indonesia	54
AS199524	G-Core Labs S.A.	54



Peering in 2019

Why set up an exchange?

- Keeps local traffic local
- Improves latency and user experience
- Can reduce operating costs

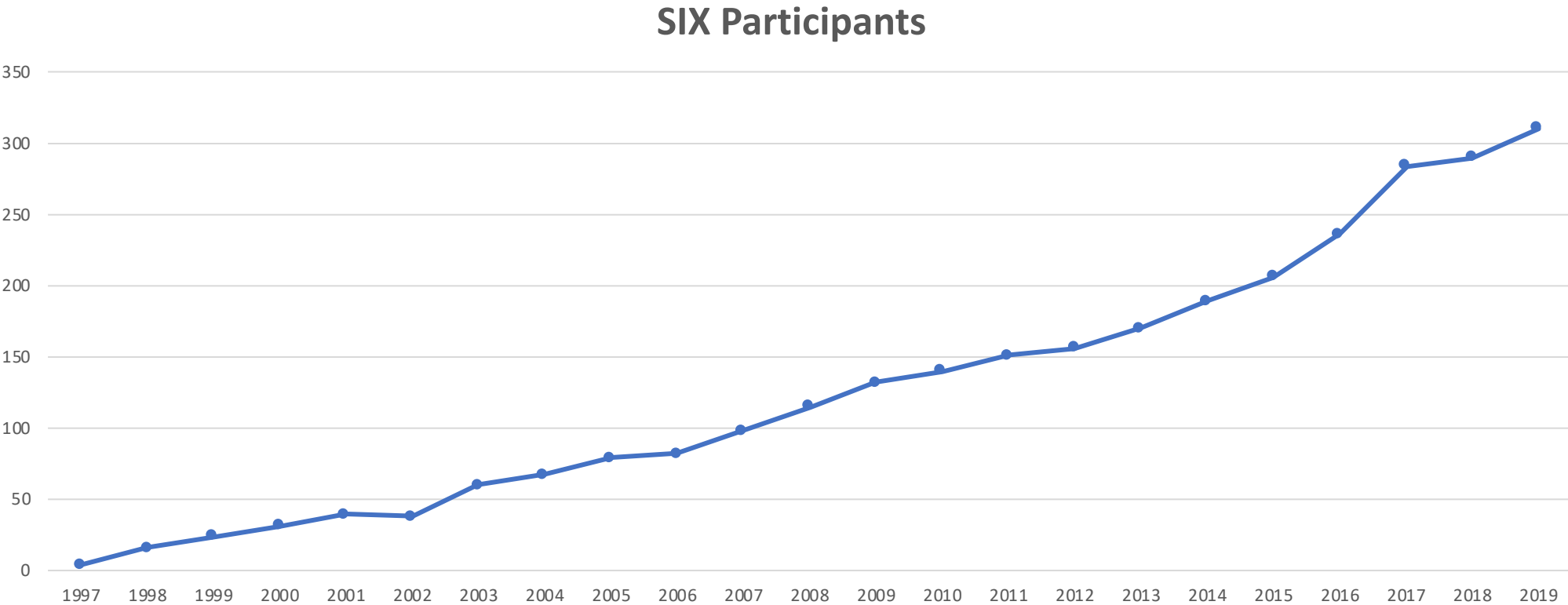
Let's look at a few of exchanges to see how they developed.

Peering in 2019

Seattle Internet Exchange (SIX)

- Three networks joined to form the SIX 1997.
- Before the IX formed, traffic transiting the Westin Building was being routed through Texas.
- The SIX is the 19th largest IX today.

Peering in 2019



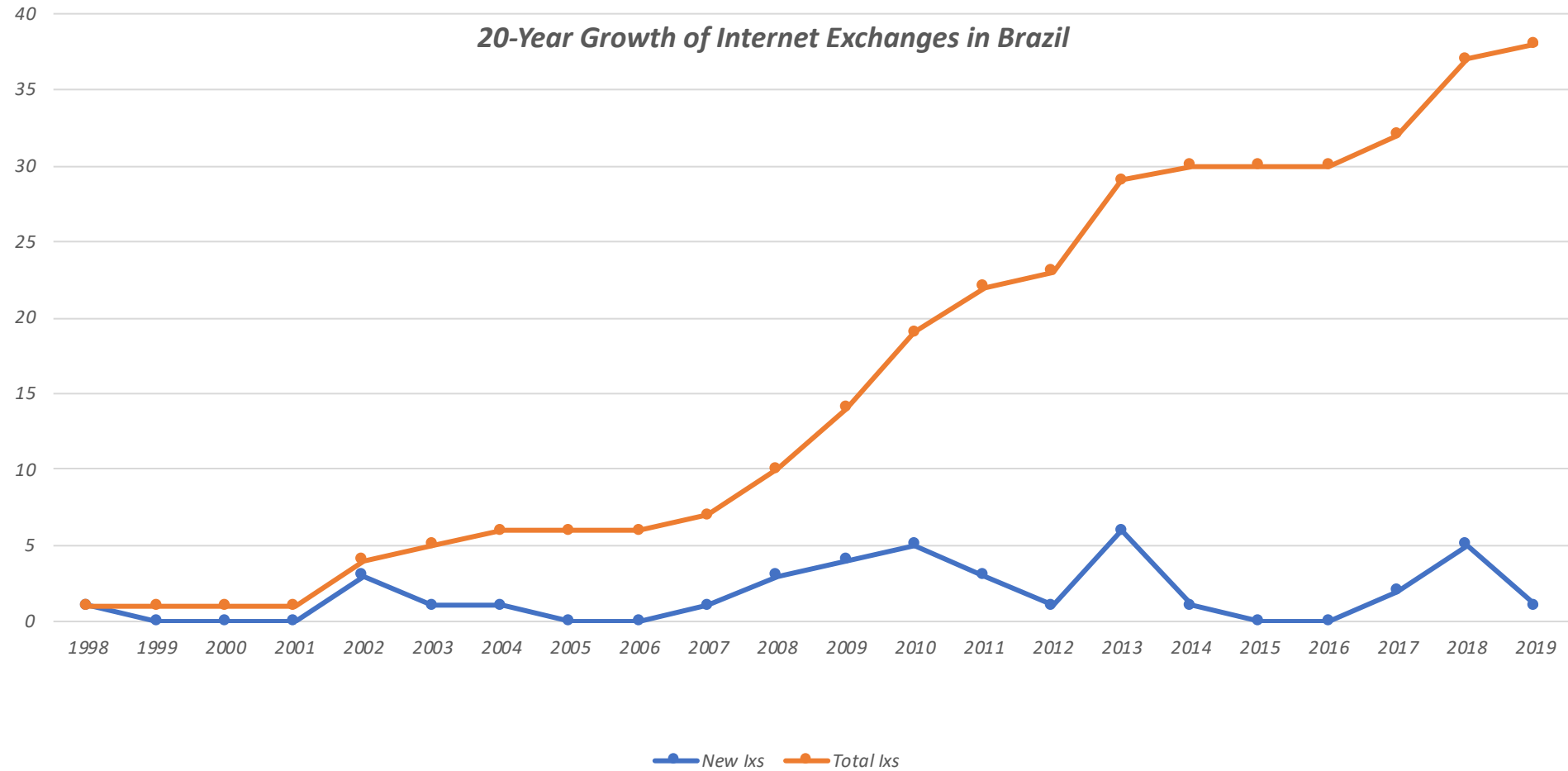
Peering in 2019

Seattle arguably is a different environment than Africa. To see how IXs are developing elsewhere, let's look at Brazil.

- Between 2005 and 2016, the percentage of Brazilians who regularly used the Internet went from about 20 percent to 60 percent.
- Largest IX in the world—PTT São Paulo—is located in Brazil.

So let's look at what happened to the establishment of Internet exchanges in Brazil:

Peering in 2019



Peering in 2019

This matters in terms of Africa because Internet adoption is rising in Africa.

- Internet usage in Southern Africa is at 51% of the population, with Northern Africa at 49%, Western Africa at 37%, Eastern Africa at 27% and Middle African countries at 12%.
- African networks look to be poised to repeat the trends seen in other countries.
- Internet penetration rates are still low across Central Africa, but it is one of the regions seeing the fastest growth in Internet adoption.
- Users in Africa are up by more than 20 percent year-on-year, with the reported number of internet users in Mali increasing by almost 6 *times* since January 2017. The number of internet users in Benin, Sierra Leone, Niger, and Mozambique has more than doubled between 2017 and 2018.

When Peering is Worth the Investment

We've established that peering exchanges are a vital part of the Internet landscape, and they look to be here to stay.

Now let's look at what a peering exchange does for a network operator and the things you might want to consider when picking a data center or an Internet exchange.

This will help you determine if peering is worth the investment.

When Peering is Worth the Investment

Peering requires an investment, and it has a value. To determine how much value, you need to think about what it actually costs you:

- How much your port costs, including optics and equipment support costs.
- Consider where the costs for connecting to the peering exchange, including the cross-connect costs at the data center that hosts you and the exchange or circuit costs if you are paying a third-party provider to reach the IX. Don't forget the setup fees.
- Now that we have considered these things, let's look at the numbers:

Why Peering is an Investment

	MyISP	MyIX
One-time Costs		
Device Port	€200	€200
Setup Fee for Cross-connect	€500	€500
Setup Fee for Service	€250	€500
Recurring Costs		
Commit Level (Mbps)	2000	n/a
Commit Price	€2,000	n/a
Price per Mb above commit	€1	n/a
Price per port	n/a	€500
Cross-connect	€250	€250

When Peering is Worth the Investment

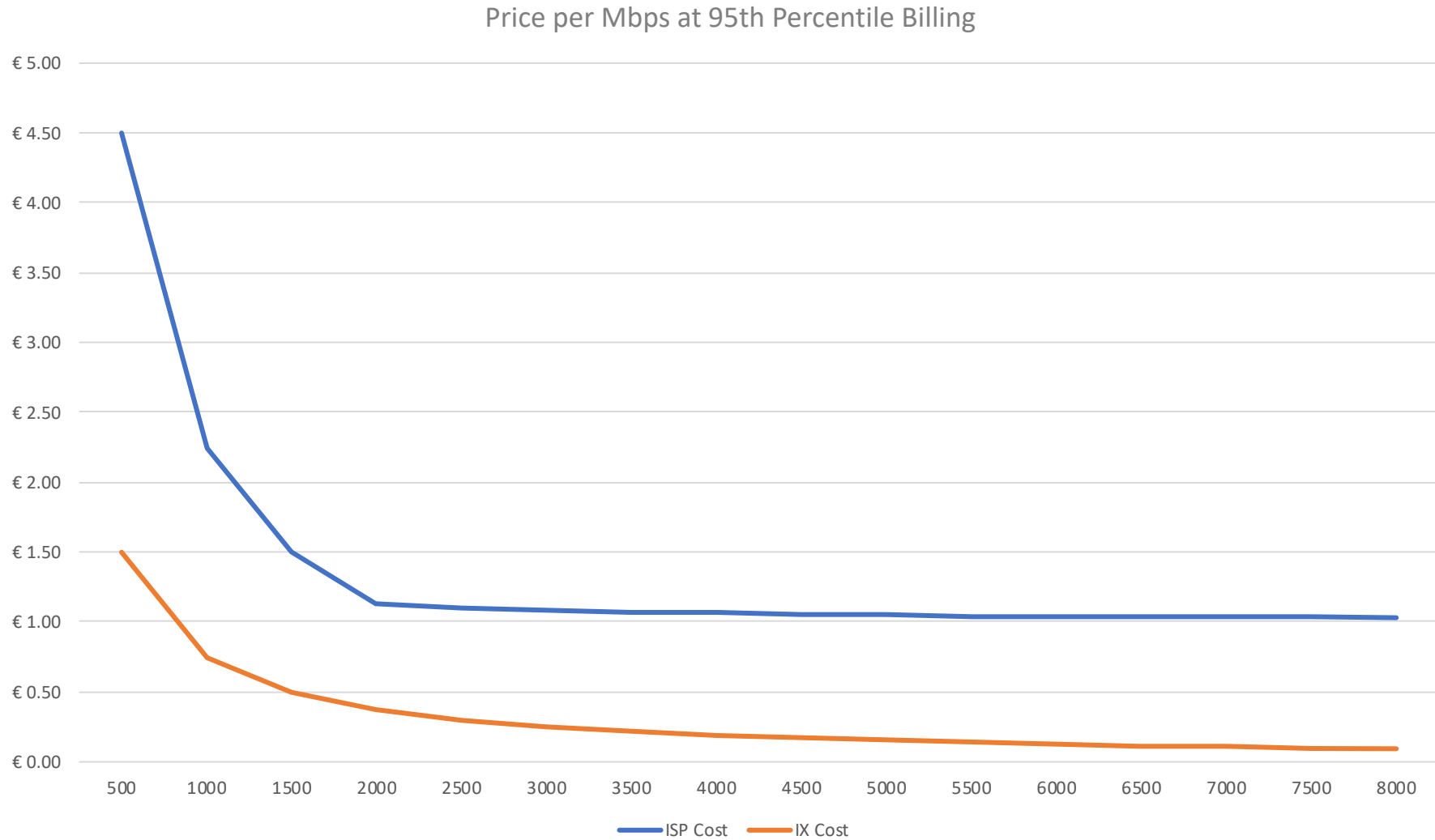
Now that you have calculated your costs, it's time to assess the benefits, which is how much traffic you can move to your new port. To make the best investment, you should consider who your potential peering partners will be on the exchange:

- Exchanges where you can reach content networks or cloud providers can be very advantageous.
- Don't forget to peer with the caching networks like Akamai, Fastly, Limelight, etc.
- Netflow or Sflow can give you a lot of information about your highest traffic sources and destinations.

When Peering is Worth the Investment

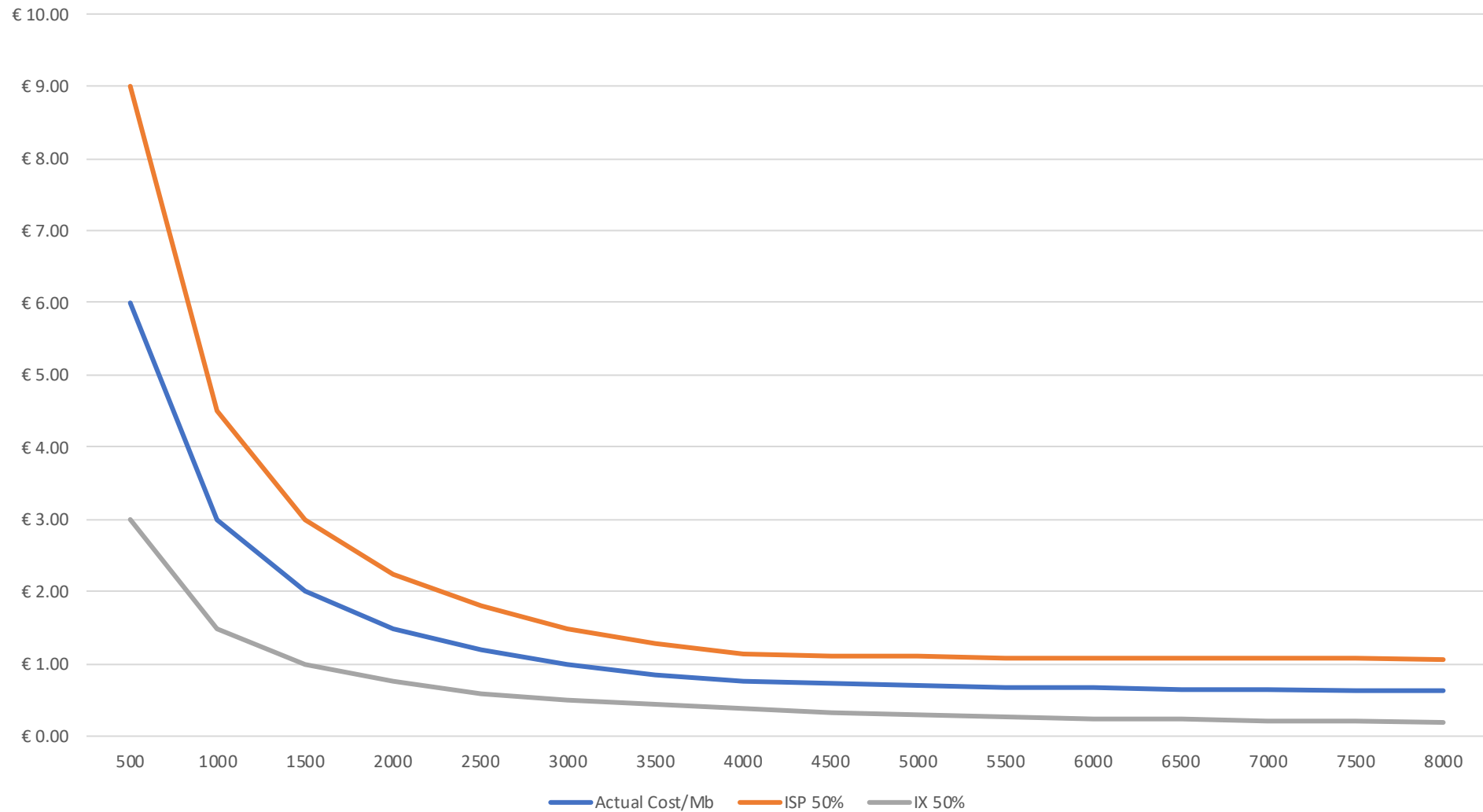
Once you have this information, you see if the getting a port on the exchange makes good business sense based on cost:

When Peering is Worth the Investment

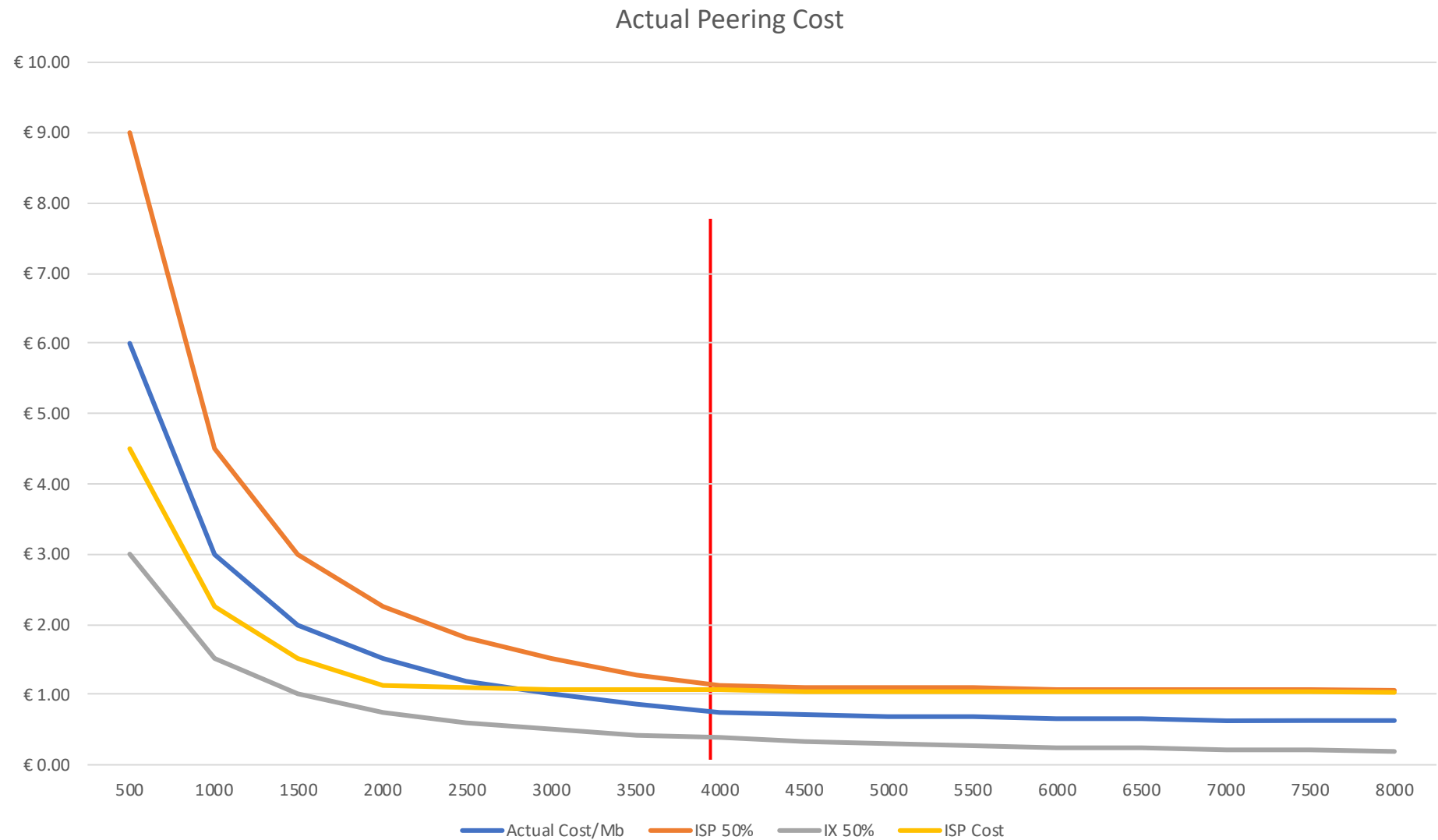


When Peering is Worth the Investment

Costs When Dividing Traffic between your ISP and your Peering Link



When Peering is Worth the Investment



When Peering is Worth the Investment

Don't forget to factor in operational support costs—and save by streamlining or automating them.

- Create two or three peer groups for your neighbors. All you need to know from a neighbor to turn configure the peers are the AS number, their IP addresses, their AS-SET and their suggested prefix limits are.
- Consider the support priority of peers. You may not need to wake up your on-call engineers.
- Monitor port capacity on your IX connections and increase it before you get into trouble.

When Peering is Worth the Investment

It's not all about the money.

- Peering can provide real tangible benefits in terms of reduced latency and improved throughput. This is especially true when a lot of your ISPs are out of country.
- You will gain more diversity at your edge. This will improve traffic flow, decrease latency and can help your routers rebuild their tables more quickly when a link goes down.
- Your internal and external customers will be happier.

Developing a peering strategy

You need a peering strategy to get the most value from your exchange port. Some of the things to consider are:

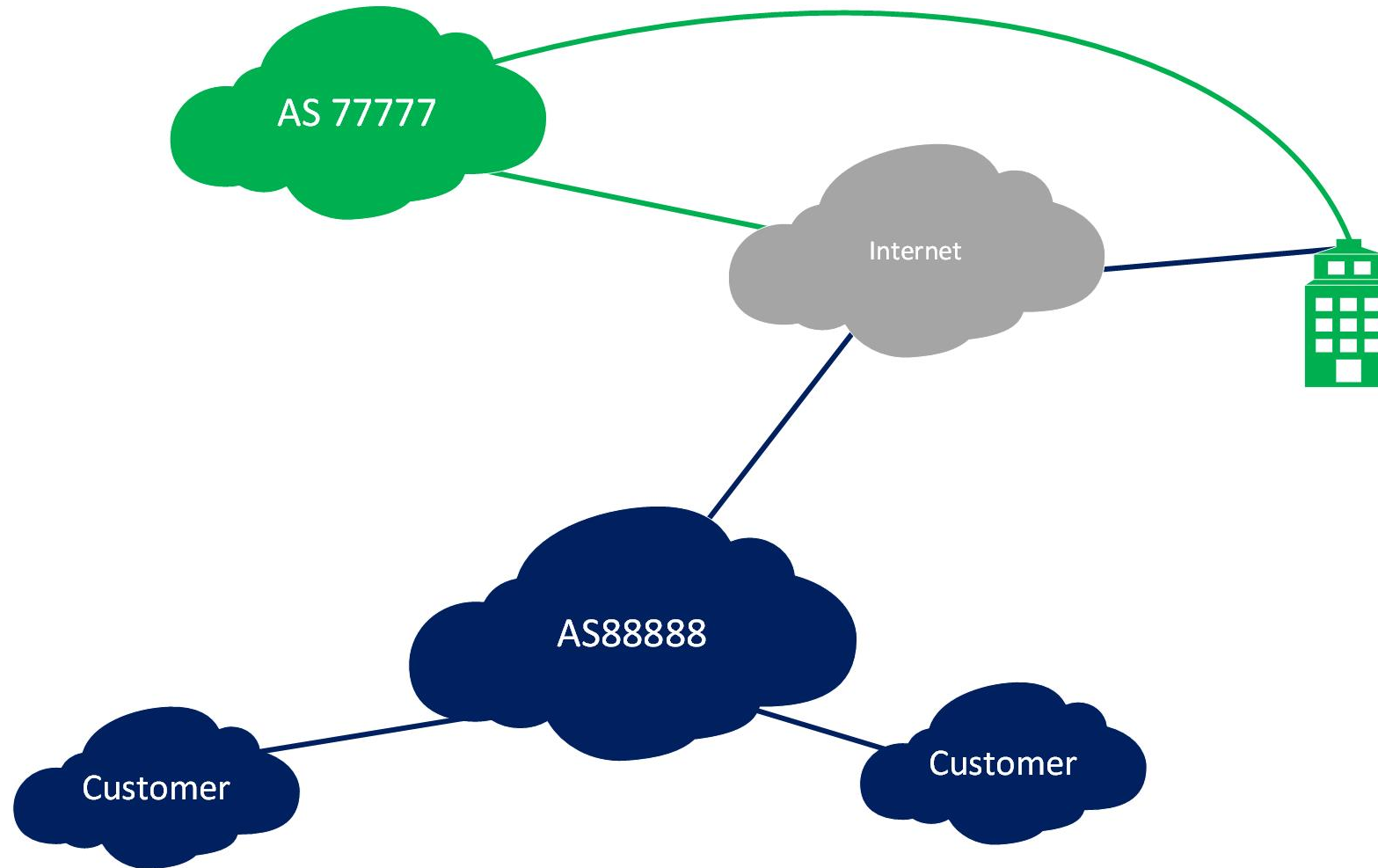
- What networks would benefit you the most?
- What exchanges should you join?
- How will you route the prefixes you receive in your network?

Developing a peering strategy

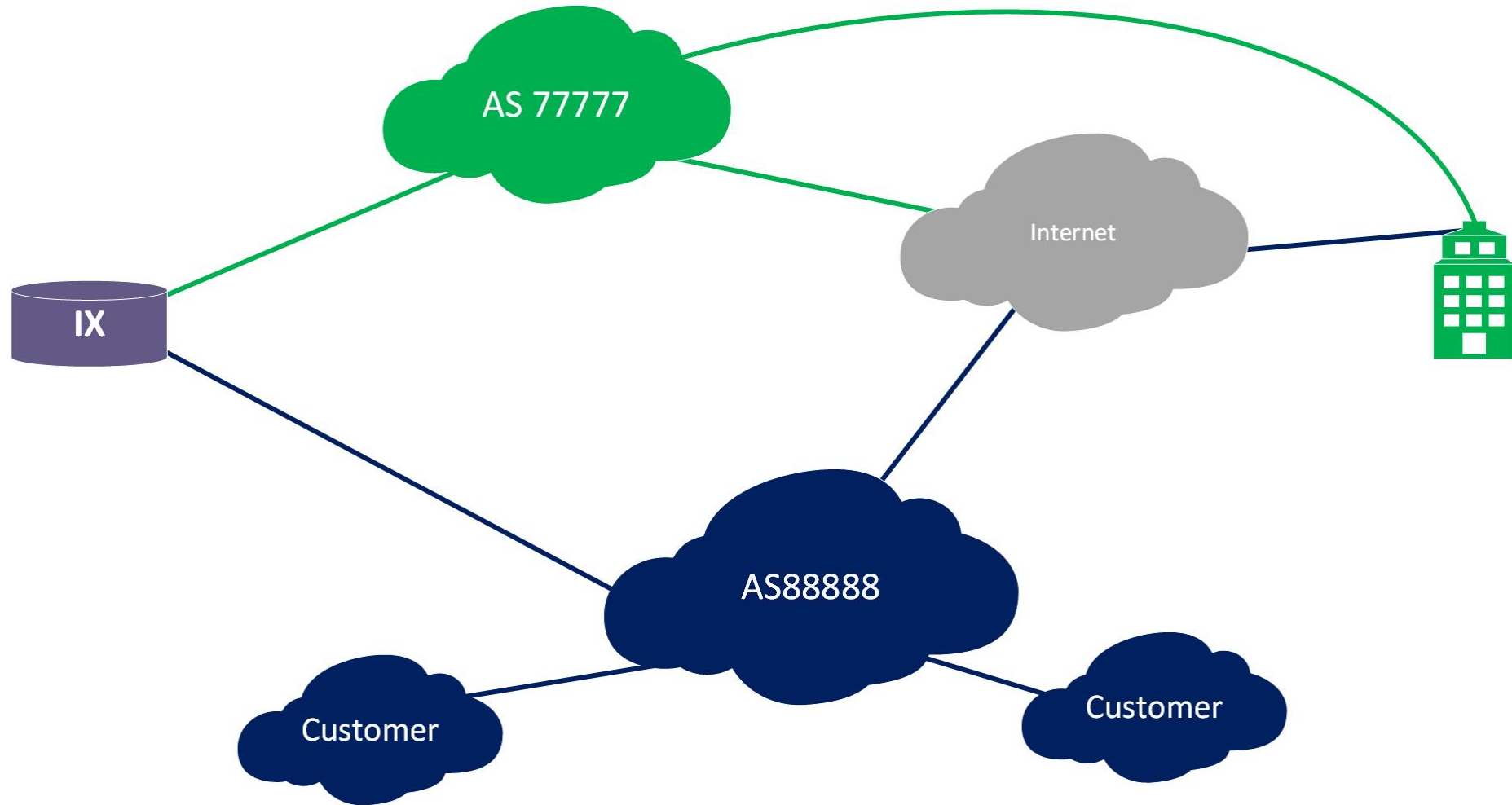
Evaluate if peering with a network makes sense for you:

- Do you send a lot of traffic to this peer over transit connections?
- Could a direct connection with lower latency have a compelling performance improvement on your network?
- Do you have excess bandwidth on your IX interface?

Developing a peering strategy



Developing a peering strategy



Developing a peering strategy

- So as we have seen, peering can improve your routing and reduce latency. Or not.
- If you peer at more than one location, consider a routing architecture that allows prefixes to be announced strategically to keep traffic local.
- Some peers can benefit your network more than others. Figuring that out can get you a bigger return on your investment more quickly.

Be a good peering partner

Peering works when it is a good experience for both parties.

- Clean up your advertisements. You shouldn't be leaking your private IP space or routes that don't originate from a public AS.
- Be easy to contact by keeping up-to-date routing and contact information in Peeringdb.com.
- Keep your IRR records up to date.
- Create Route Origin Authorizations (ROAs) for all of your prefixes and update them on a periodic basis.

Be a good peering partner

While the other network you are peering with is probably a fine organization, trust no one.

- Set maximum prefix limits for your peers.
- Filter the routes to accept only routes valid from the peer's AS and deny private IP space and bogons. Don't forget to check services like Spamhaus to prevent acceptance of blocked prefixes.
- Consider using AS-Path filters to further ensure against leaks.

Be a good peering partner

- Be responsive when you are notified of an issue. No one likes a peer who ignores them, especially if they are experiencing a DDoS, phishing, or other types of naughty behavior from users on your network.
- No one can take advantage of you without your permission. Control your advertisements.
- Even if you do everything right, not all networks will want to peer with you. This usually is more to do with their peering policy and strategies and less to do with you.

Thank you!

Questions and Discussion

Resources

- <https://bgp.he.net>
- <https://www.pch.net/ixp/dir>
- <https://wearesocial-net.s3.amazonaws.com/wp-content/uploads/2018/01/DIGITAL-IN-2018-003-INTERNET-PENETRATION-MAP-V1.00.png>