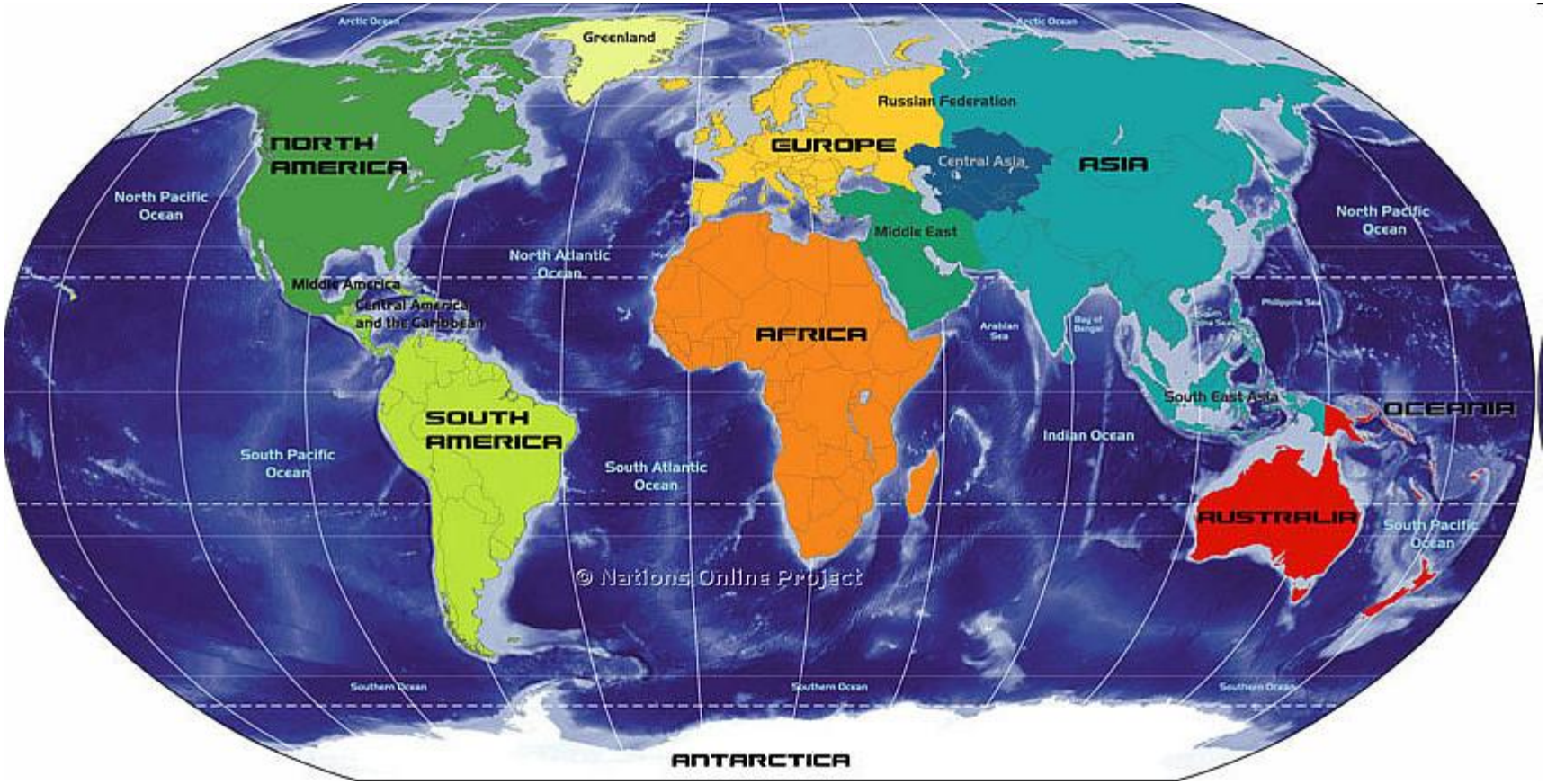
Peering and Network Deployment at 10G



Nigel Titley

Introductions

- Thanks very much for inviting me to speak to you
- Currently Head of Peering and Transit at Easynet Ltd
- RIPE NCC Board Chairman
- Peering Coordinator at British Telecom, Level 3 (Europe and Asia), PacketExchange, and Flag Telecom

Agenda

- What am I talking about?
- What is peering and why you should do it
- Peering policy – what is it?
- Peering strategy – what is it?
- Exchange points and direct peering
- Building a peering network
- Tools of the trade
- Conclusions
- Questions and Answers

What is Easynet?

- UK and European ISP specialising in Corporate customers
- 1G European network: France, Germany, Italy, Belgium, Netherlands, Spain
- Local Loop unbundling in the UK (over 1000 exchanges undbundled)
- Bought by BSkyB satellite broadcaster (owned by News International)
- Over 2M domestic broadband customers and 140G of traffic
- Traffic mostly eyeballs

What am I talking about?

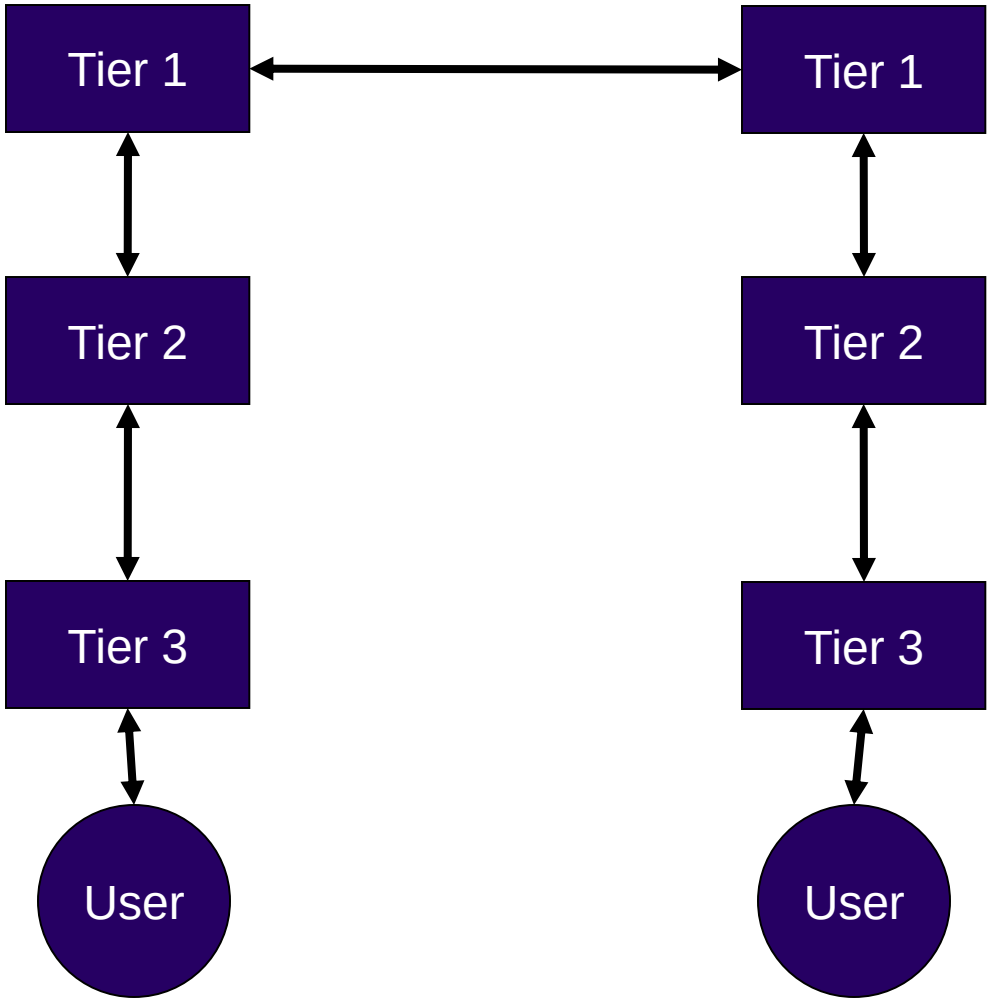
- Peering and why you should do it
- Why Easynet invested 2.5M in building a 10G network just for peering
- Peering tools of the trade

Definition?

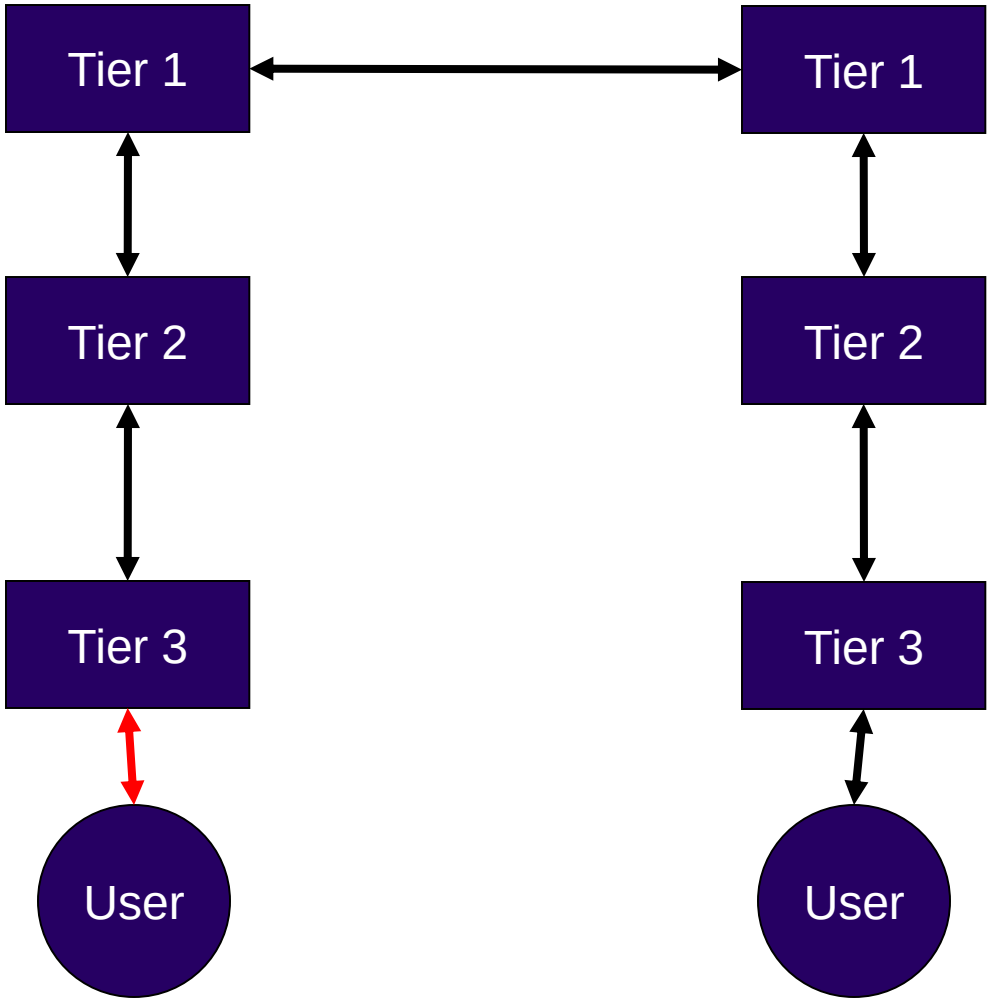
Peering:

- The act of one national Internet backbone provider accepting and passing traffic from another national provider. See NAP.

Peering – what is it?



Peering – what is it?



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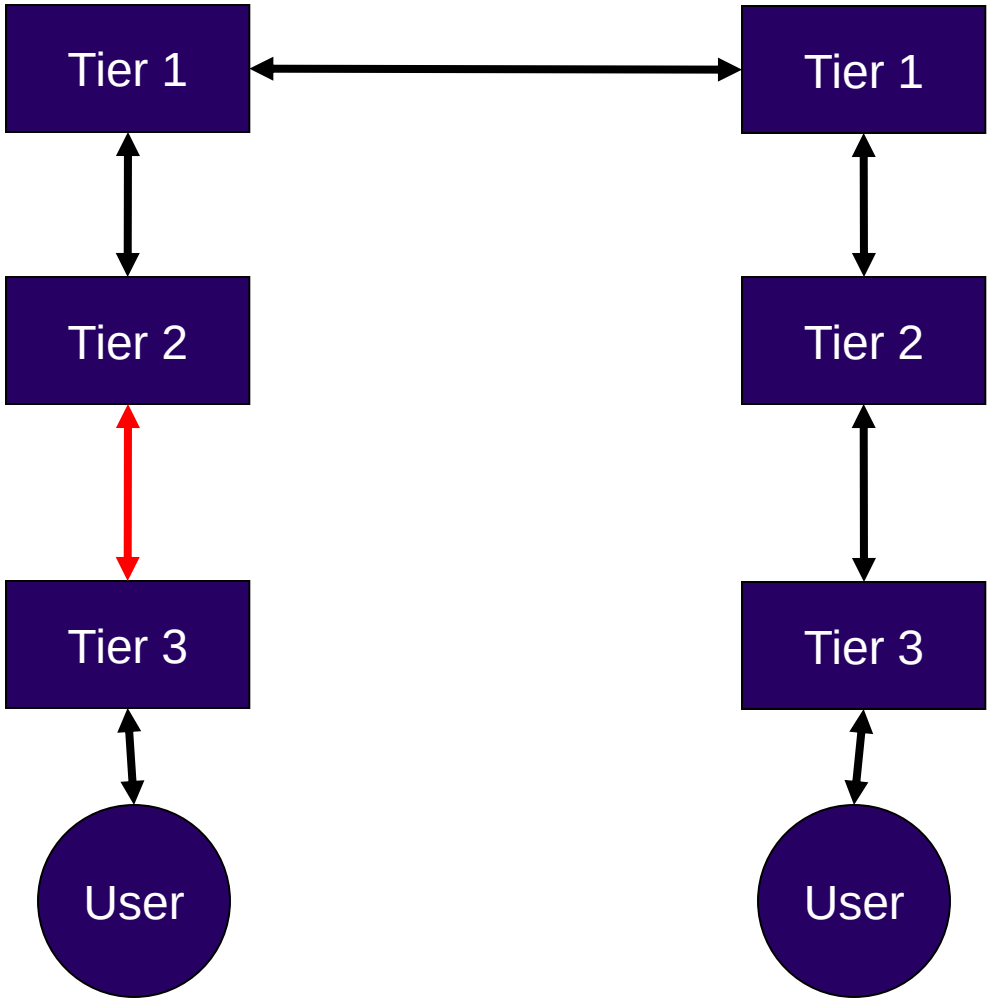
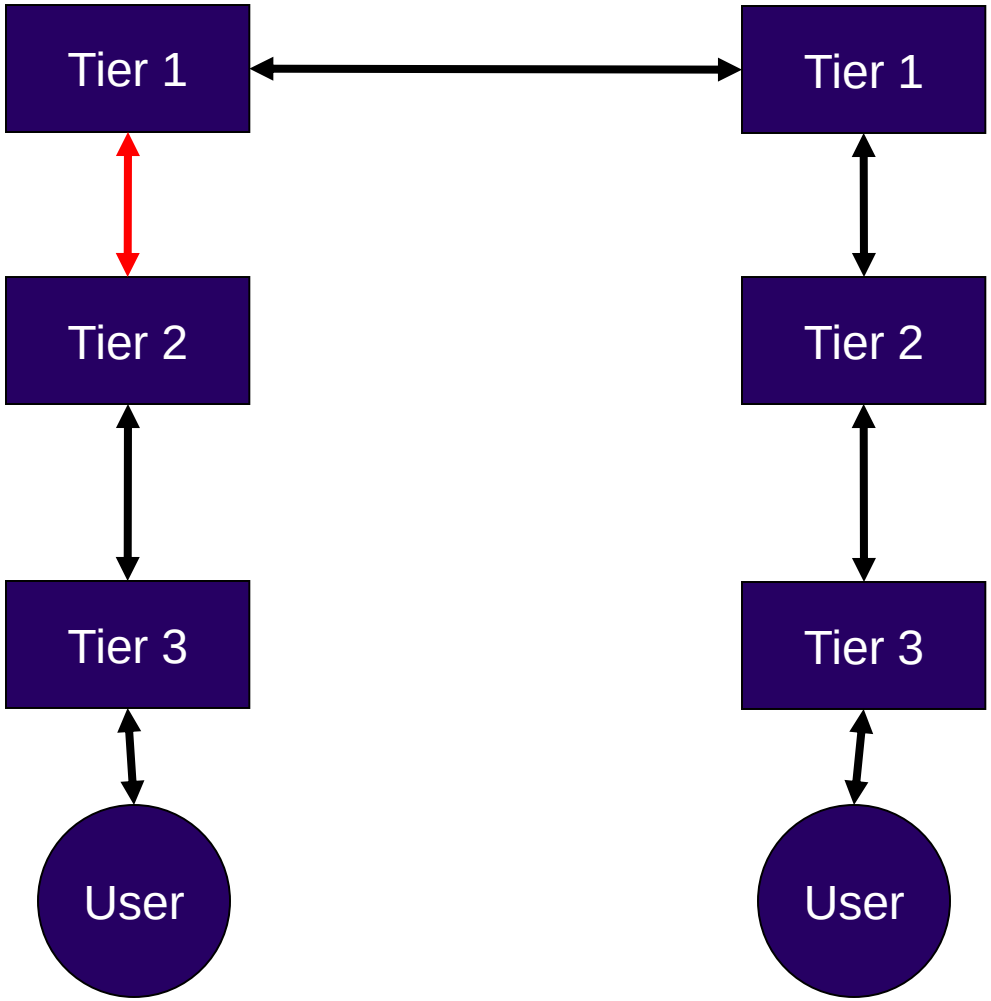
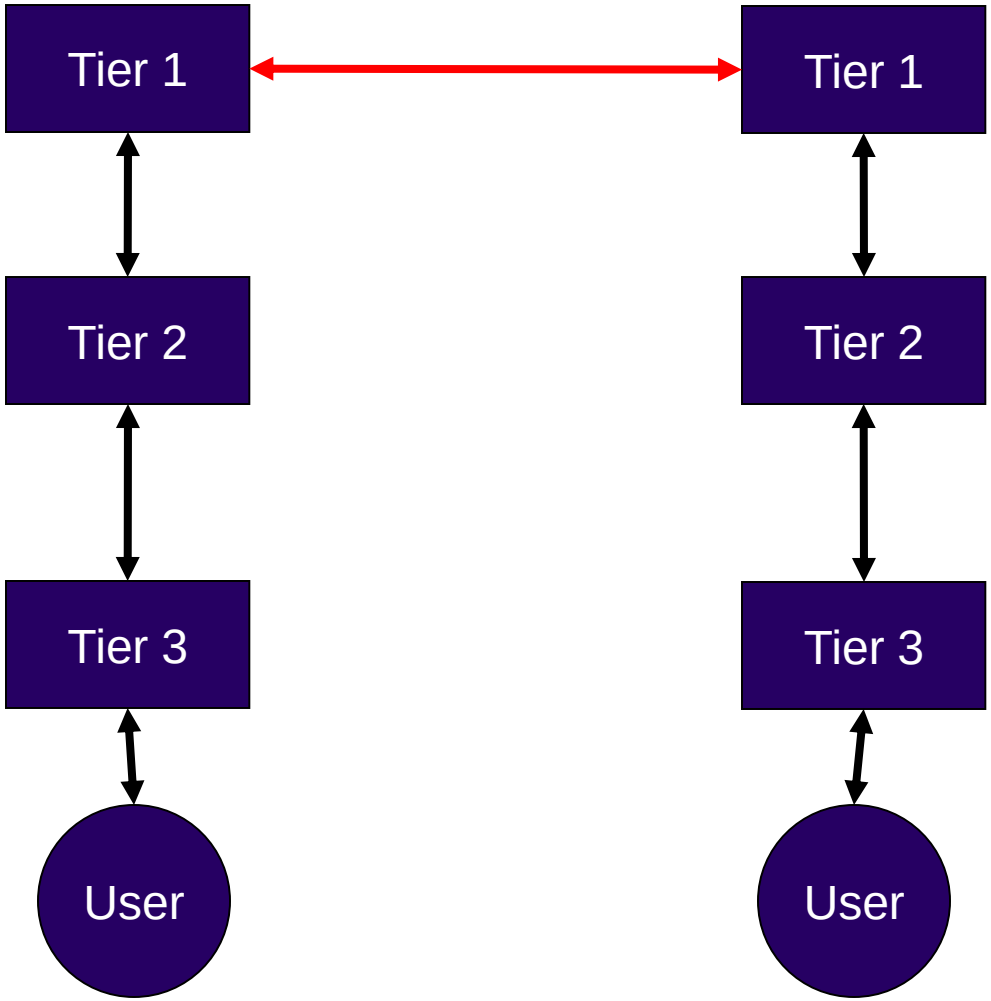


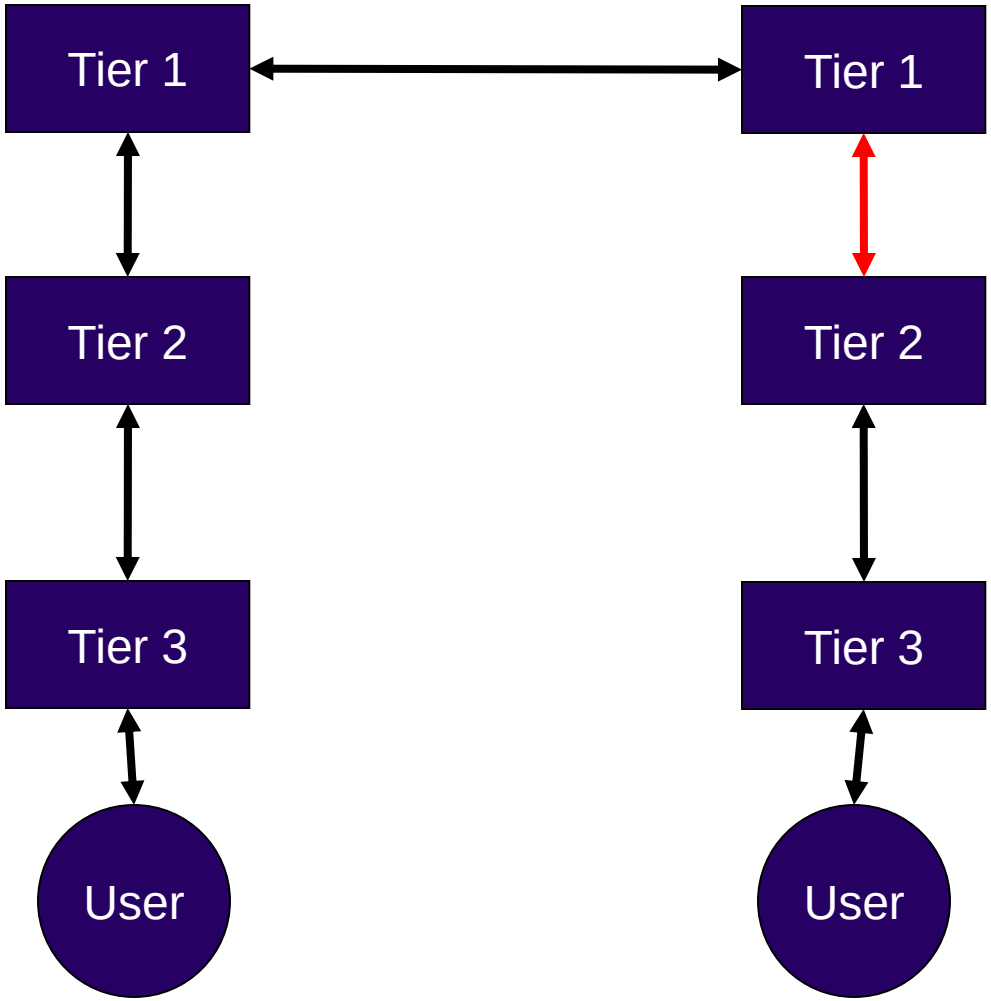
Peering – what is it?



Peering – what is it?



Peering – what is it?



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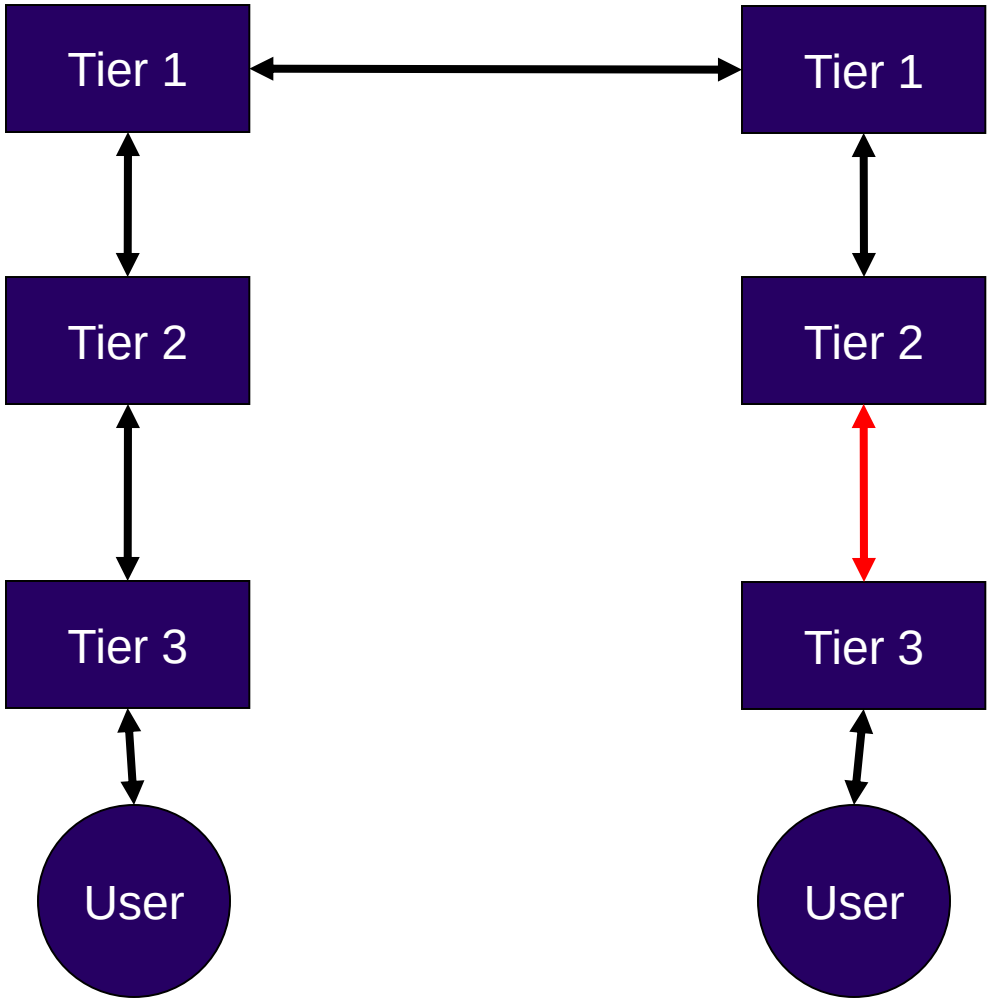
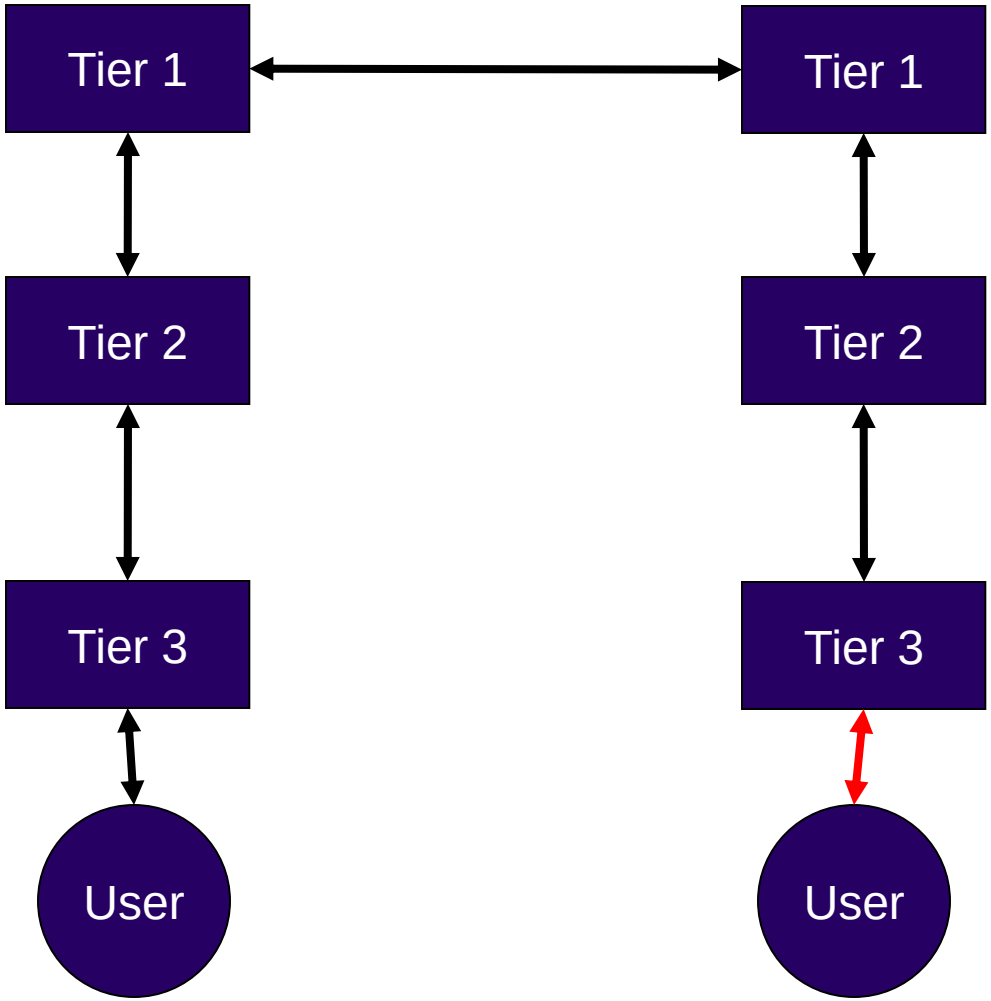
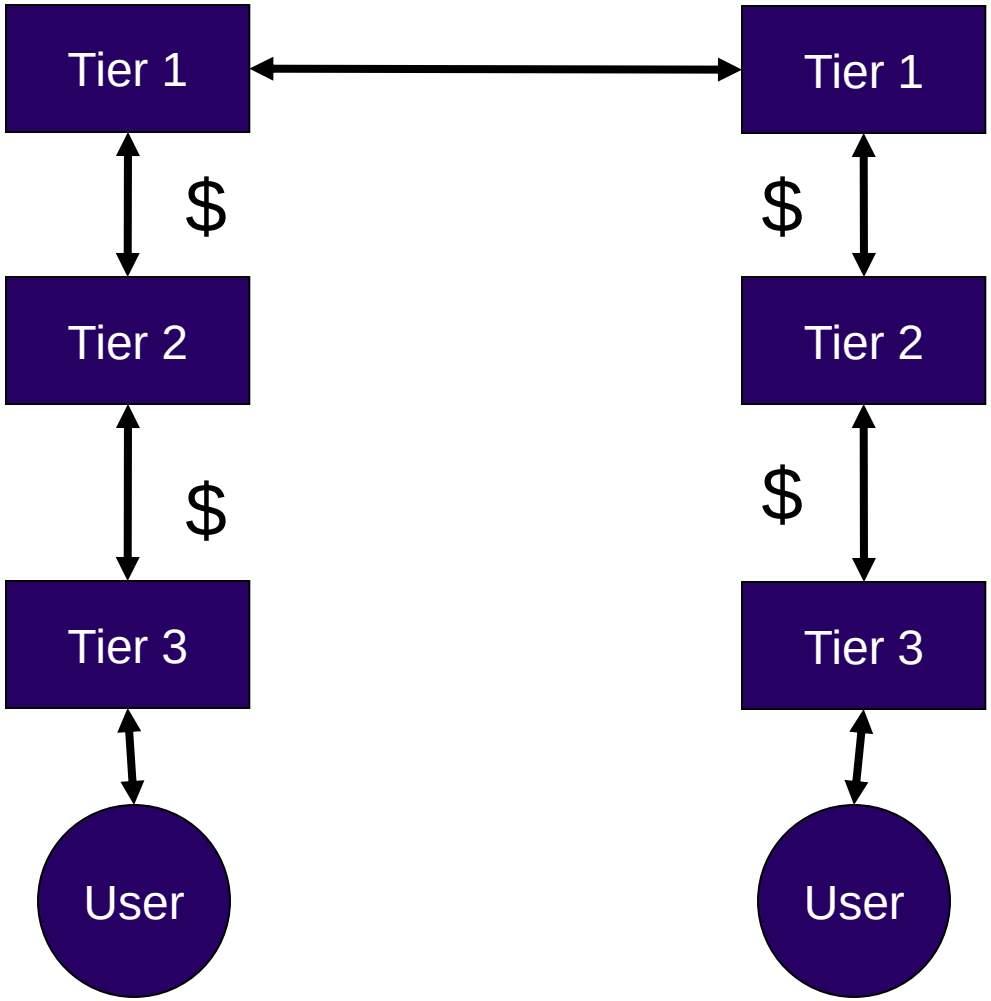


Peering – what is it?



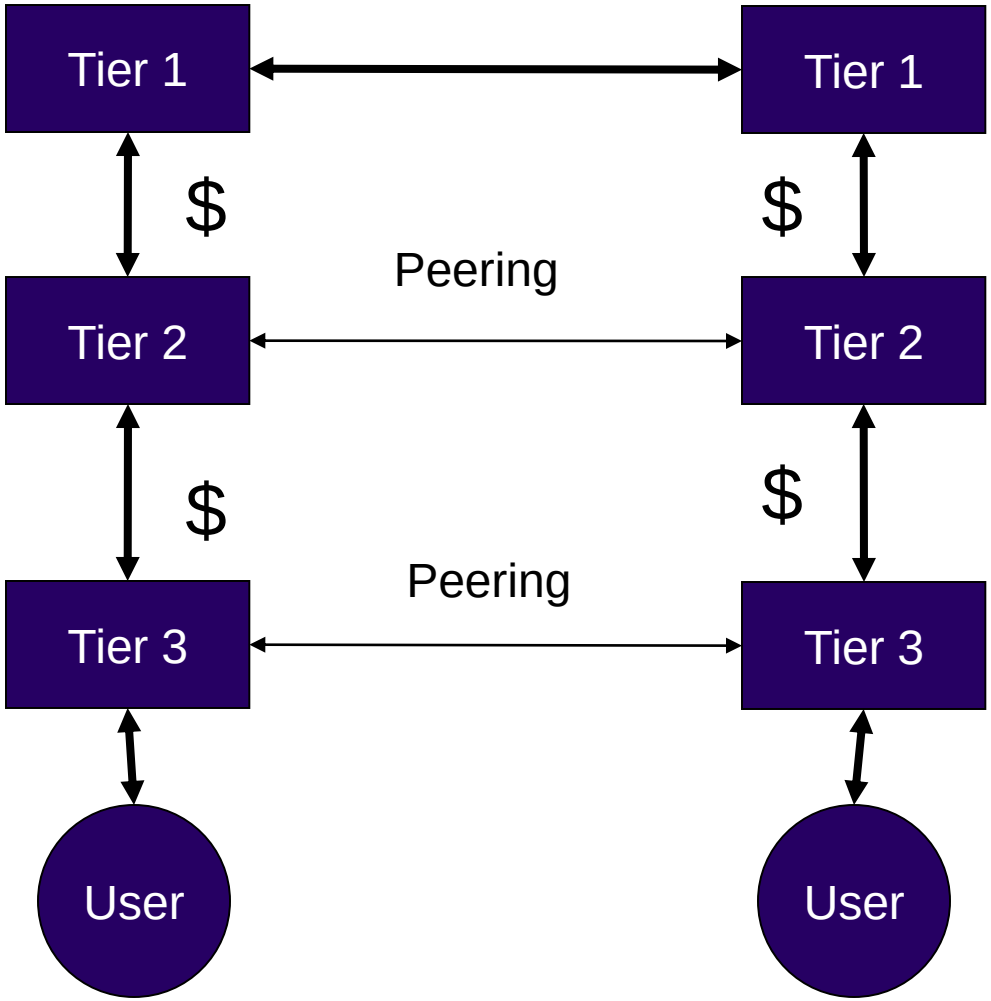
So what is the problem?



Other Problems

- Latency
  - Traffic may dog-leg via the US or Europe
  - Especially important for peer to peer traffic or gaming
- Congestion
  - Expensive international links
  - Makes everything unresponsive
- Jitter (or delay variance)
  - A combination of the above
  - Makes VOIP and video difficult to use or unusable

What do we do to fix it?



Advantages

- Tier 2 and 3 pay less transit charges (Hurrah!)
- Local traffic stays local
  - Lower latency
  - Less jitter
  - Less chance of congestion
  - Less dependency on external factors (like undersea cable breaks)
- Cooperation between ISPs
  - Overall better service
  - Possible moves towards a trade association

Disadvantages

- Tier 1 sees less revenue (but who cares)
- Tier 2 may see less revenue (but is paying less to Tier 1)
- Management may see peering as cooperation with potential competitors (but we all know how to manage our management don’t we?)

Policies and Strategies

- Peering Strategy
  - How do I plan to achieve: reduced transit costs, increased profits, better customer experience, world domination etc
  - Private
- Peering Policy
  - What do I tell people who want to peer with me?
  - Should be publicly available (on your web site)
  - Includes contact info
  - Referred to on your PeeringDB page
  - If you are a large player or are very selective then should be objective in order to avoid problems with regulators

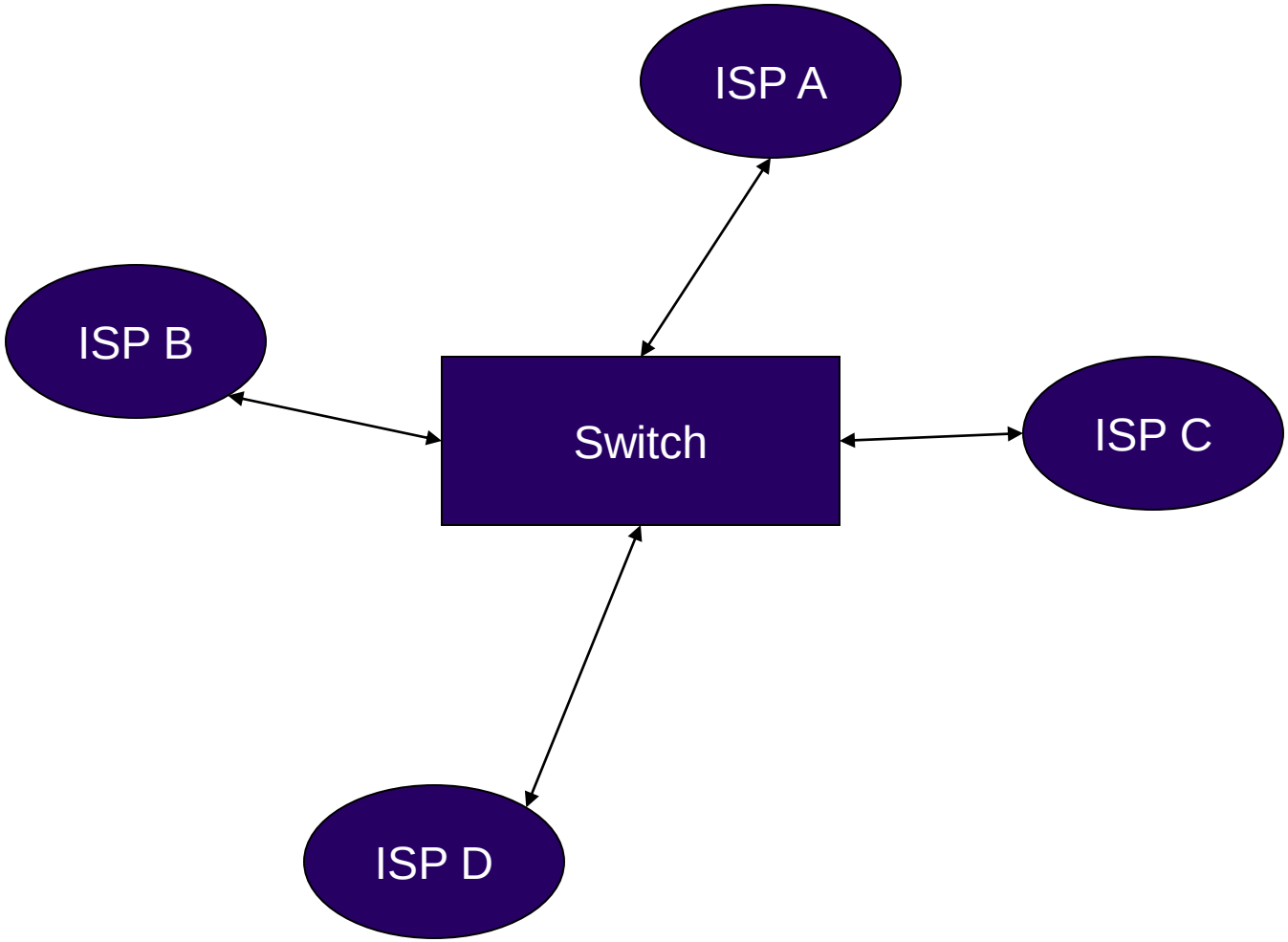
Types of Peering Policies

- Open (we peer with anyone)
- Selective (we are a bit fussy about who we peer with)
- Restrictive (we actively discourage people from peering with us)
- Closed (we won’t peer with anyone)

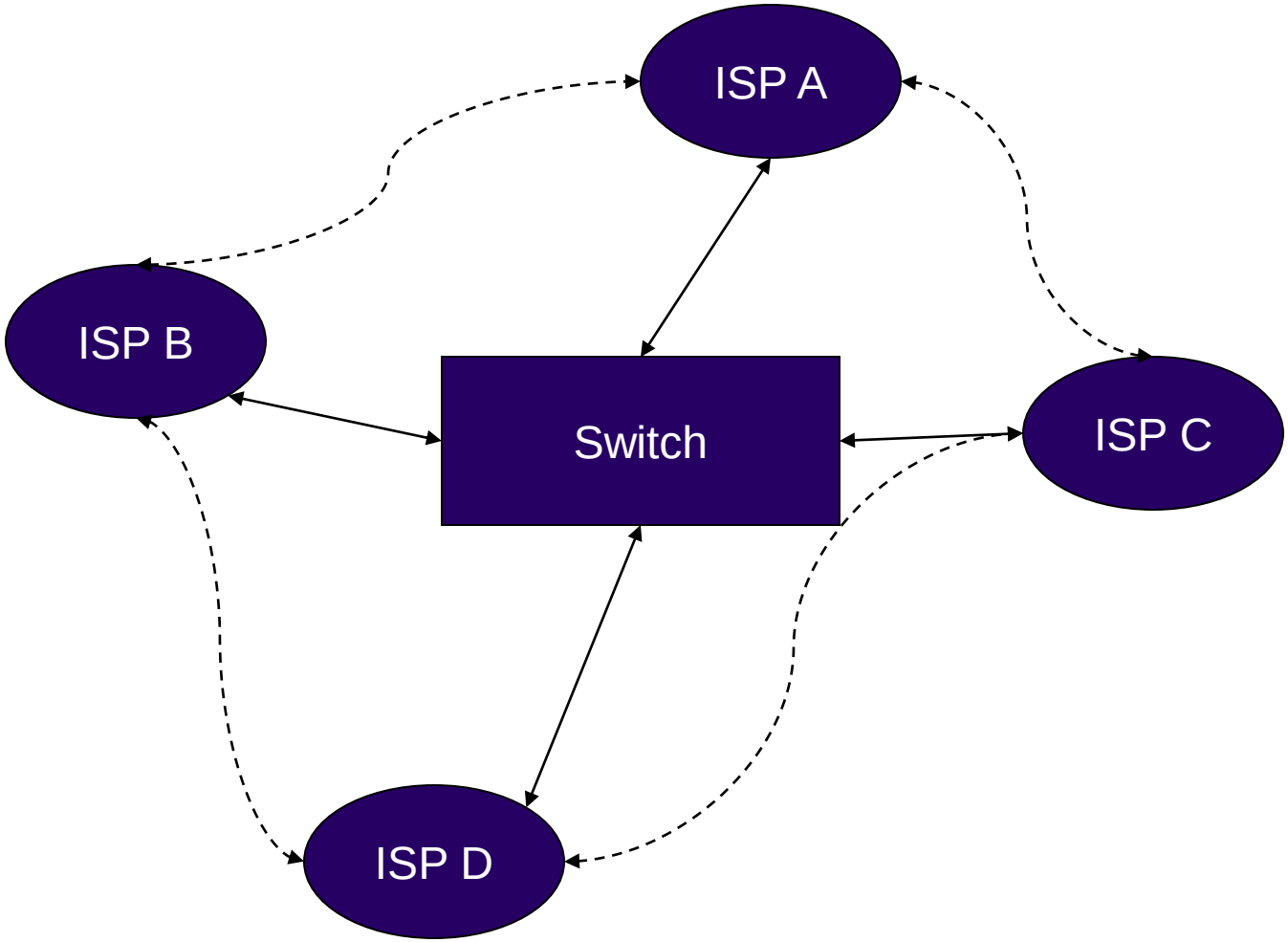
How do we do it?

- Via an Internet Exchange Point
  - –A neutrally managed layer 2 switch
- Via direct peering
  - –A direct connection between two ASes

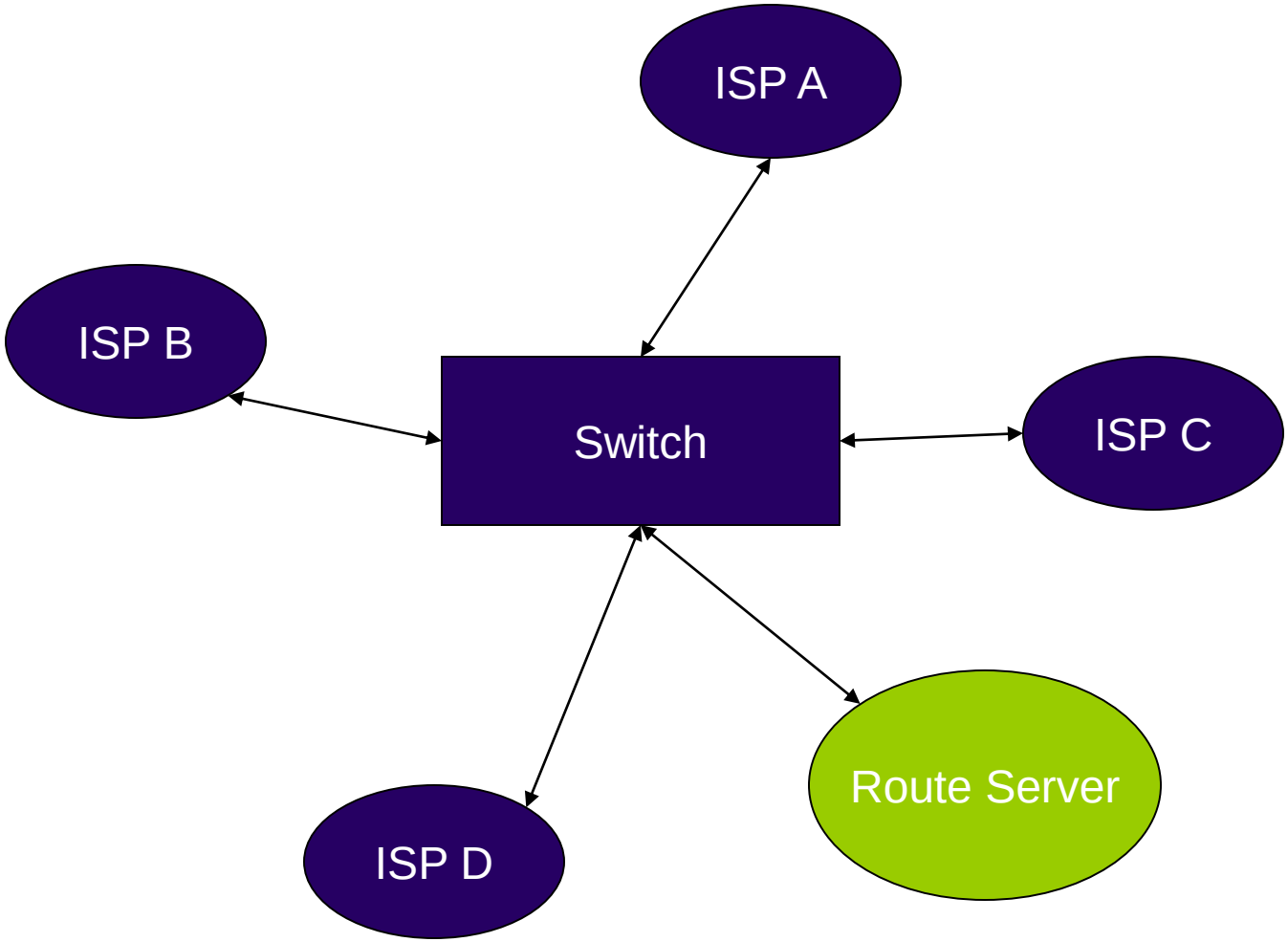
Typical IXP (Physical)



Typical IXP (Logical)



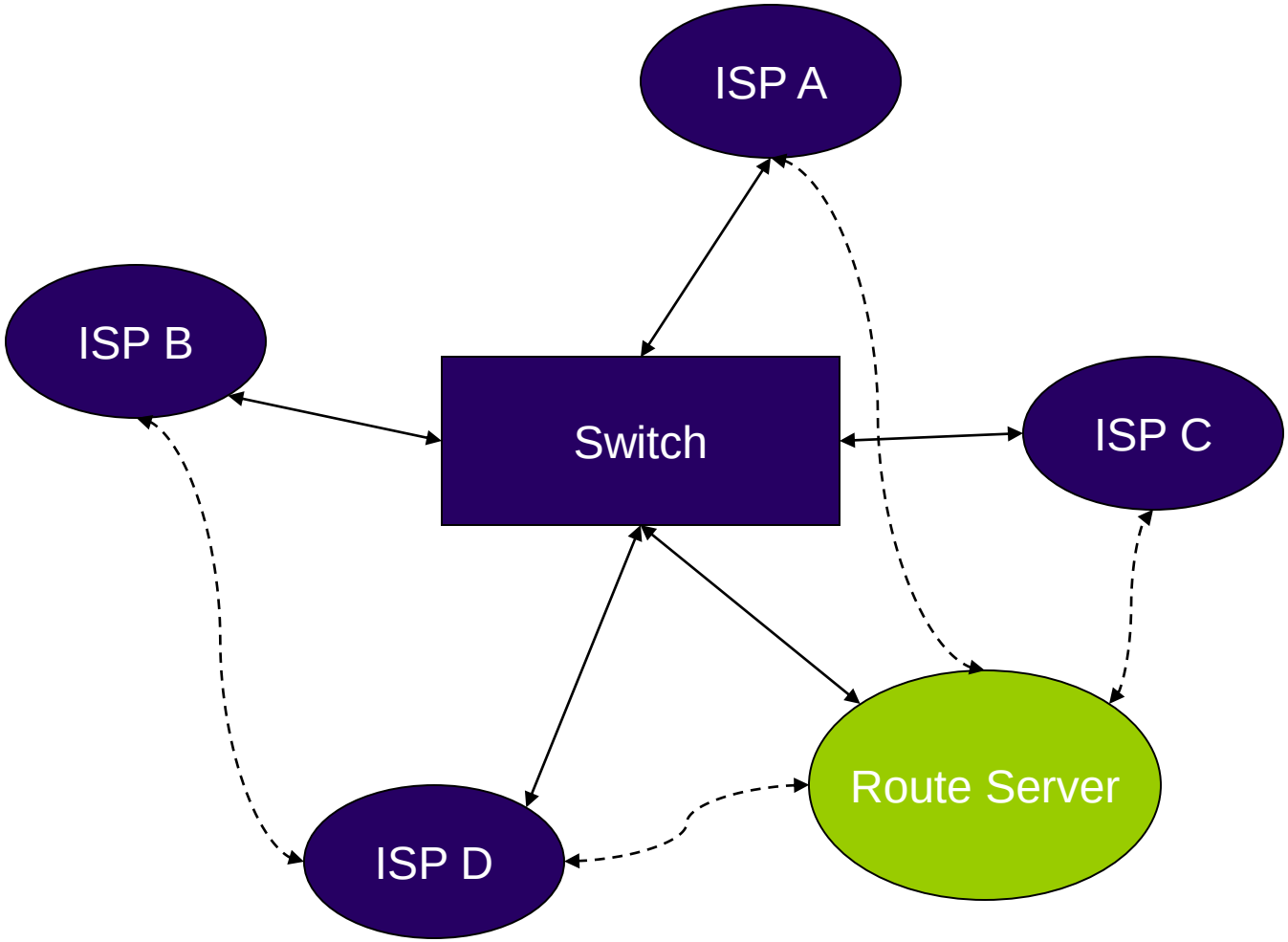
Typical IXP (Physical with route server)



Route Server

- Typically a PC running UNIX/Linux
- Zebra or Quagga
- Sets up BGP sessions with IXP members
- Distributes routes (not traffic)
- May be mandatory or optional

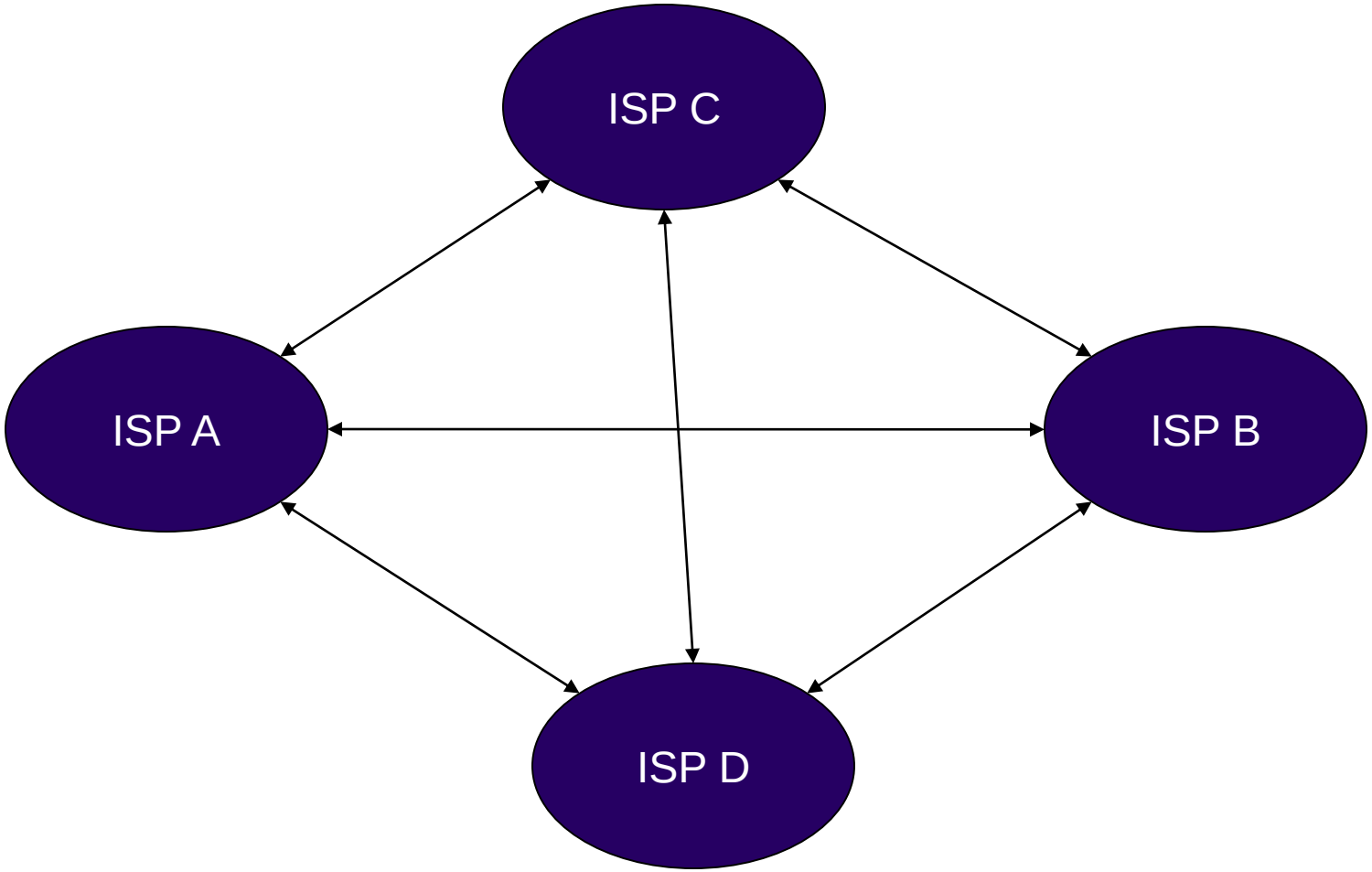
Typical IXP (Logical with route server)



IXP pros and cons

- Pros
  - Only one connection needed
  - Can be very cheap
  - All potential peers immediately available (especially with route server)
  - Can form the basis for cooperative ventures such as trade associations
- Cons
  - Infrastructure may congest (unlikely)
  - Single point of failure
  - Bad traffic (broadcast storms) may disrupt peering
  - Lack of flexibility (with route server)
  - May be difficult to measure traffic to individual peers
  - There may not be an IXP available (so create one, see PCH)

Direct Peering



Direct peering pros and cons

- Pros
  - Easy to see how much traffic is flowing to your peer
  - No single point of failure
  - No interference between peering session
- Cons
  - Port required for each peer (expensive)
  - Bringing up session needs physical installation (so tends to inhibit peering)
  - Cannot share bandwidth between several peers

Compromises

- Start peers on a shared infrastructure (IXP)
- Measure peering flows
- Migrate onto direct peerings when economical to do so
- Best of both worlds
- Assumes that you have the means to measure traffic flows

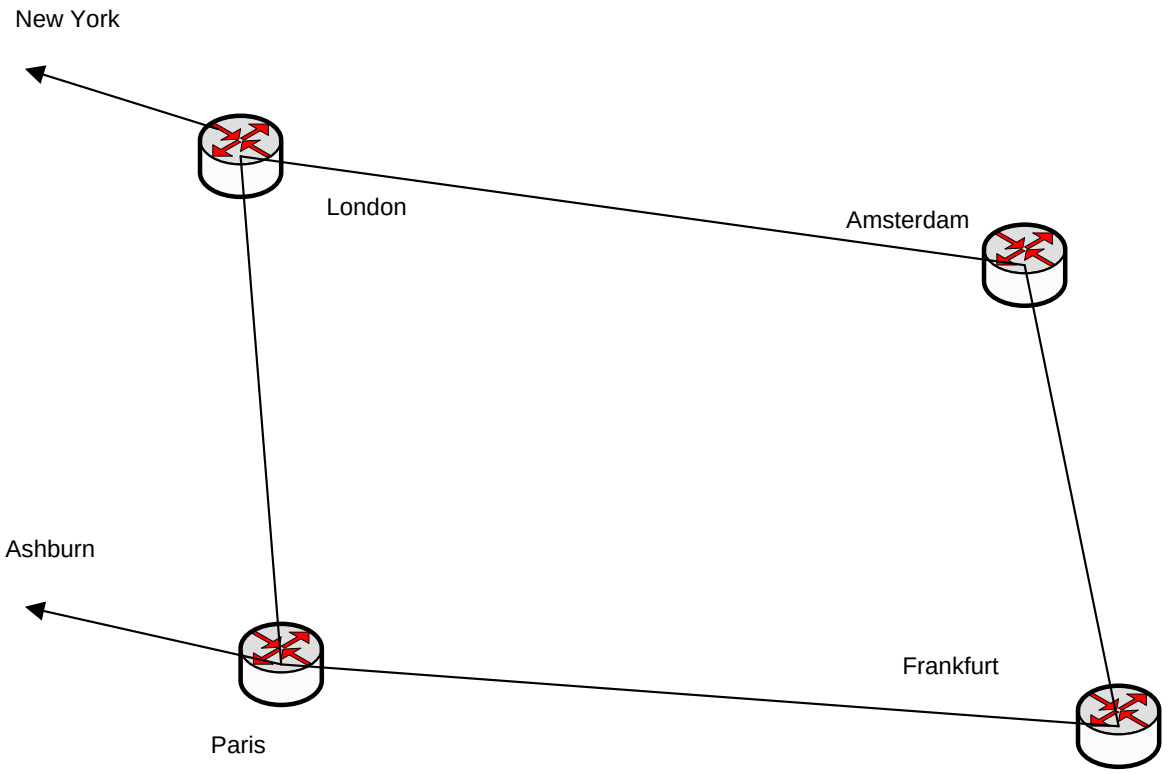
Why build a peering network?

- Cheaper than transit
- More control over traffic
- Traffic flows (especially if your traffic is asymmetrical)
- Ego factor
- Keep me in a job

Planning

- Estimates of amount of peering traffic
  - At least 20G
- Region
  - US
  - Europe
  - Split roughly 50/50
- Target likely peers
  - Content providers
  - Peer to peer (other eyeballs)
- Locations

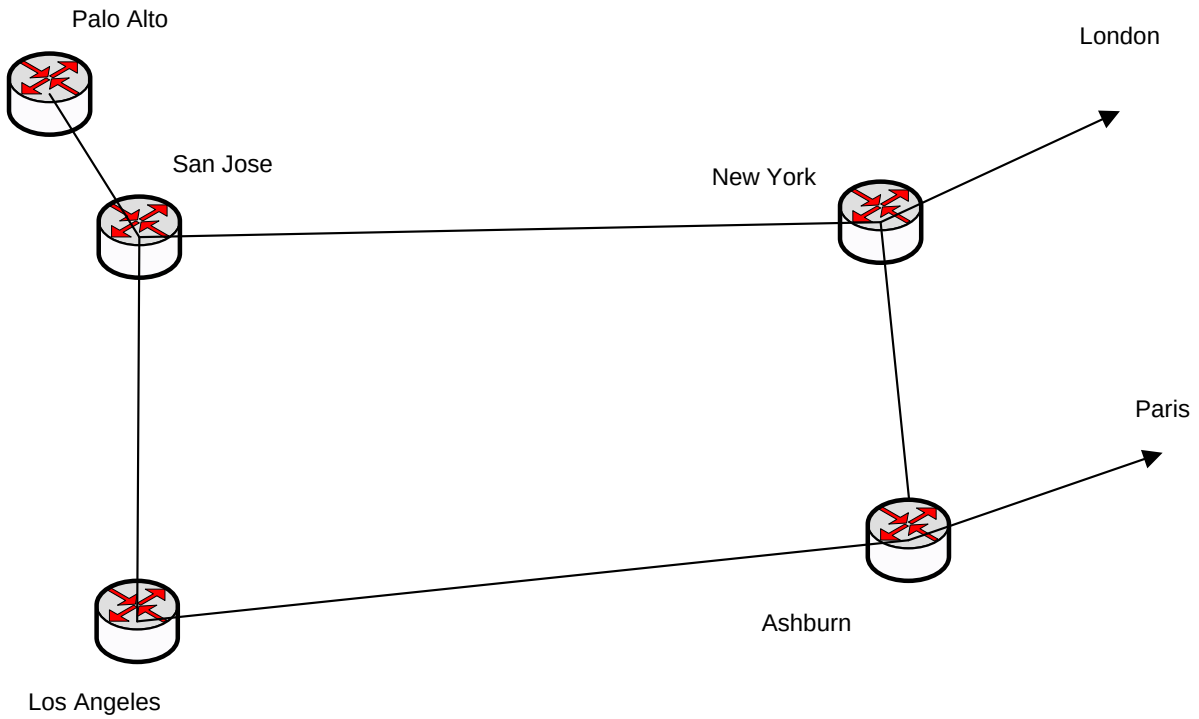
Network Diagram (Europe)



Locations (Europe)

- Fairly Easy as we already had a network in Europe
- Based around IXPs
  - Amsterdam (AMSIX)
  - Frankfurt (DECIX)
  - Paris (SFINX/PANAP/FreeIX)
- Initial Build
  - 10G ring London – Amsterdam – Paris – Frankfurt
  - Cisco CRSes (room to grow)
  - Optics as we need them

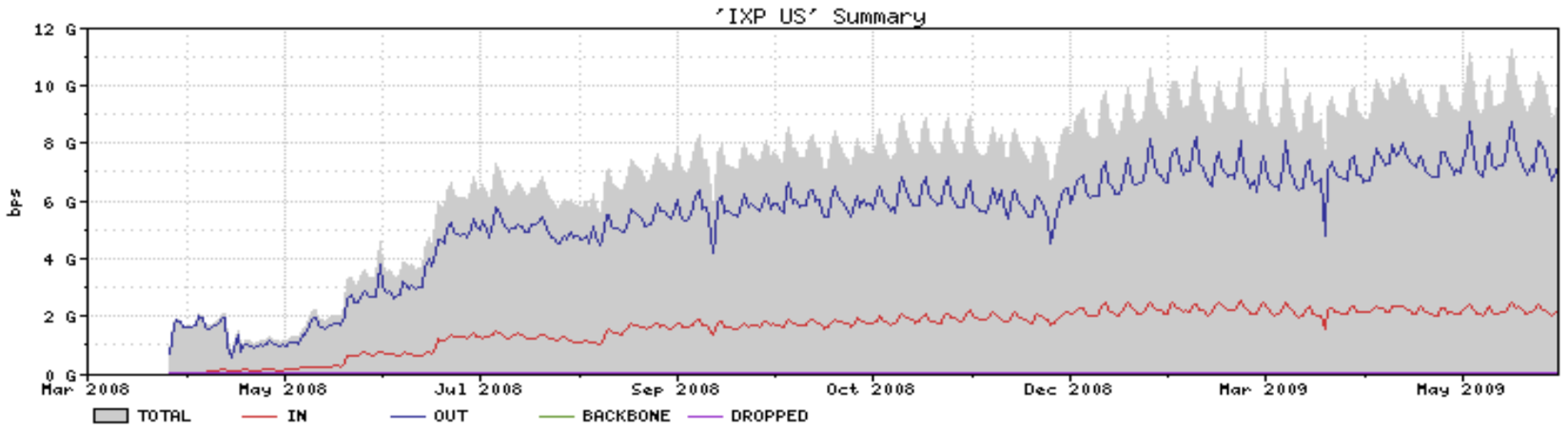
Network Diagram (US)

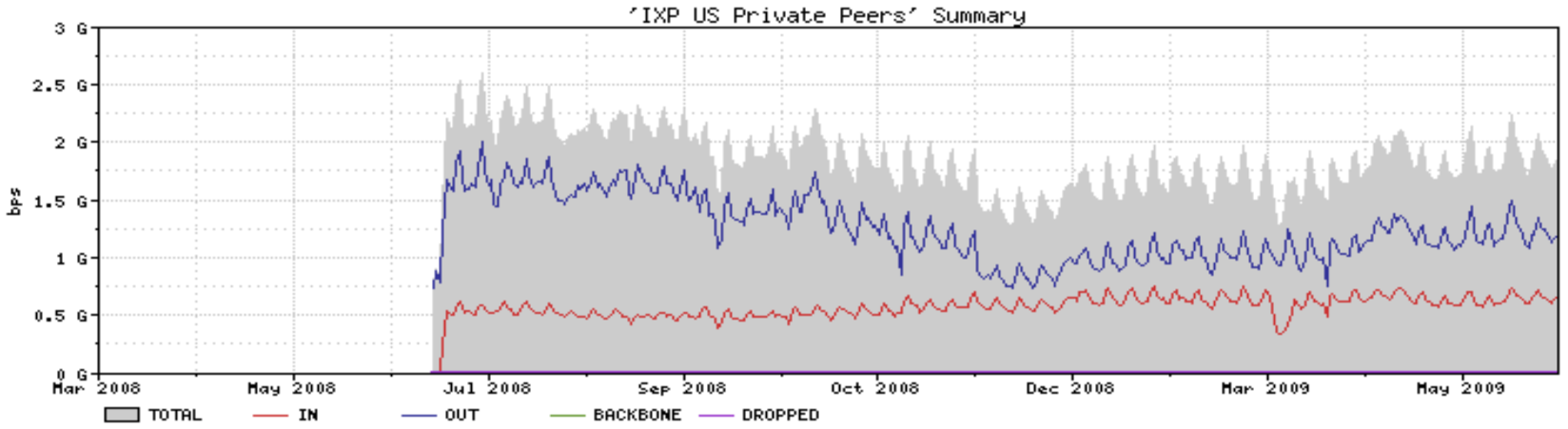


Locations (US)

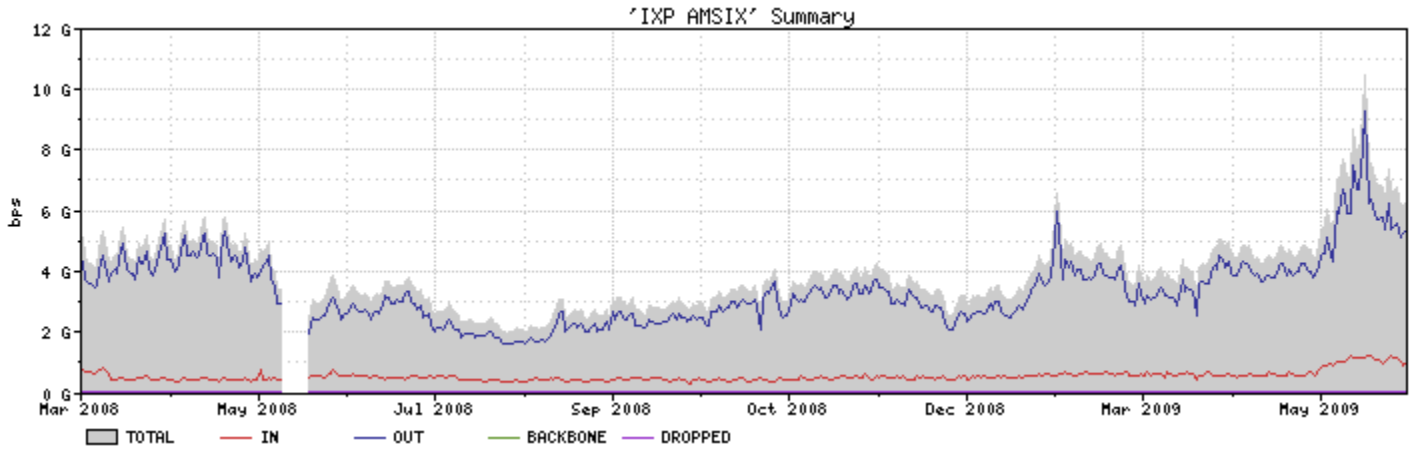
- Brand New Network
- Based around IXPs
  - New York (NYIIX, PAIX)
  - Ashburn (Equinix)
  - Los Angeles (Any2, LAIIX)
  - Palo Alto (PAIX)
  - San Jose (Equinix)
- Initial Build
  - 10G ring New York – Ashburn – Los Angeles – San Jose
  - 10G spurs to Palo Alto
  - Cisco CRSes (room to grow)
  - Optics as we need them

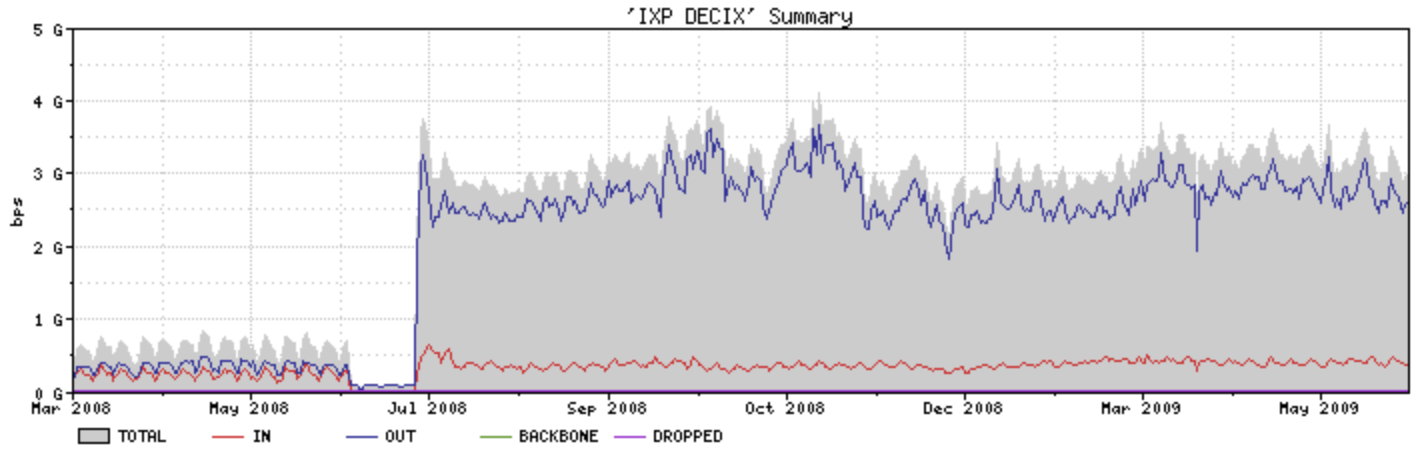
US traffic growth



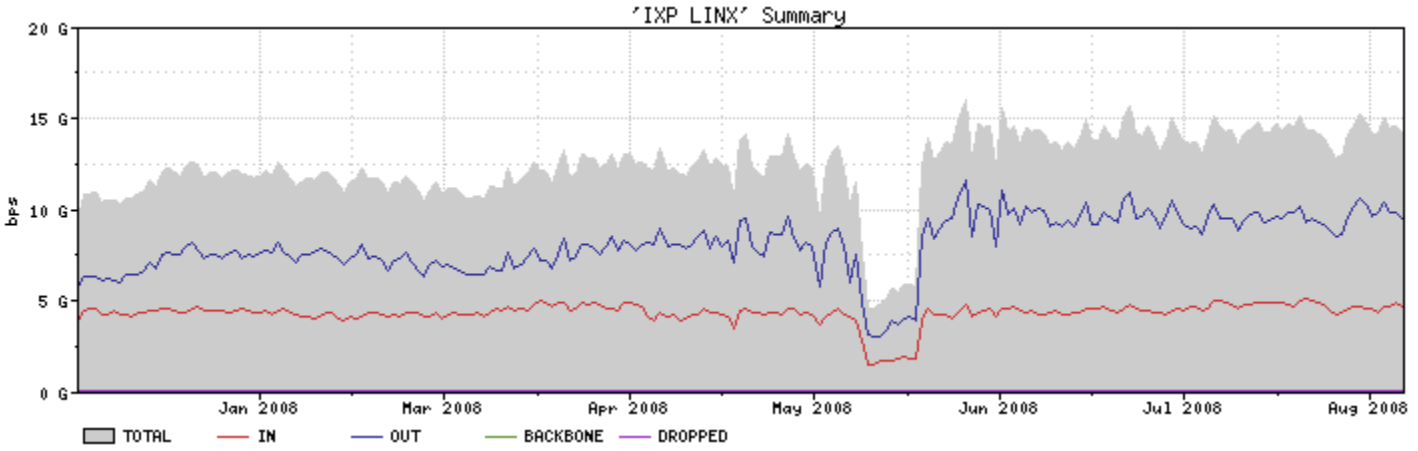


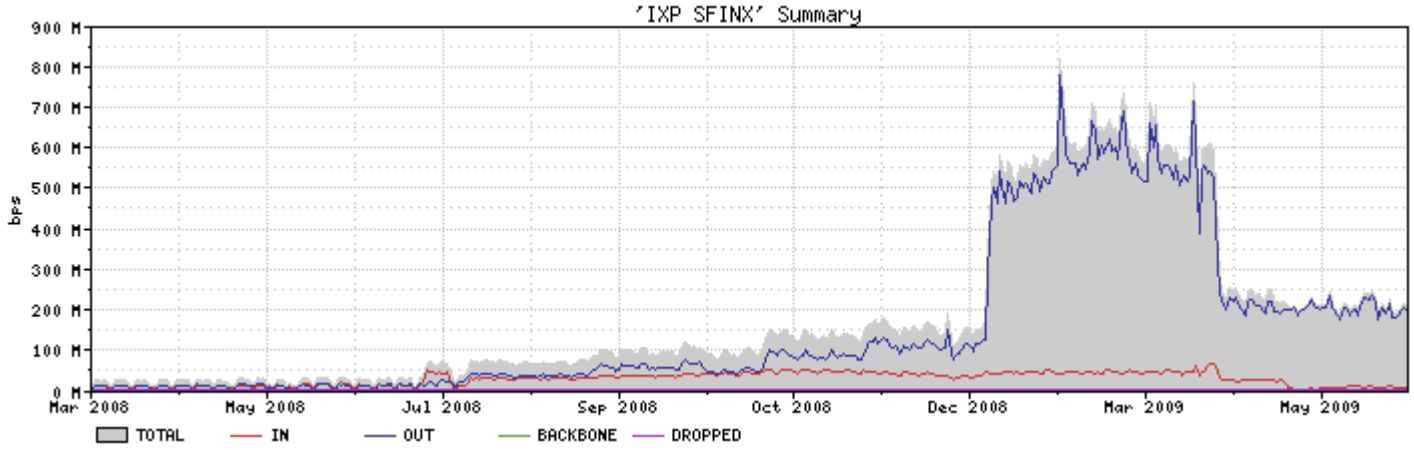
Europe Traffic growth



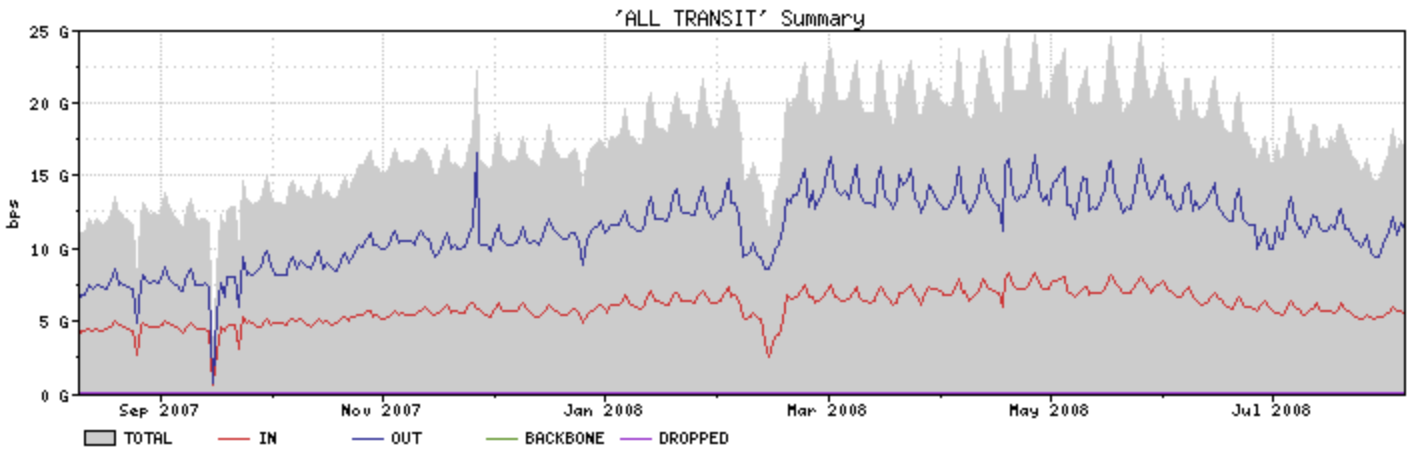


European Traffic growth (2)





Effect on transit



Savings

- Transit – Peering = 30 – 50%
- Total traffic = 140G approx
- Peering ratio approx 70%
- Latency/jitter improved
- Network available for reverse traffic FOC

How to use the New Network

- Analyse traffic (probably already done as part of your planning phase)
- Await requests to peer
- Stalk and hunt desired peers
- Bring up peerings

Tools of the Trade

- Good business card file
- PeeringDB
- Arbor (or similar)
- Renesys
- Local database
- Friendly and engaging smile

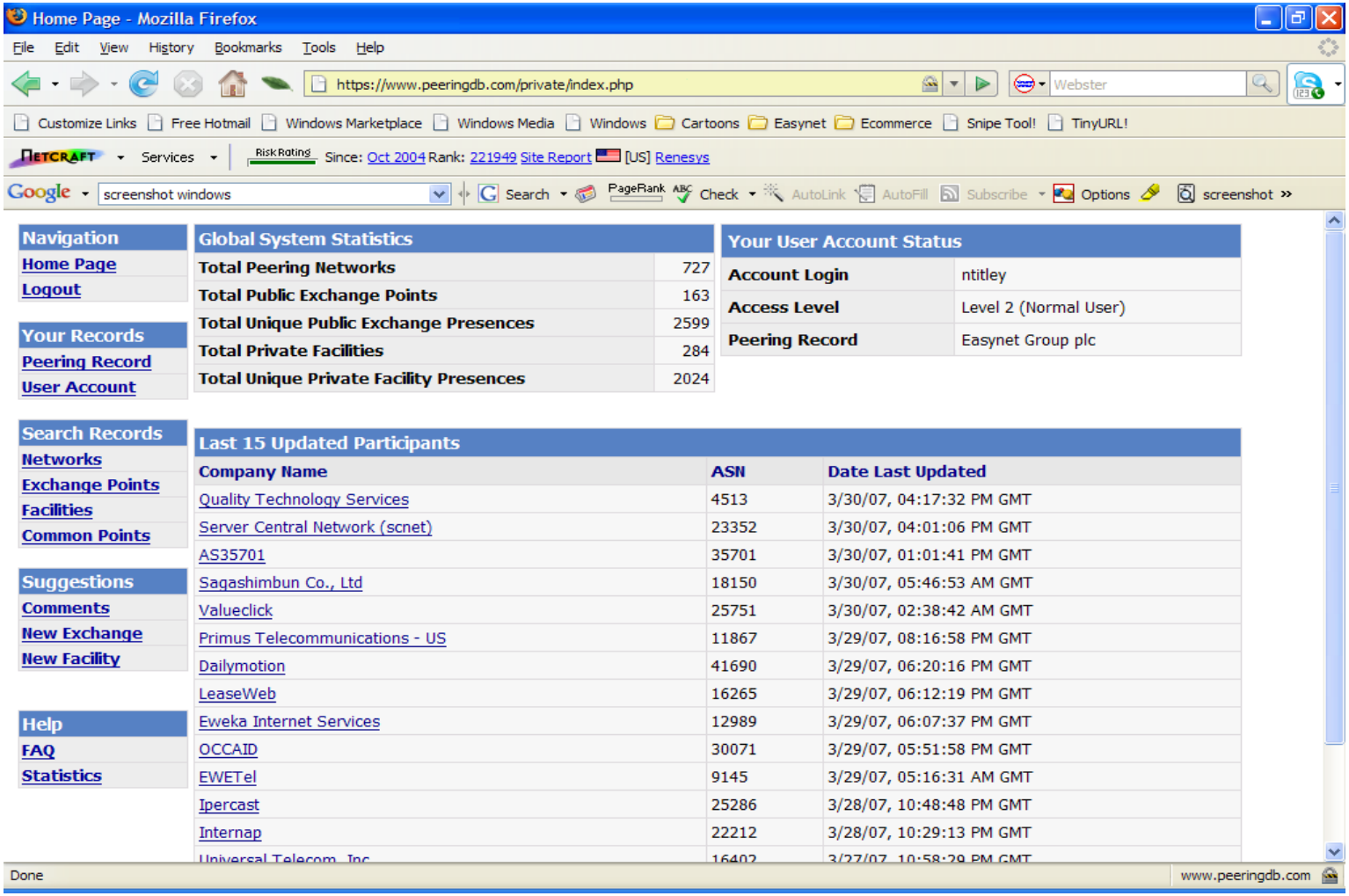
Business card file

- Contact details
- Phone number
- Email address
- Write things on the back (like AS number)
- May get extensive
- Review regularly (but don’t throw away cards, peering coordinators move between companies but keep the same job)

PeeringDB

- Free!
- Incredibly useful resource
- http://www.peeringdb.com
- Guest access (guest/guest)
- Register your own account (https://www.peeringdb.com/registration/register.php)
- Enter your own network's details
- Easily search for details of potential peers

Peering DB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Customize Links Free Hotmail Windows Marketplace Windows Media Windows Cartoons Easynet Ecommerce Snipe Tool! TinyURL!
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Google screenshot windows Search PageRank Check AutoLink AutoFill Subscribe Options screenshot
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Logout
Your Records
Peering Record
User Account
Search Records
Networks
Exchange Points
Facilities
Common Points
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Help
FAQ
Statistics
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Total Unique Public Exchange Presences 2599
Total Private Facilities 284
Total Unique Private Facility Presences 2024
Your User Account Status
Account Login ntitley
Access Level Level 2 (Normal User)
Peering Record Easynet Group plc
Last 15 Updated Participants
Company Name | ASN | Date Last Updated
Quality Technology Services | 4513 | 3/30/07, 04:17:32 PM GMT
Server Central Network (scnet) | 23352 | 3/30/07, 04:01:06 PM GMT
AS35701 | 35701 | 3/30/07, 01:01:41 PM GMT
Sagashimbun Co., Ltd | 18150 | 3/30/07, 05:46:53 AM GMT
Valueclick | 25751 | 3/30/07, 02:38:42 AM GMT
Primus Telecommunications - US | 11867 | 3/29/07, 08:16:58 PM GMT
Dailymotion | 41690 | 3/29/07, 06:20:16 PM GMT
LeaseWeb | 16265 | 3/29/07, 06:12:19 PM GMT
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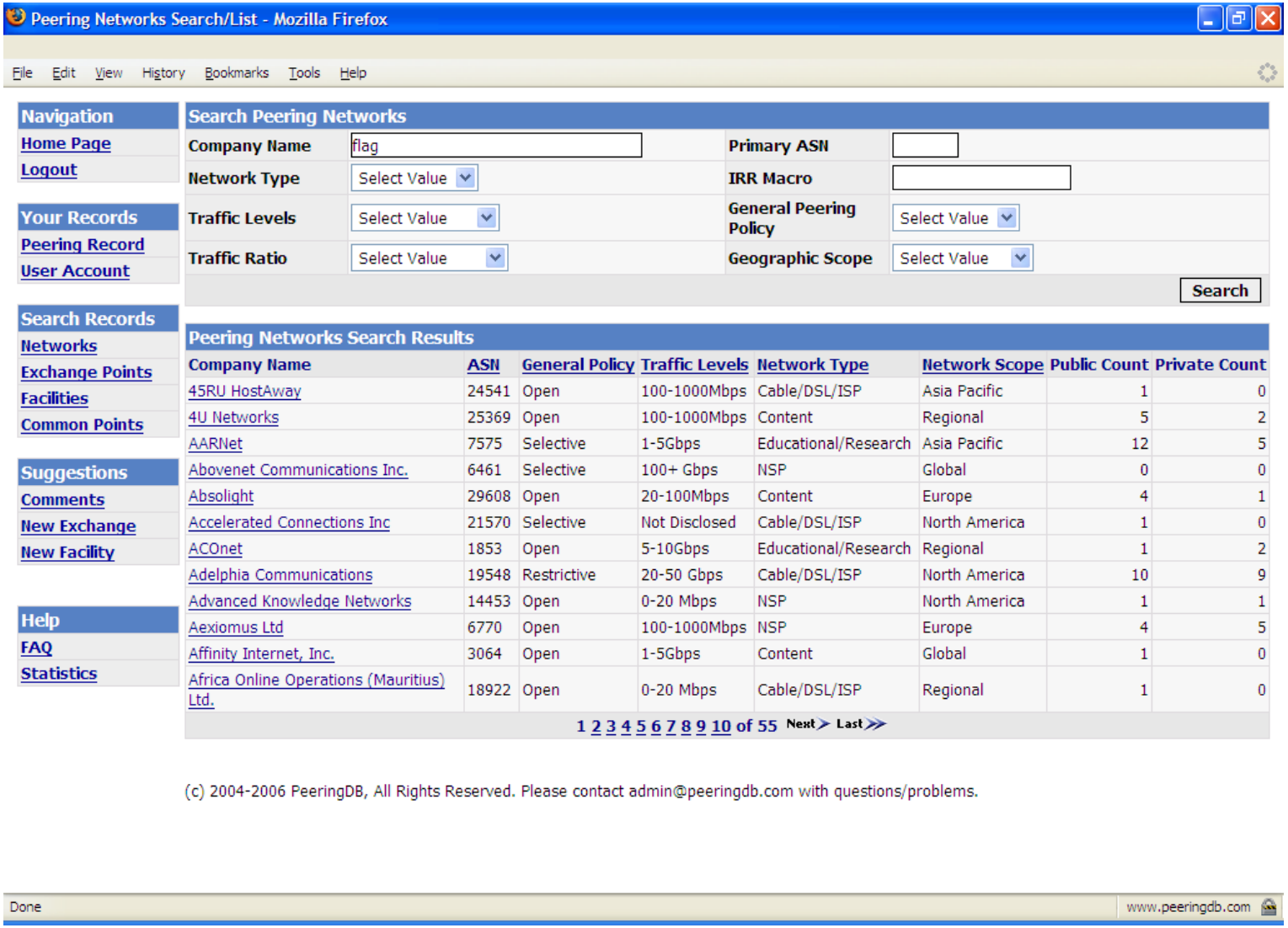
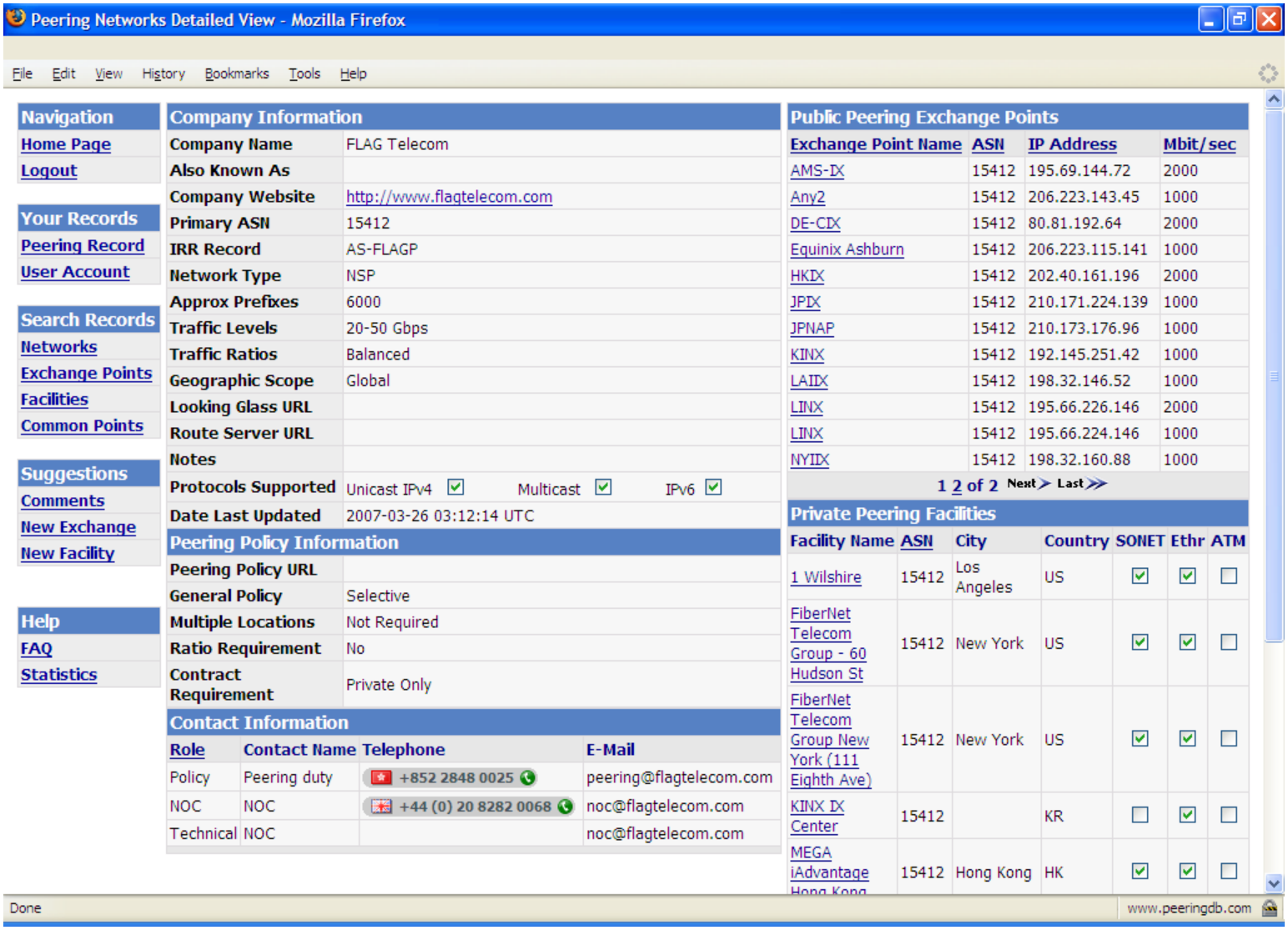
OCCAID | 30071 | 3/29/07, 05:51:58 PM GMT
EWETel | 9145 | 3/29/07, 05:16:31 AM GMT
Ipercast | 25286 | 3/28/07, 10:48:48 PM GMT
Internap | 22212 | 3/28/07, 10:29:13 PM GMT
Done
www.peeringdb.com

PeeringDB (search)



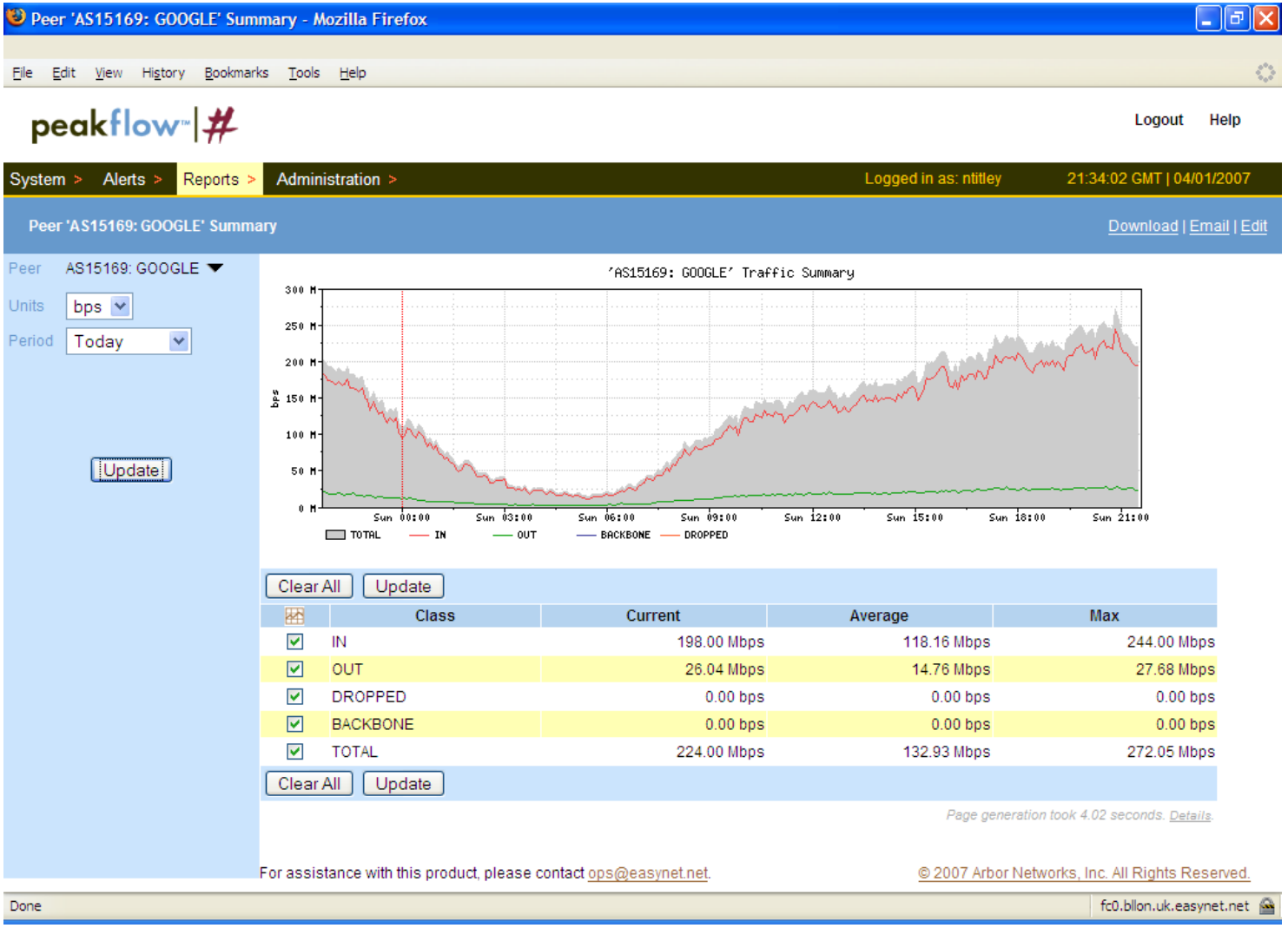
PeeringDB (search results)



Arbor Peakflow (or similar)

- For each router in network
  - Takes netflow data
  - Takes an iBGP feed
  - Takes SNMP feed
- Used to determine traffic to and from a peer (or potential peer)
- For a potential peer will show the current path
- Also shows
  - Traffic breakdown (by destination port)
  - Traffic flowing from a peer to a peer (useful for detecting misconfigurations)
  - Peering adviser mode, shows peers to aim for
  - Traffic flows within network
  - Historical data
- Disadvantage
  - Cost (licensed per router)
  - May lie to you

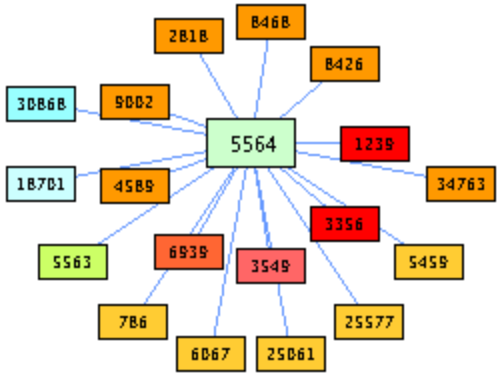
Arbor Peakflow (example)



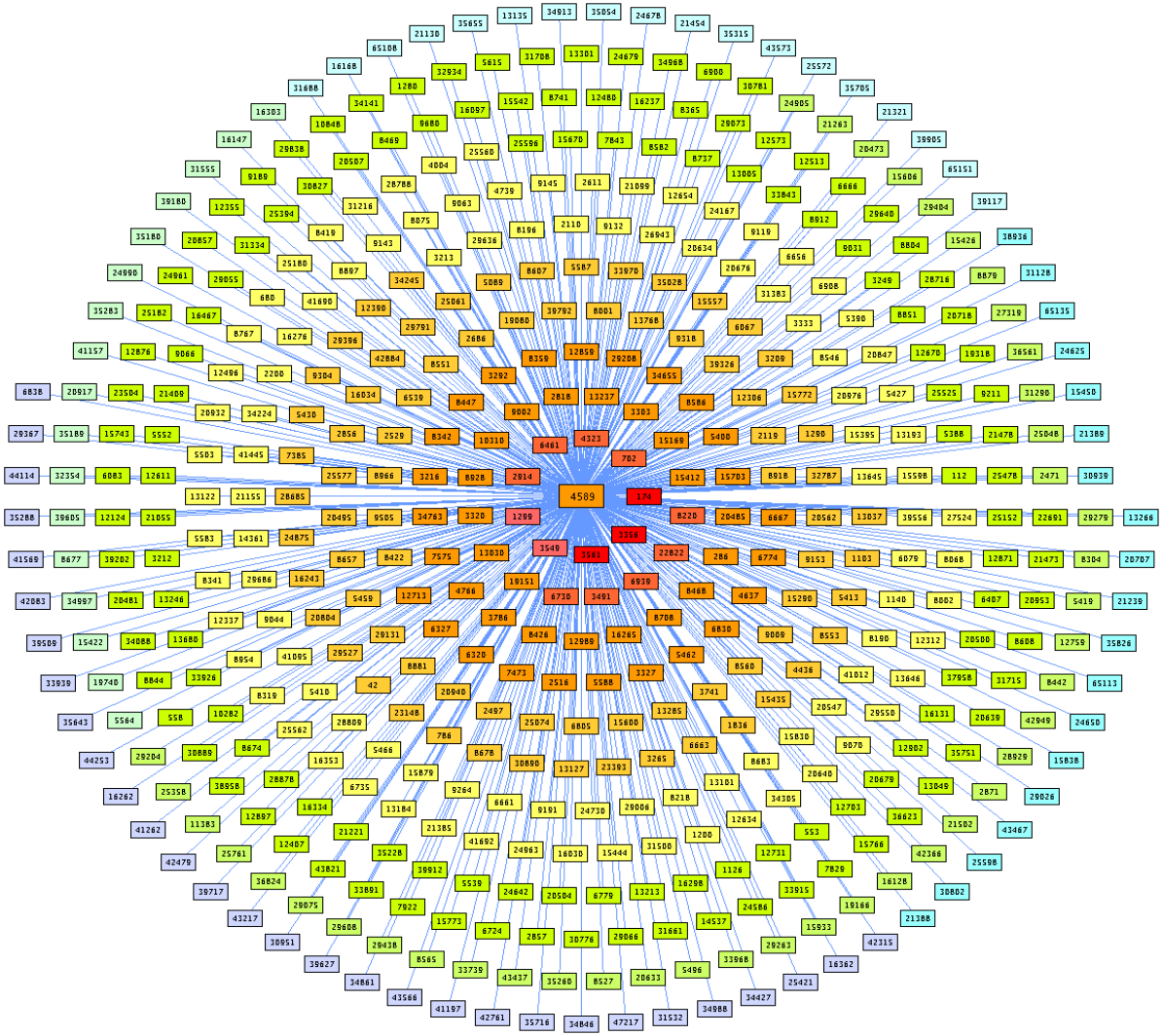
Renesys

- http://www.renesys.com
- Historical routing topology data
- Very useful
  - Debugging routing problems
  - Working out routing topologies
- Peering advisor tool
- Free
  - Give them a peering
  - Get access to basic tools
- Pay
  - Get automatic advisories of routing topology problems to feed to your NOC
  - Get access to complete history

AS5564 (Scotland Online)



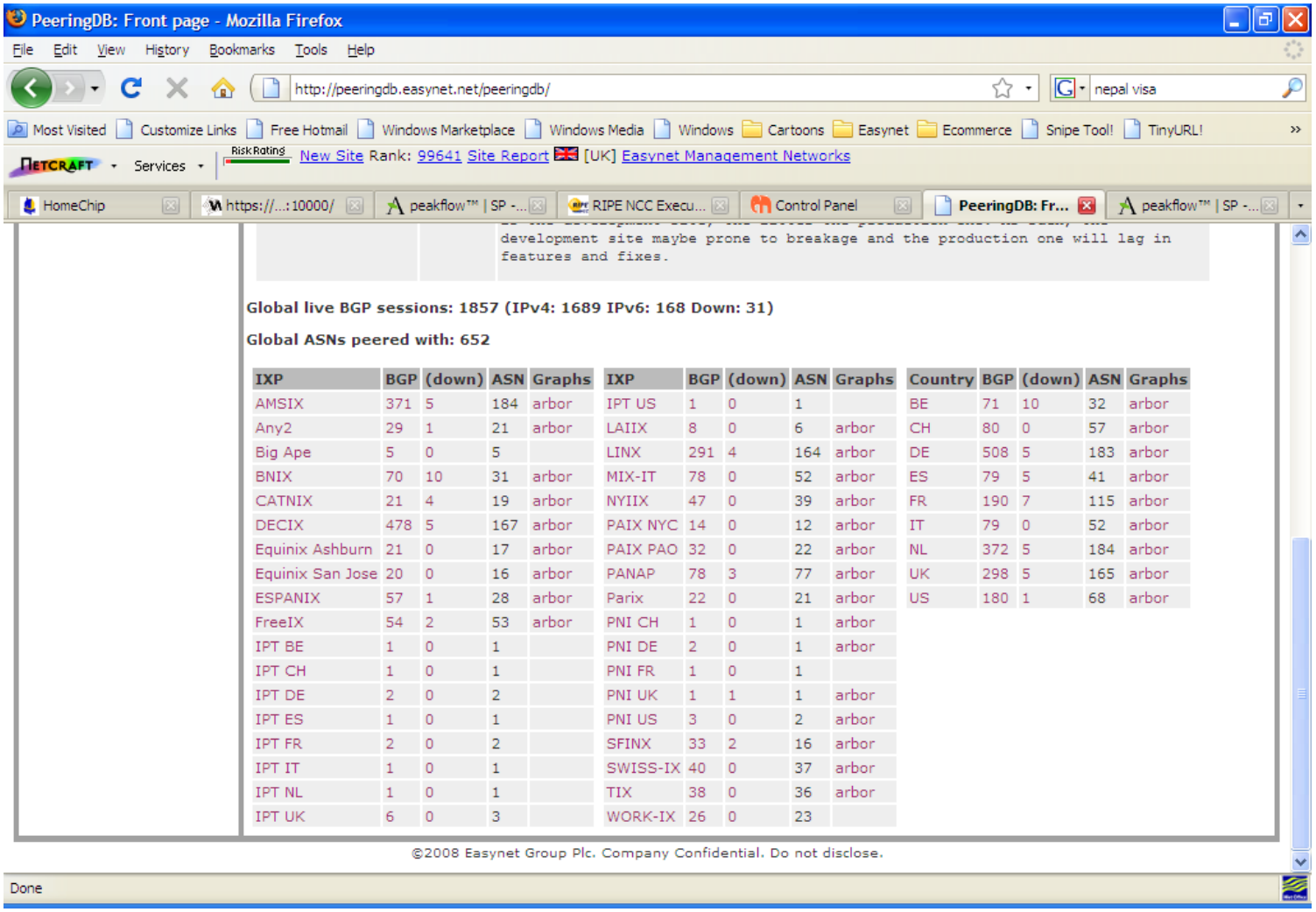
AS4589 (Easynet)



Local Database

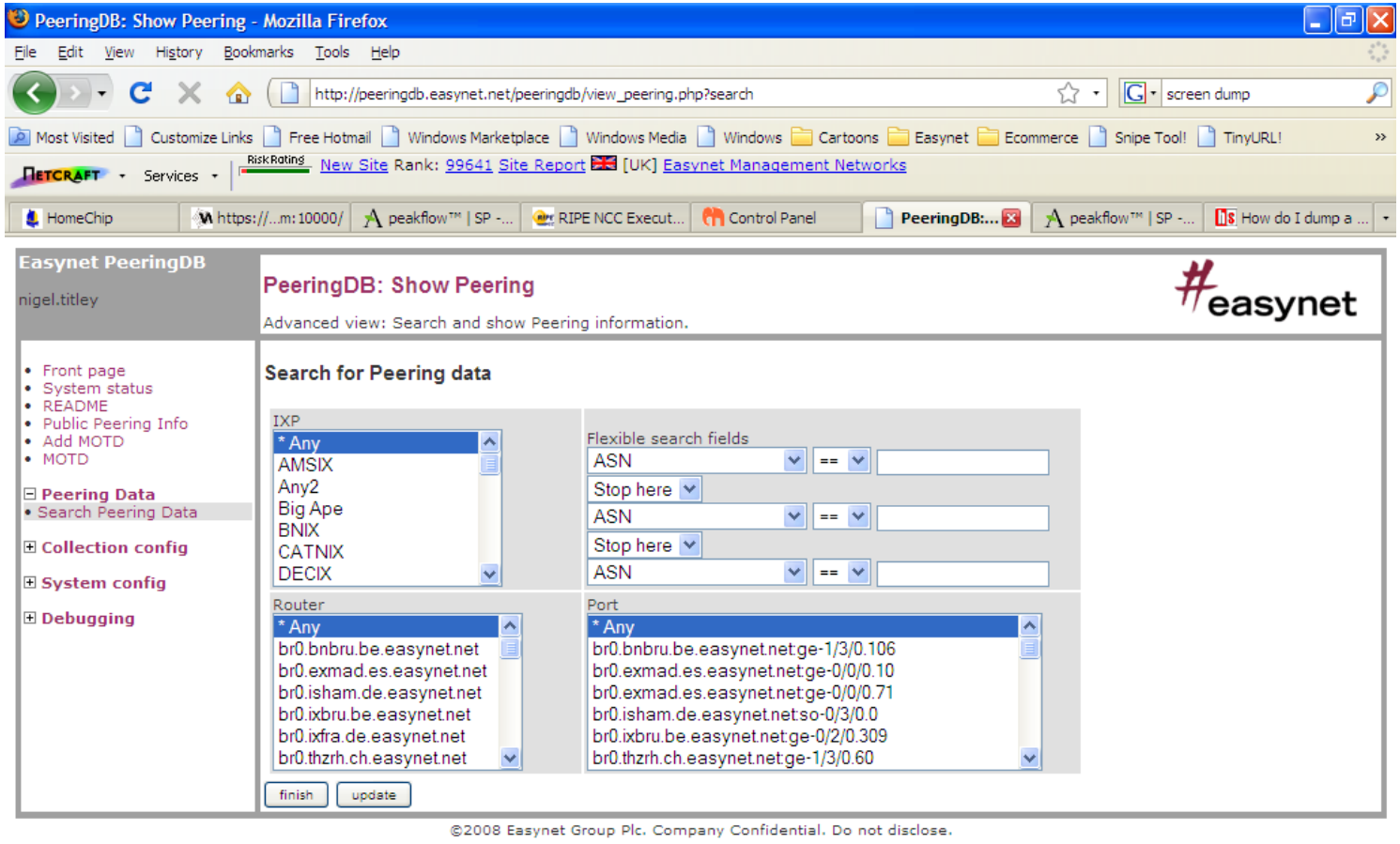
- Where do I peer
- Who do I peer with?
- How do I contact them?
- Who *don't* I peer with?
- Missing peering points
- Anything else you might want to record

IXP Overview



IXP	BGP	(down)	ASN	Graphs	IXP	BGP	(down)	ASN	Graphs	Country	BGP	(down)	ASN	Graphs
AMSIX	371	5	184	arbor	IPT US	1	0	1		BE	71	10	32	arbor
Any2	29	1	21	arbor	LAIIX	8	0	6	arbor	CH	80	0	57	arbor
Big Ape	5	0	5		LINX	291	4	164	arbor	DE	508	5	183	arbor
BNIX	70	10	31	arbor	MIX-IT	78	0	52	arbor	ES	79	5	41	arbor
CATNIX	21	4	19	arbor	NYIIX	47	0	39	arbor	FR	190	7	115	arbor
DECIX	478	5	167	arbor	PAIX NYC	14	0	12	arbor	IT	79	0	52	arbor
Equinix Ashburn	21	0	17	arbor	PAIX PAO	32	0	22	arbor	NL	372	5	184	arbor
Equinix San Jose	20	0	16	arbor	PANAP	78	3	77	arbor	UK	298	5	165	arbor
ESPANIX	57	1	28	arbor	Parix	22	0	21	arbor	US	180	1	68	arbor
FreeIX	54	2	53	arbor	PNI CH	1	0	1	arbor					
IPT BE	1	0	1		PNI DE	2	0	1	arbor					
IPT CH	1	0	1		PNI FR	1	0	1						
IPT DE	2	0	2		PNI UK	1	1	1	arbor					
IPT ES	1	0	1		PNI US	3	0	2	arbor					
IPT FR	2	0	2		SFINX	33	2	16	arbor					
IPT IT	1	0	1		SWISS-IX	40	0	37	arbor					
IPT NL	1	0	1		TIX	38	0	36	arbor					
IPT UK	6	0	3		WORK-IX	26	0	23						

Peer Search


PeeringDB: Show Peering - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://peeringdb.easynet.net/peeringdb/view_peering.php?search
screen dump
Most Visited Customize Links Free Hotmail Windows Marketplace Windows Media Windows Cartoons Easynet Ecommerce Snipe Tool! TinyURL!
Services New Site Rank: 99641 Site Report [UK] Easynet Management Networks
HomeChip https://...m:10000/ peakflow™ | SP -... RIPE NCC Execut... Control Panel PeeringDB:... peakflow™ | SP -... How do I dump a ...
Easynet PeeringDB
nigel.titley
PeeringDB: Show Peering
Advanced view: Search and show Peering information.
#easynet
Front page
System status
README
Public Peering Info
Add MOTD
MOTD
Peering Data
Search Peering Data
Collection config
System config
Debugging
Search for Peering data
IXP
* Any
AMSIX
Any2
Big Ape
BNIX
CATNIX
DECIX
Flexible search fields
ASN == Stop here
ASN == Stop here
ASN ==
Router
* Any
br0.bnbru.be.easynet.net
br0.exmad.es.easynet.net
br0.isham.de.easynet.net
br0.ixbru.be.easynet.net
br0.ixfra.de.easynet.net
br0.thzrh.ch.easynet.net
Port
* Any
br0.bnbru.be.easynet.net:ge-1/3/0.106
br0.exmad.es.easynet.net:ge-0/0/0.10
br0.exmad.es.easynet.net:ge-0/0/0.71
br0.isham.de.easynet.net:so-0/3/0.0
br0.ixbru.be.easynet.net:ge-0/2/0.309
br0.thzrh.ch.easynet.net:ge-1/3/0.60
finish
update
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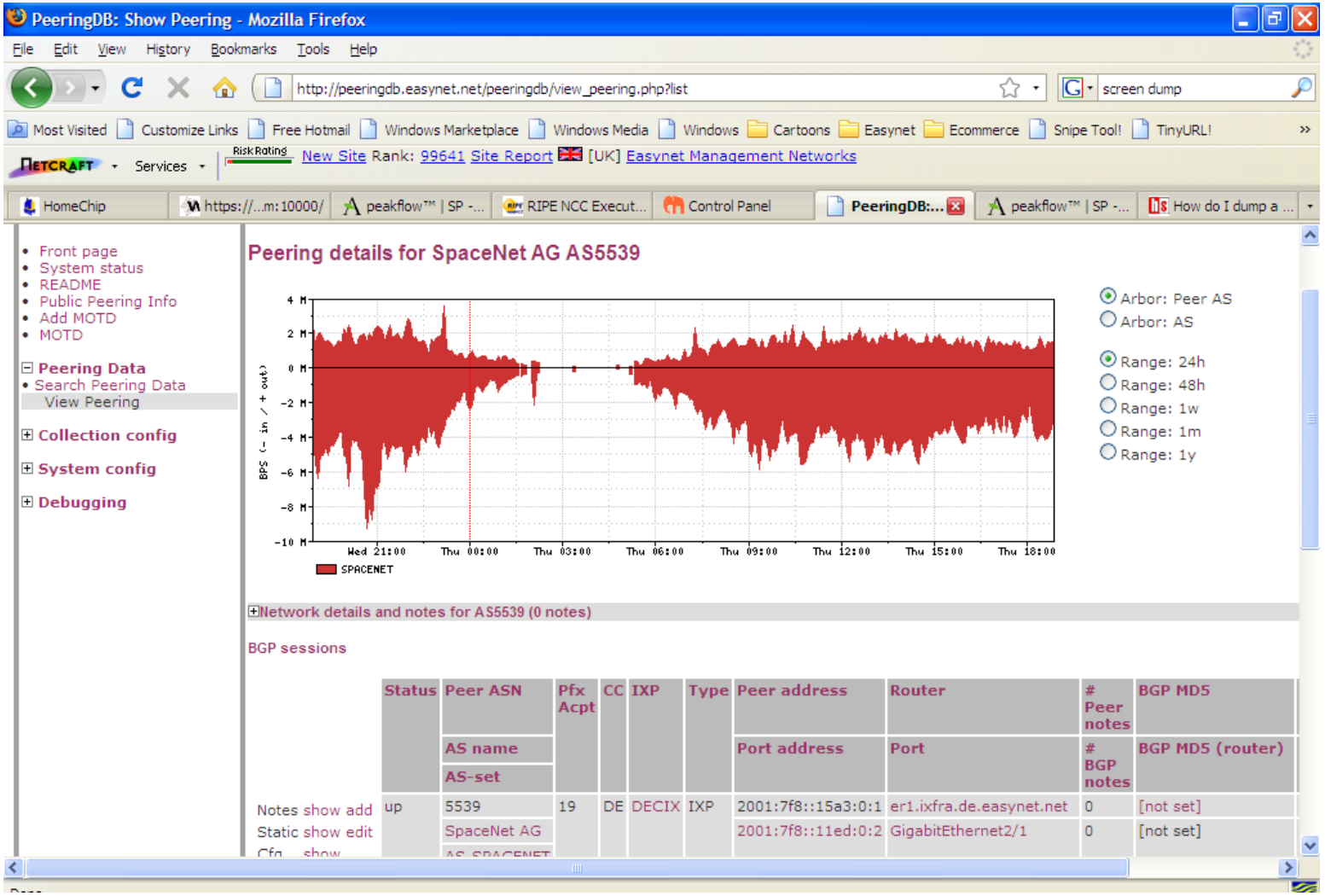
Peer details

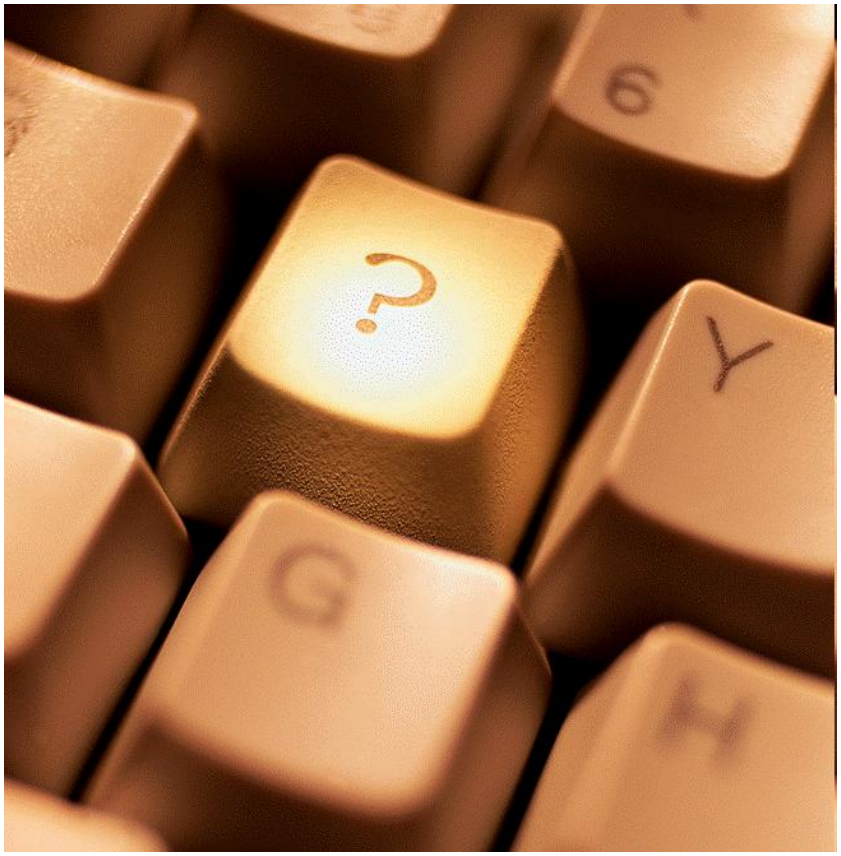


Friendly and Engaging Smile

- It helps to be friendly, but I seem to have managed to get away with it.
- Buy drinks
- Bring tee-shirts
- Go to meetings
  - RIPE
  - NANOG
  - APRICOT
  - SANOG
  - MENOG
  - UKNOF
- Sponsor APRICOT meetings

Conclusions

- Pleasure
  - It can be a lot of fun being a peering coordinator
  - Cooperation
  - Meeting like minded people
  - Making the internet a better place (without peering there would be no internet)
- Profit
  - Peering is your markup
  - Difference between the price you pay for transit and the price you charge your customers
  - More peering generally means more profit and happier customers



Questions?

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