



Investigating AS112 Routing and New Server Discovery

Evan Wright
Sept 24, 2008

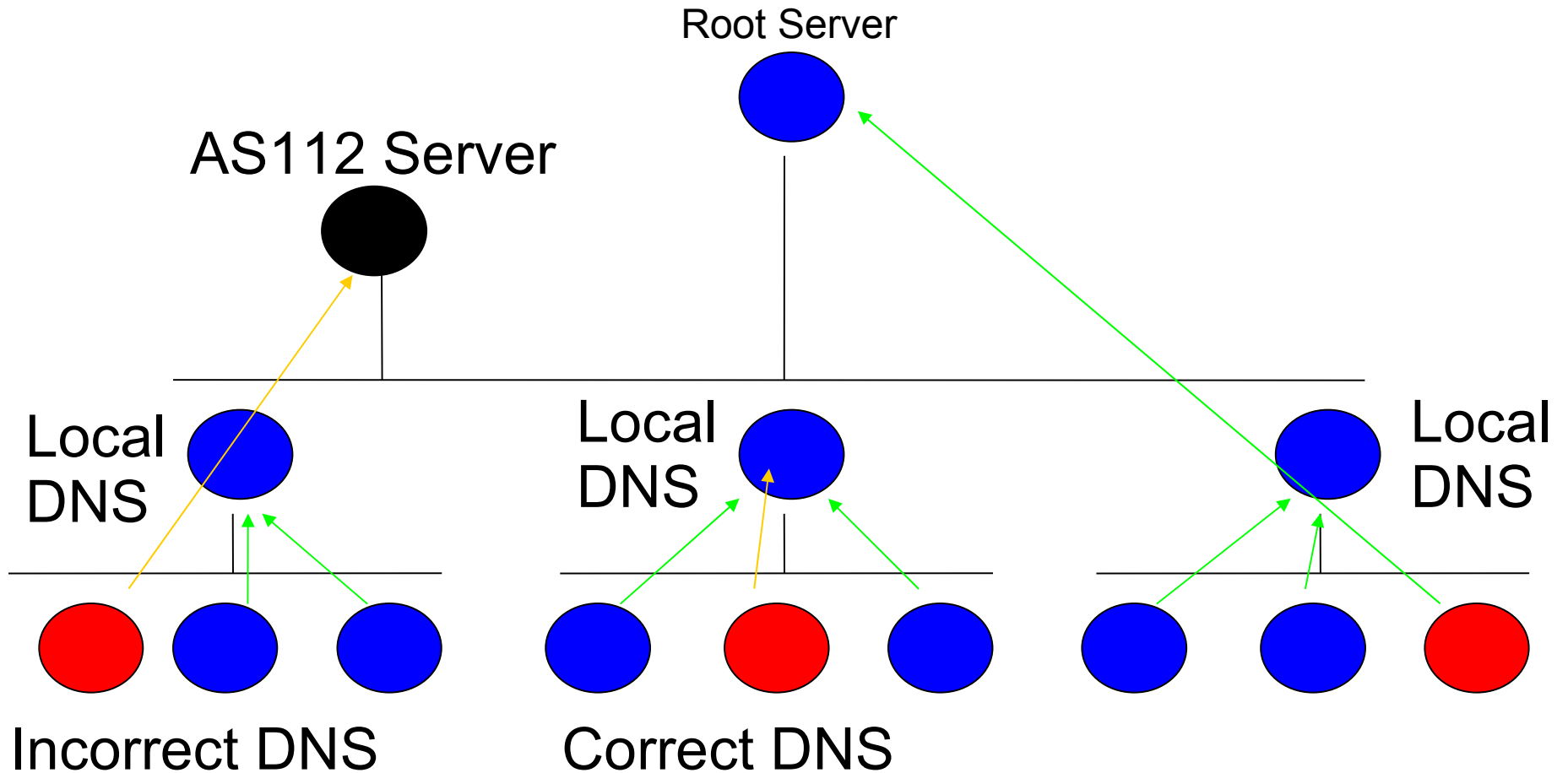
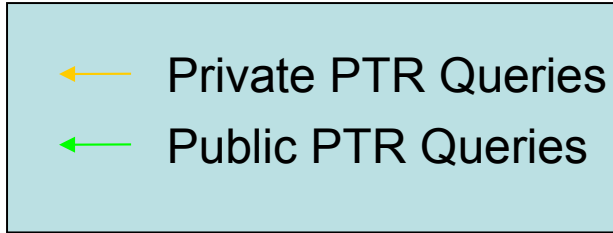


AS112

In case AS112 doesn't matter to you, why care?

- One of few anycast implementations
 - We don't know a lot about how anycast works in practice
 - You haven't seen the routes of where they go intermediately
 - You haven't seen route that are not going to your DNS server/
packet sniffers
- IPv6 will use anycast much more extensively
 - IPv4 anycast is possibly a pseudo-anycast, but I refer to it as
the same

Purpose of AS112



Agenda

2. AS112 Behavior
4. Benefits of Deploying AS112 Server
6. Discovering New AS112 Servers

8.



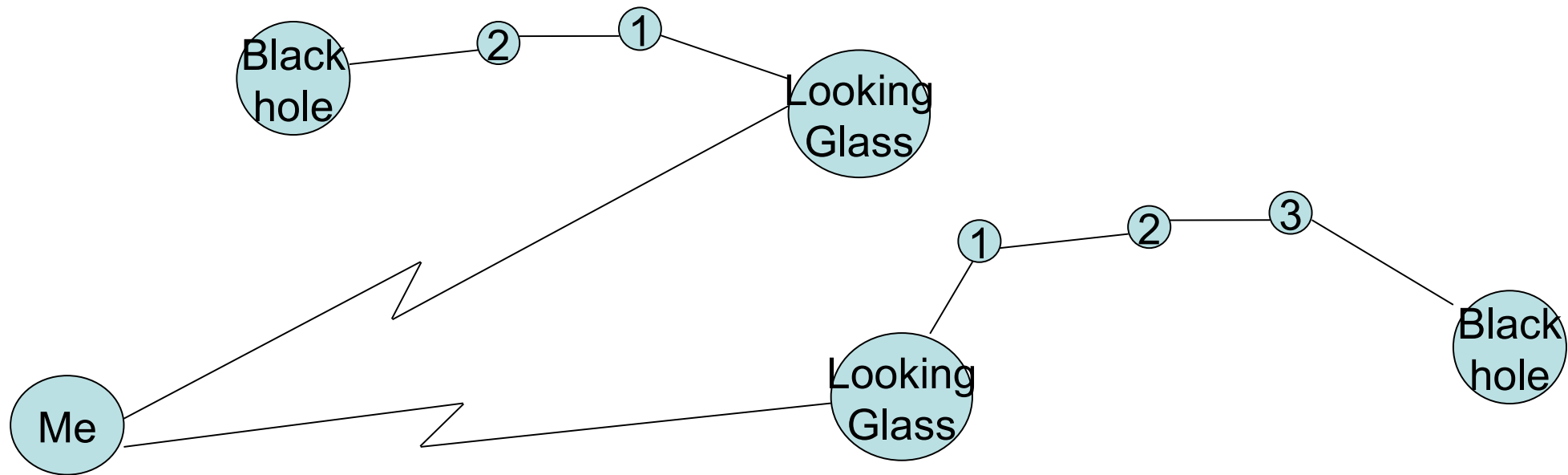


AS112 Behavior

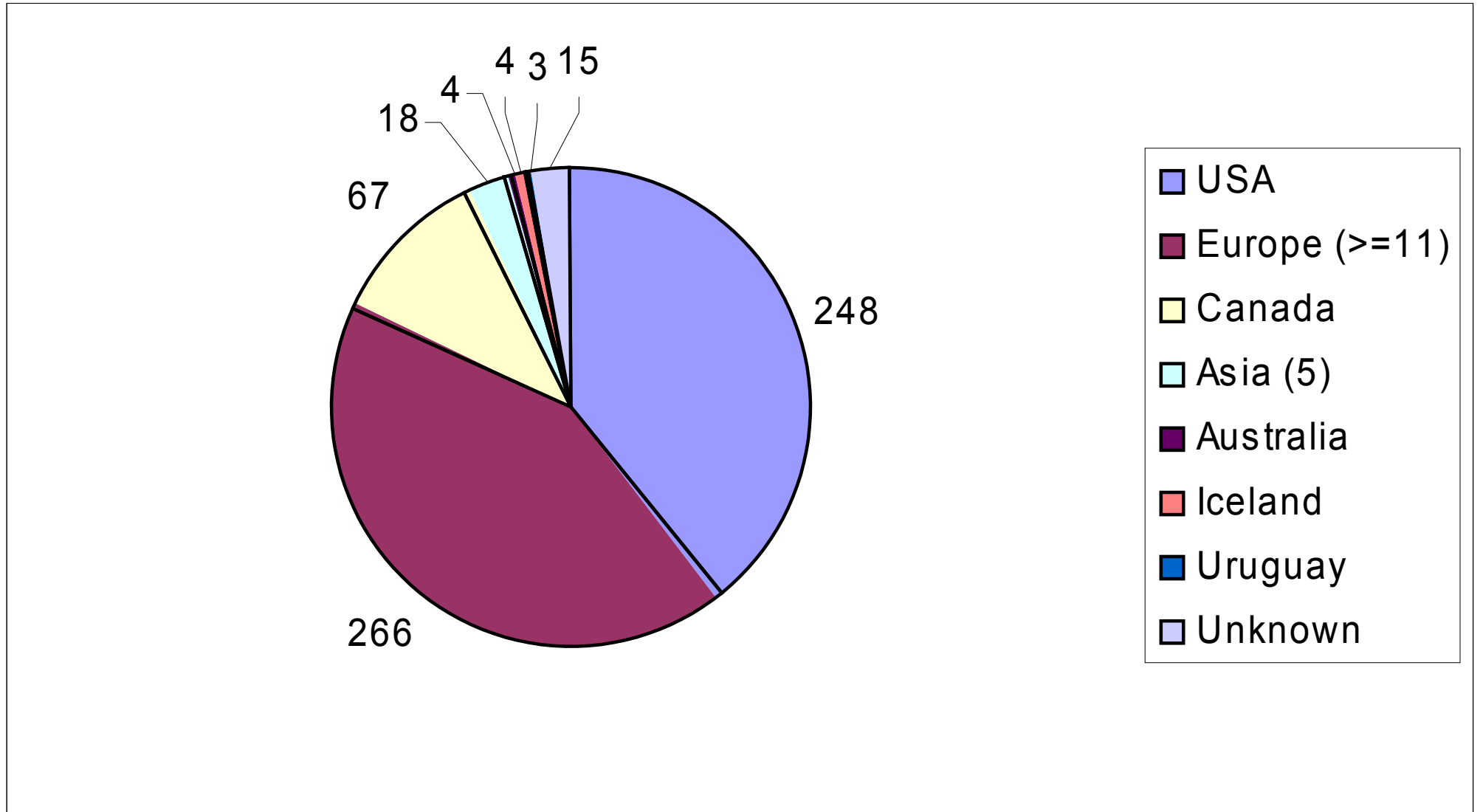


Method to the Madness

- Obtain list of publicly accessible nodes
- Have them traceroute the special anycast address for blackholes - *192.175.48.0/24*



April Sample Sources by Country



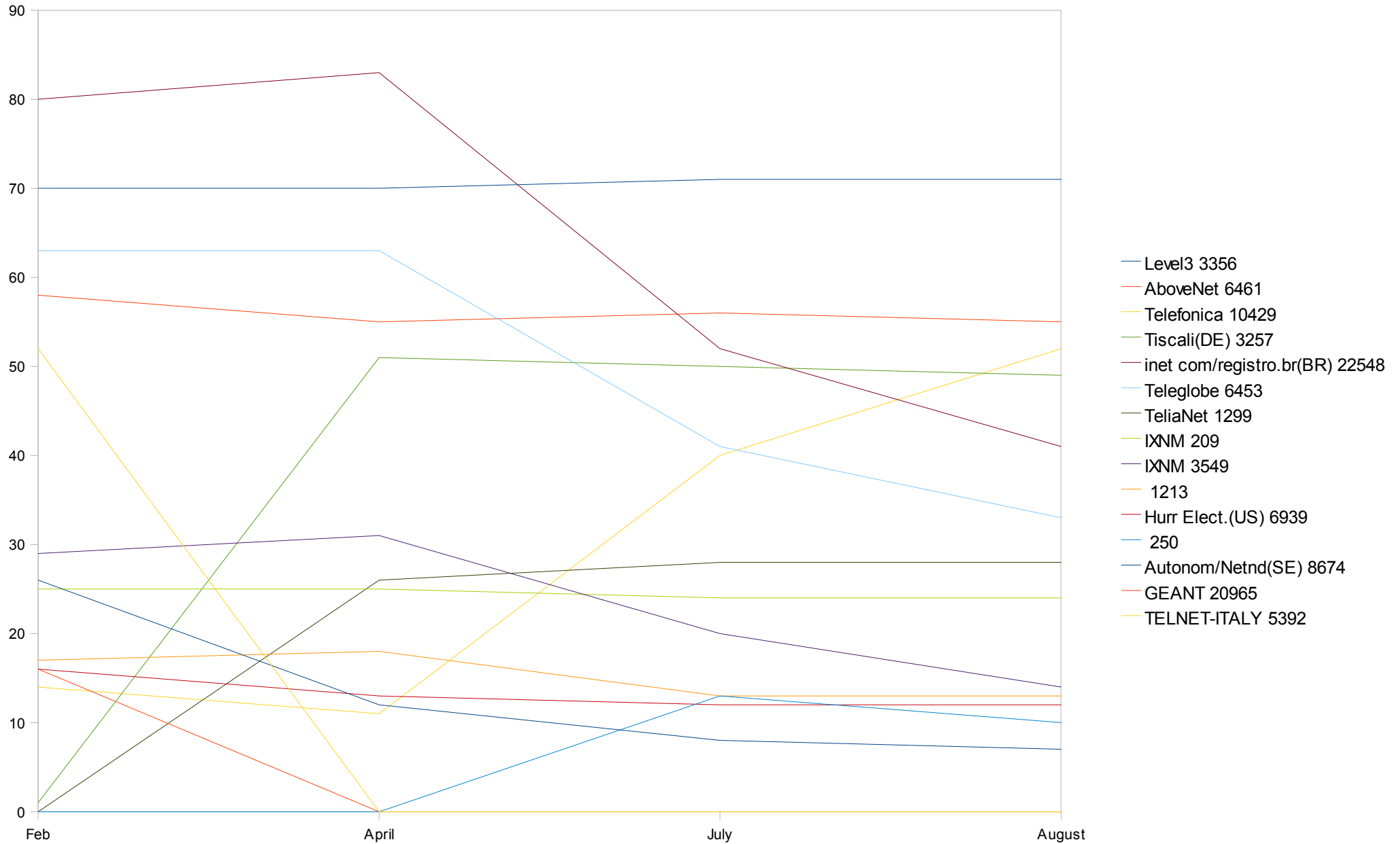
Destination Countries, Origin= US

Most routes that originated in the US, terminated in the US

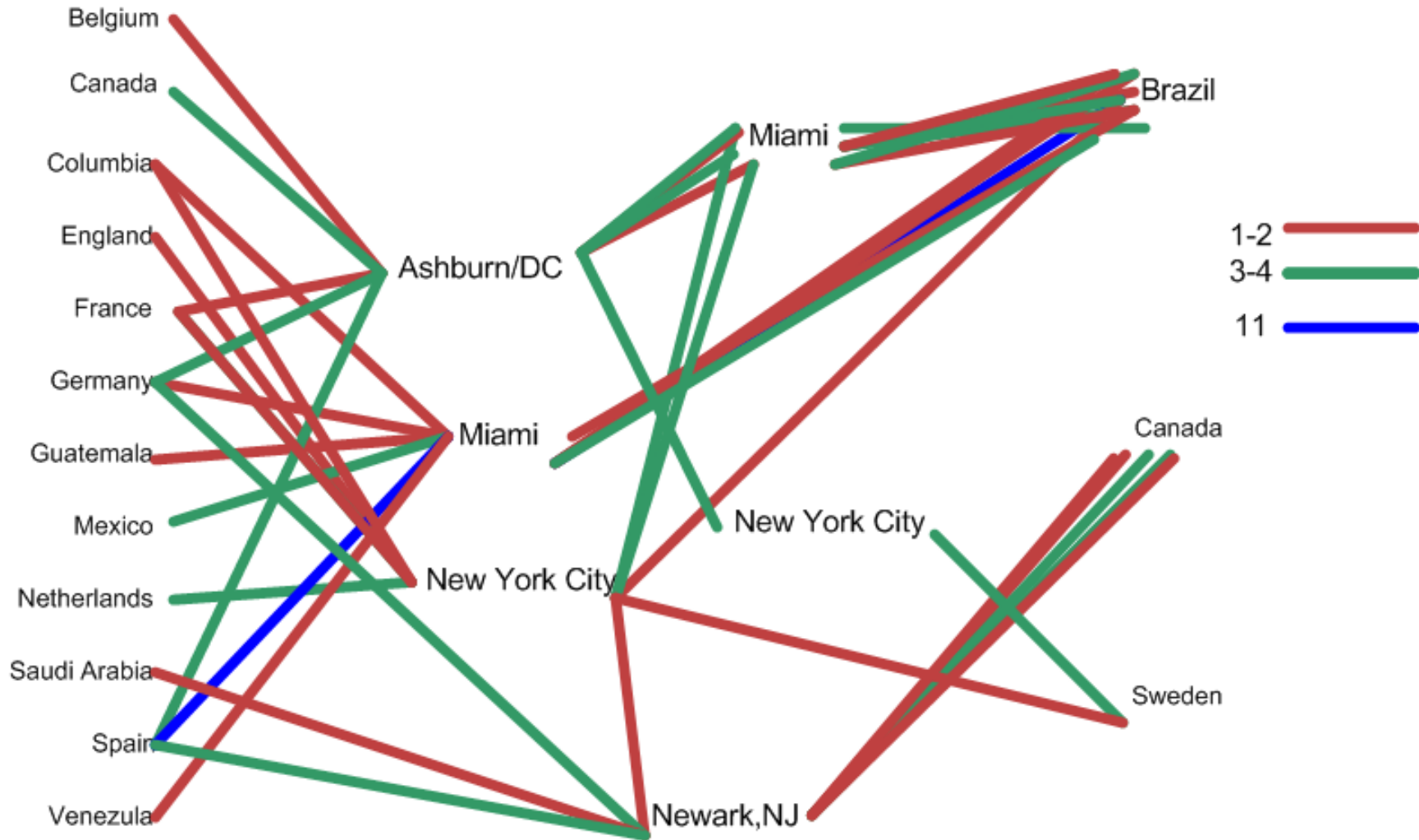
Brazil	22
Italy*	8
Bulgaria*	3
China	1
England	1
Ireland	1
Pakistan*	1
Netherlands	1
Sweden	1
Total	39

* Last hop country can't be accurately inferred. Country displayed is n-1 hop

Volatility



USA as Transit (April)



A series of horizontal blue bars of varying lengths and heights are stacked on the left side of the slide, creating a staircase-like effect. The longest bar is the one that points towards the title.

Benefits of Deploying an AS112 Server



Behavior of anycast is determined by Routing policy

- Trade secret?
- Learning Anycast behavior == learning routing policy

AS112 Myths

- Best route
- AS112 queries are garbage (security)

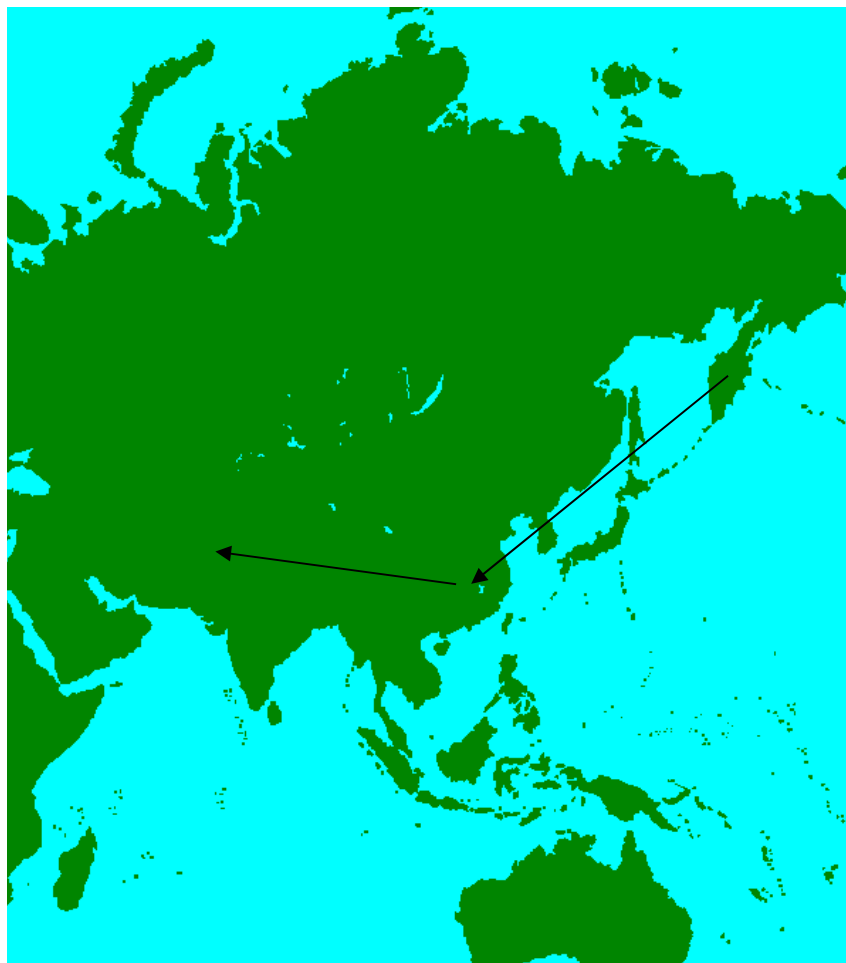
Strange Routing Behavior in April

China -> Italy



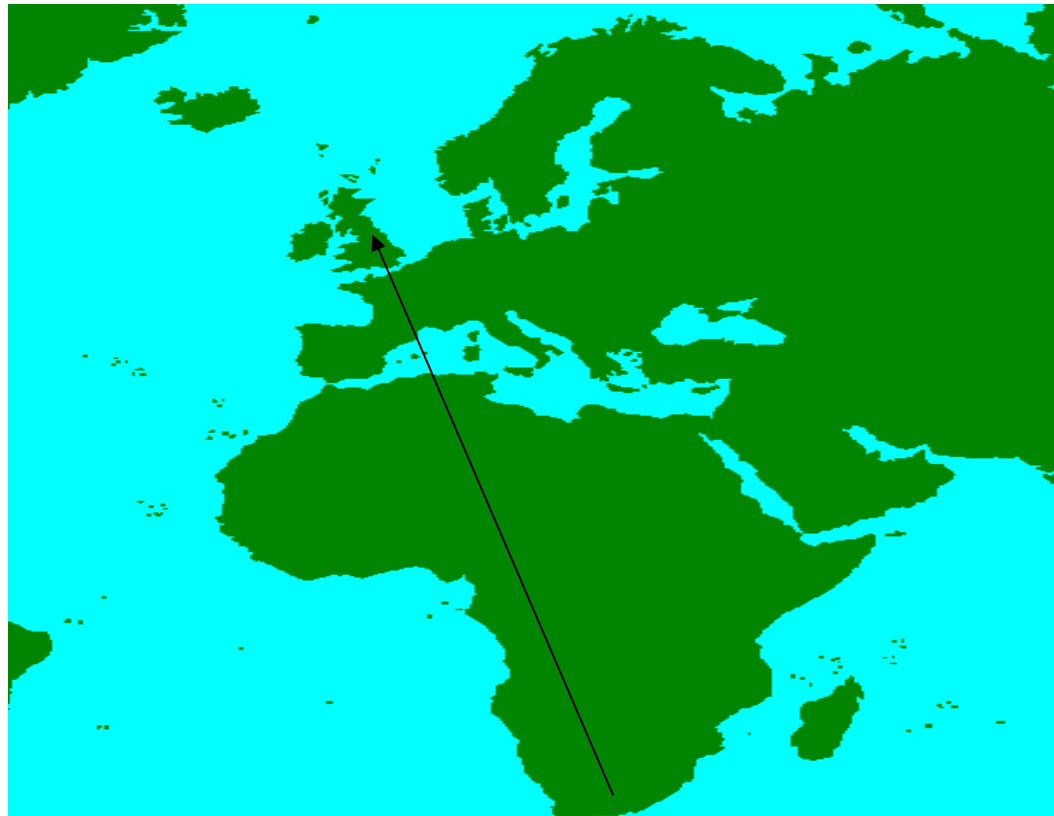
Strange Routing Behavior in April

Japan->China->Pakistan -> ?



Strange Routing Behavior in April

South Africa-> England



Strange Routing Behavior in April

Iceland->Italy



Strange Routing Behavior in April

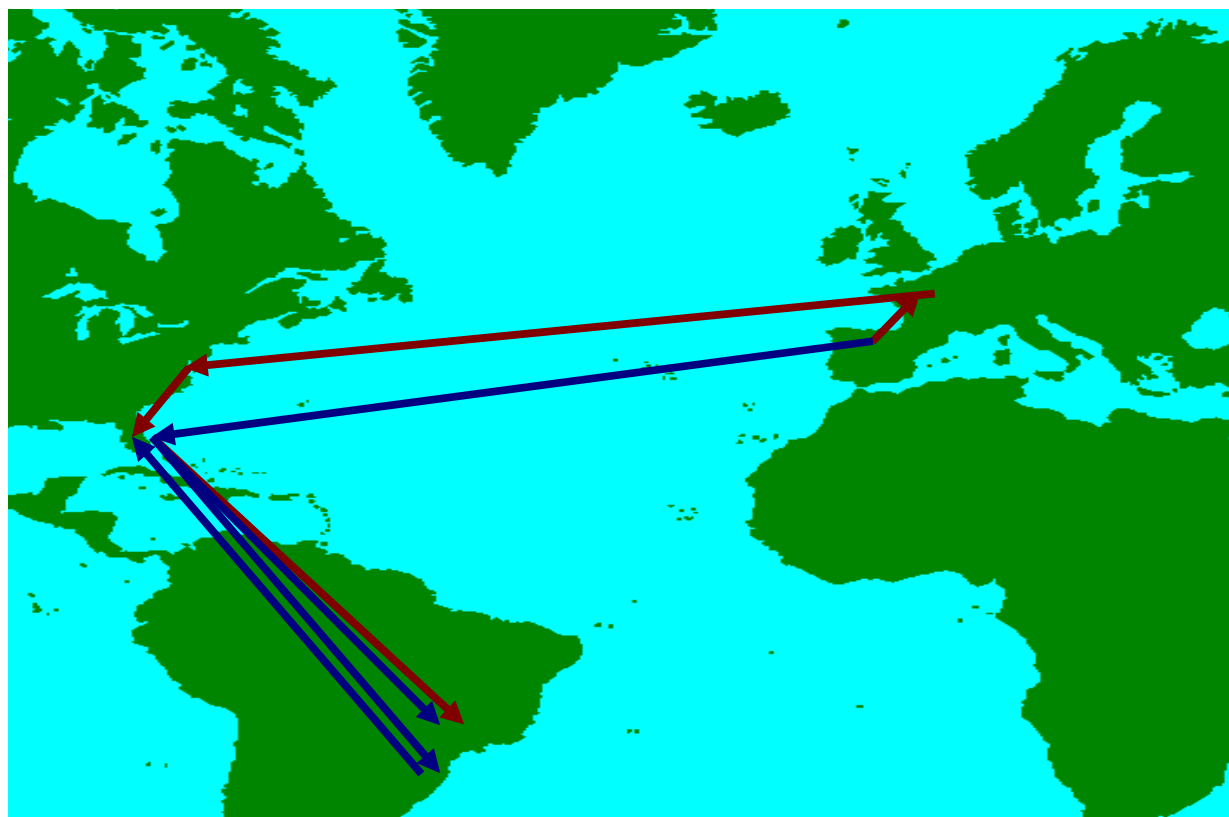
Argentina -> Mexico -> Brazil



Strange Routing Behavior in April

FE0-1-grrmadtc1.red.telefonica-wholesale.net

April
August



TeleGlobe / TATA, > 1 AS112

Two AS112 Blackholes

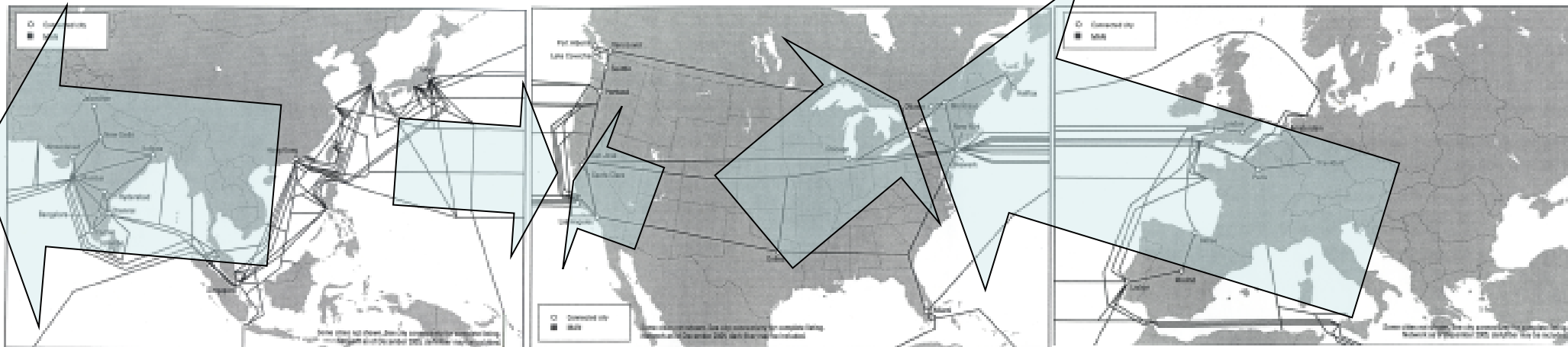
- Toronto, Canada
- Palo Alto, CA, USA

Most Traffic goes to Canada

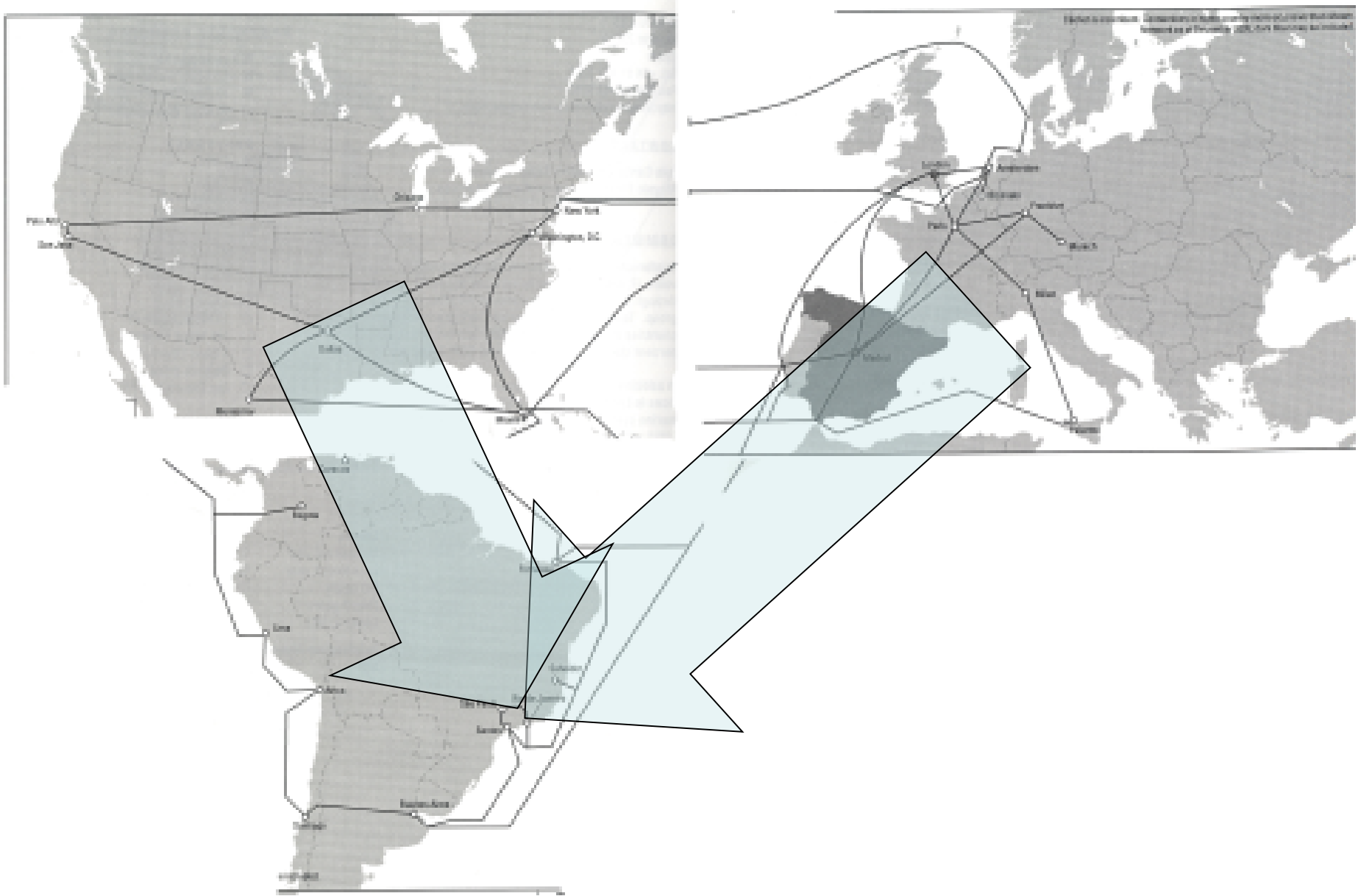
- Africa, Europe, Mid-East, Western SE Asia, Most USA

A little traffic goes to Palo Alto

- Eastern SE Asia, Far Eastern Asia, Far Western US



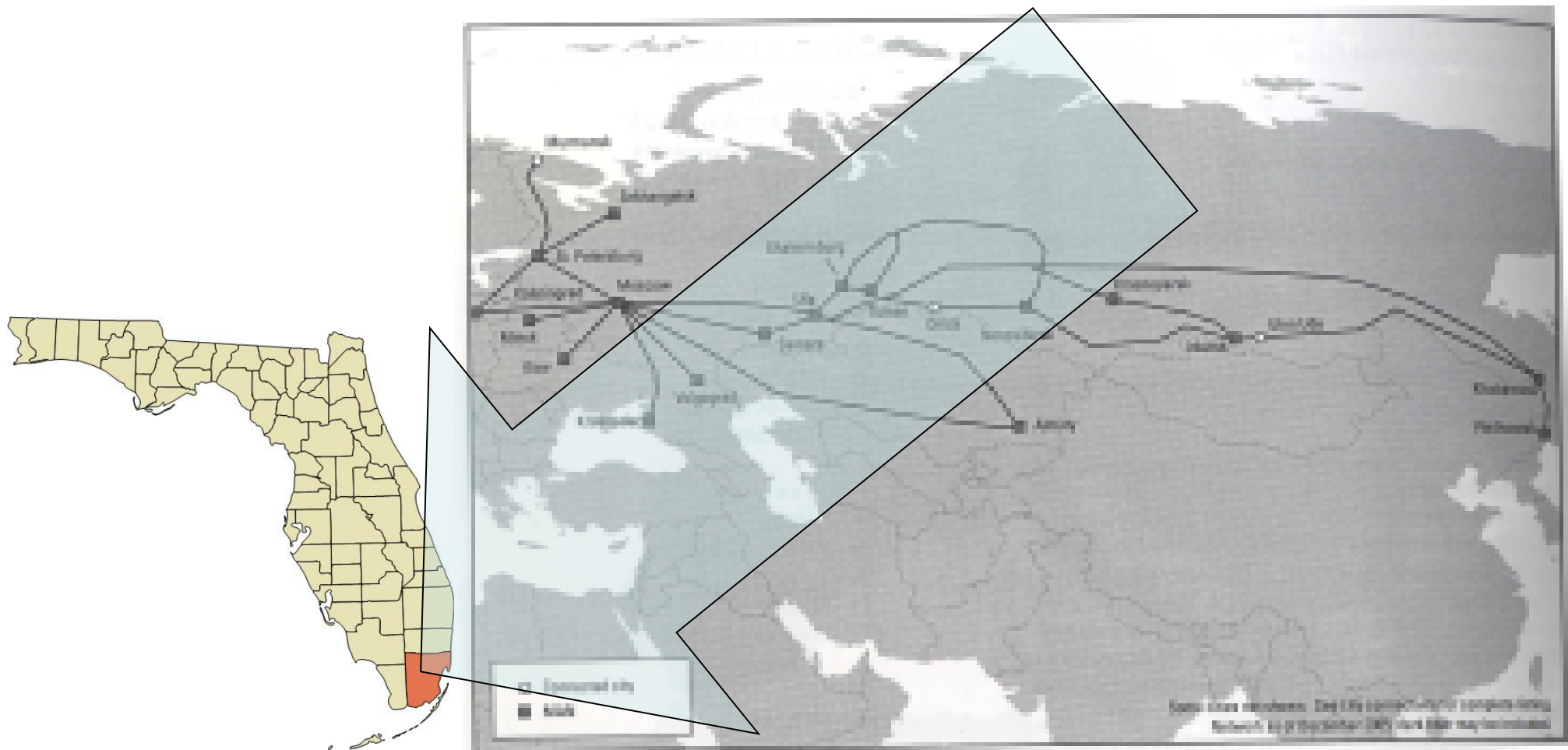
Telefonica, 1 AS112 Server



Corbina – 0 AS112 Servers

AKA Golden Telecom, the Largest ISP in Russia

100% of tested nodes send AS112 data to Miami via Level3



AS112 Myths

Best Route?

- Reflect routing topology
- Some ASes aren't aware of AS112
- Avg route length was 6.94/8.02 hops from LG/RS

Junk?

- PTR queries hold internal (pre-NAT) IP & hostname
- You never know who will be sending you data

Conclusion: Consider a local AS112 server



Discovering New AS112 Servers



Blackhole Registration

54 Registered/publicly known AS servers

42 With Geographic Data

<i>Who</i>	<i>Where</i>	<i>Unicast</i>	<i>Transit AS</i>
Internet Software Consortium	CA, US	204.152.184.241-242	3557 and/or 1280
Abovenet Communications, Inc	?	?	3557, via 6461
Accretive Technology Group, Inc.	?	?	3557, via 11608
Afilias	?	?	12041
ASP Networks	Dorset, UK	193.178.223.33	20538
Autonomica	Stockholm, SE	192.36.144.115	8674
...

Probable Discovered Blackholes

218 of 591 routes went to an unregistered blackhole

- 71 go to AS# 3356 operated by Level 3 (Miami)
- 54 go to AS# 5392 operated by Telnet-Italy
- 17 go to AS# 1213 operated by HEAnet
 - Ireland Educational Network
- 16 go to AS# 20965 operated by GEANT
 - Europe-wide Educational Network
- 14 go to AS# 10429 operated by Telefonica ISP (Brazil)
- There were more

Things Anycast teaches us

Evaluates routing policy

- Harder to keep this secret
- If it doesn't go to your anycast node you don't know where it is going
- Traffic may unnecessarily traverse International/ ISP trunk links to stay in ISP

If any of this bothers you setup your own AS112

The End

Thanks

- ewright@cert.org