Lightning talk

IPv6 Country-to-Country BGP Routing Measured

BGP routing data is not the final answer; but it's a good start

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Can regional BGP routing be measured?

NATIVE IPv6 EVERYWHERE

- **Question:**
  - Is there enough routing between ISPs in Asia?
  - Can BGP routing tables provide insight?

- **Methodology:**
  - Lots of BGP routing tables collected globally
  - Data from http://bgp.he.net/ processed further
  - Graphical view on a country-to-country basis

Measuring BGP routing by collecting tables

- Build on exceptional work by others
  - RIPE/RIS & Oregon routeviews collect BGP tables
  - A hearty "Thank you"

- Use Hurricane Electric's http://bgp.he.net/ site and it's database
  - Daily processing of those BGP tables
  - Results are user-friendly visualization of routing

- Take the data one step further …

- Only look at BGP peer data (v4 & v6)
  - It's only interesting to look at BGP adjacency
  - Map ASN to country-codes
  - Search for adjacencies where CCs are different

- Process resulting data to search for in-region connections
  - Clean up the data
  - Display the data

Example processing – CC & ASN

http://bgp.he.net/country/MY

Process each ASN within each country

Networks: Malaysia

ASN	Name	Adjacencies v4	Routes v4	Adjacencies v6	Routes v6
AS4788	TM Net, Internet Service Provider	145	562	45	35
AS38182	Extreme Broadband - Total Broadband Experience	53	73	6	1
AS24218	Global Transit Communications - Malaysia	42	314	16	25
AS9930	TIME dotCom Berhad	22	90	7	1
AS2042	JARING Communications Sdn Bhd.	18	66	7	2
AS9534	Binariang Berhad	14	71	2	1
AS45352	IP ServerOne Solutions Sdn Bhd,	11	57	2	7
AS24514	Malaysian Research & Education Network	11	69	4	5
AS10204	Arcnet NTT MSC ISP	8	8	2	3
AS10030	Celcom Internet Service Provider	8	15	5	2
AS23678	MyKRIS Asia Sdn Bhd	6	46	2	4
AS17666	Free Net Business Solutions Sdn Bhd	6	16	0	0
AS56111	Agarto Sdn Bhd	5	8	3	1
AS55799	Hostemo Technology Sdn Bhd	5	10	3	1
AS55720	THEGIGABIT.com - Dedicated Server & Server Co-Location	5	19	0	0
AS4818	DiGi Telecommunications Sdn. Bhd.	5	6	3	1
AS45839	PIRADIUS NET AS45839	5	18	1	2
AS45785	Techavenue Data Center, Global IP Transit, KL, Malaysia	5	13	1	1
AS55482	Level 12 Menara Sunway, Jalan Lagoon Timur,	4	4	0	0

Note the ASNs within the country …

http://bgp.he.net/AS24514#_peers

Remove all peers within CC

AS9534 Binariang Berhad

Rank	Description	IPv6	Peer
1	Level 3 Communications, Inc.		AS3356
2	TELECOM ITALIA SPARKLE S.p.A.		AS6762
3	Singapore Telecommunications Ltd	X	AS7473
4	Tata Communications		AS6453
5	NTT America, Inc.	X	AS2914
6	Hutchison Global Communications		AS9304
7	Hong Kong Internet Exchange--Route Server 1		AS4635
8	Measat Transit, Measat Teleport and Broadcast Centre Cyberjaya		AS38891
9	Freescale Semiconductor, Inc.		AS14857
10	e-Genting Sdn Bhd		AS55520
11	Office Squared		AS45331
12	SHTECH, City Broadband Service		AS45410
13	VNPT Global JSC		AS45896
14	BRUHAAS		AS55724

Note the peer connections that are outside the country …

Visualizing IPv6 country-to-country BGP peers

Unconnected to Asia:
AP Asia Pacific
GU Guam
KP Korea
MM Myanmar
MN Mongolia
MV Maldives
PF French Polynesia
TK Tokelau
TL Timor-Leste
WF Wallis and Futuna
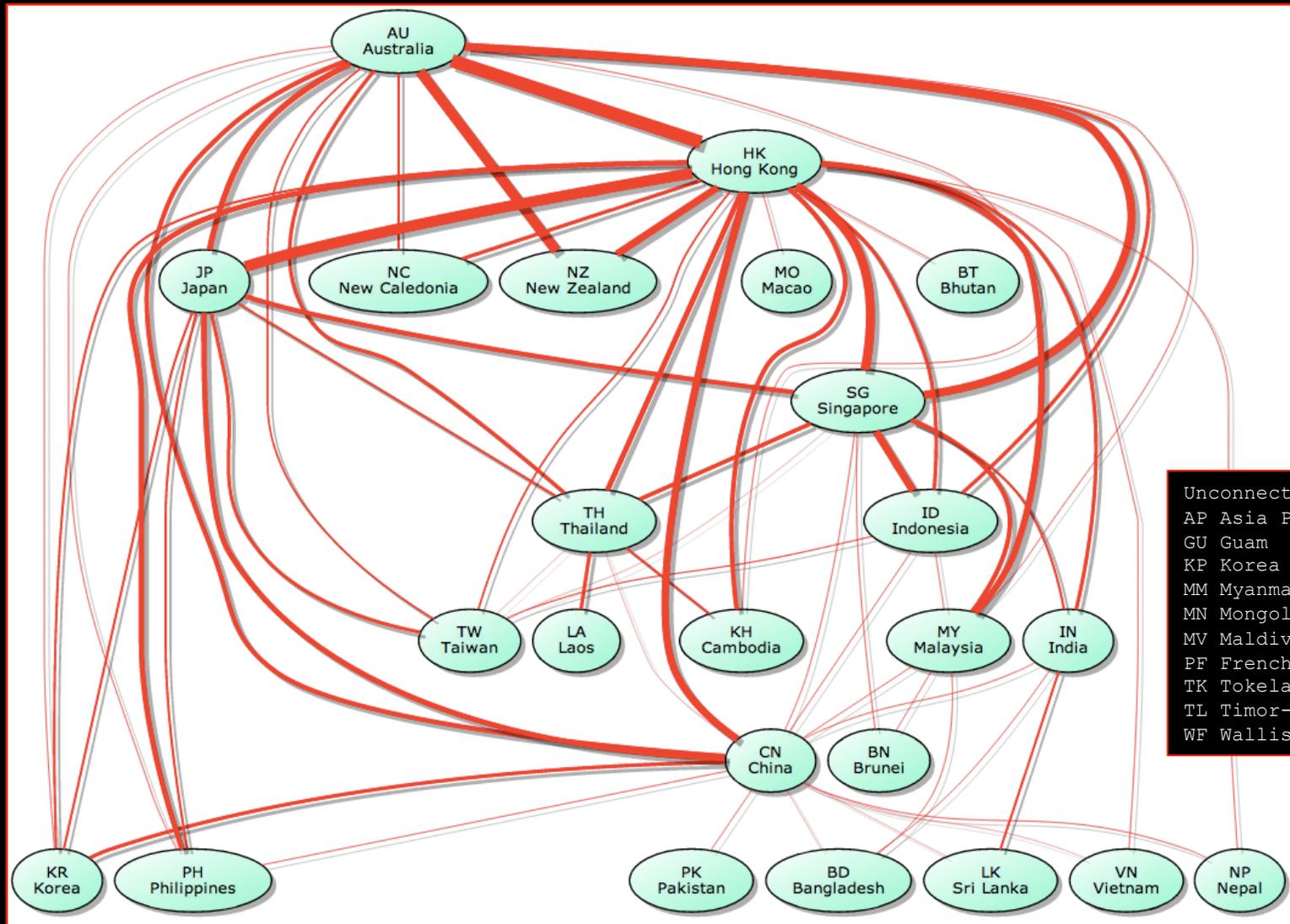
Visualizing IPv4 country-to-country BGP peers

Yes – this is spaghetti … Good thing BGP can do this!
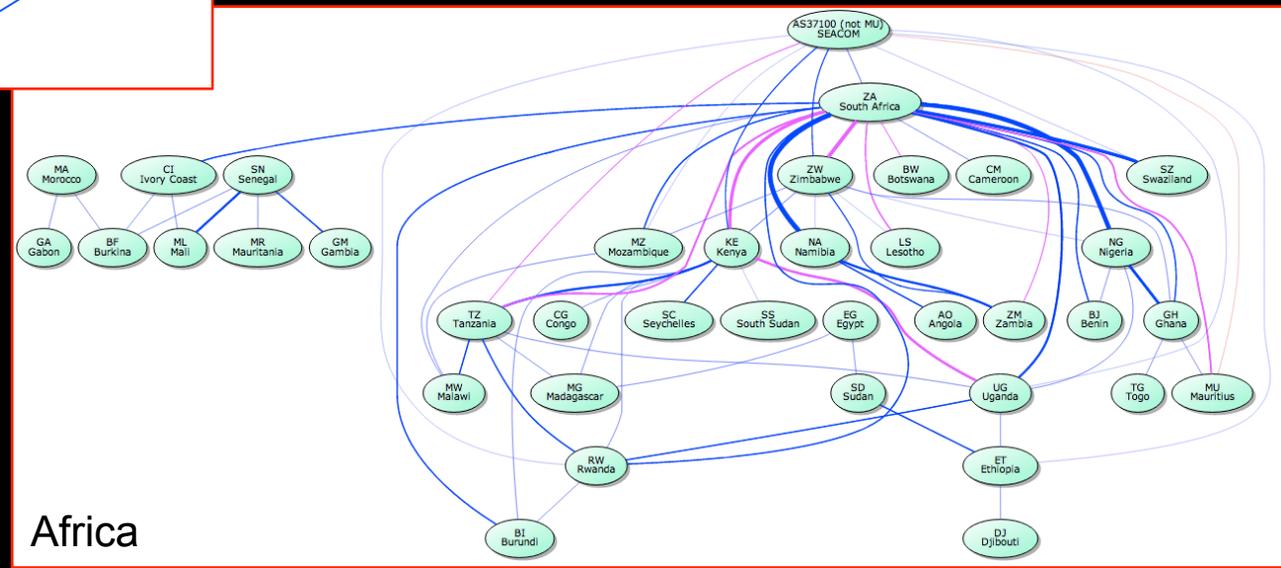

Unconnected to Asia:
PF French Polynesia
TK Tokelau
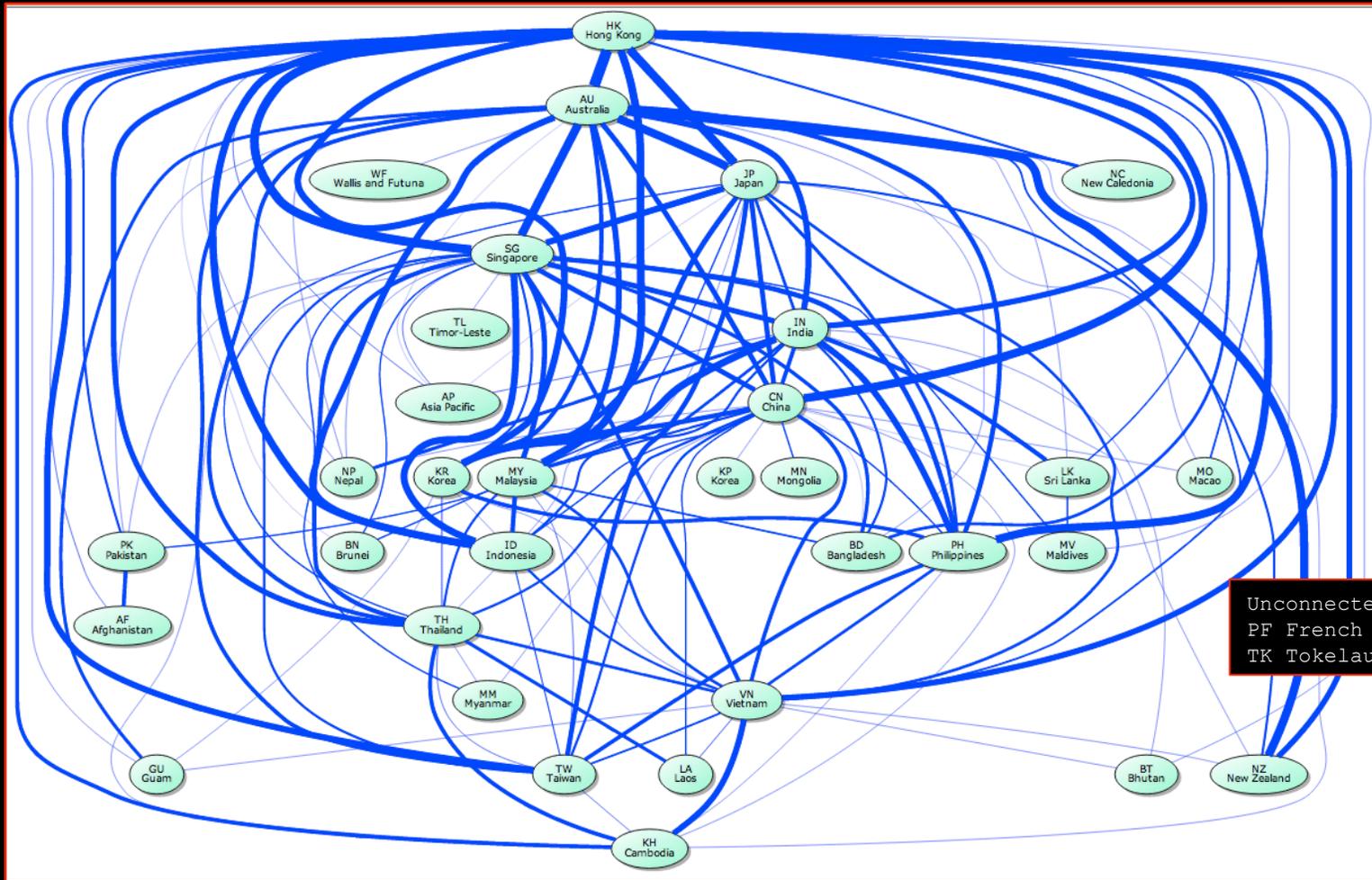
Other regions?
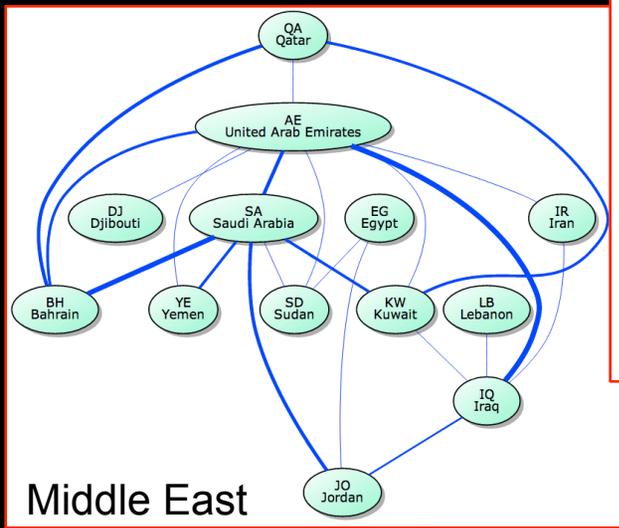
Middle East
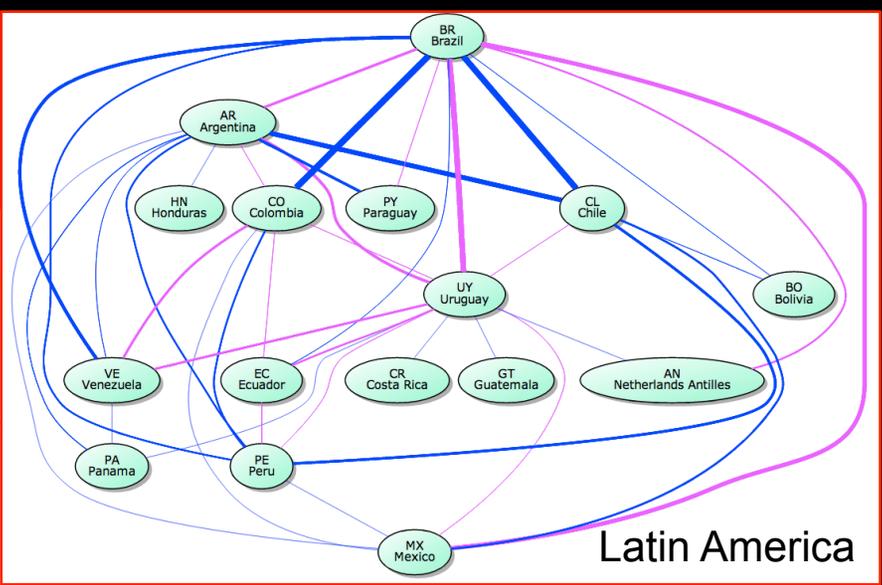
Latin America

Africa

Summary

- ## Can you question the collected BGP data?
  - ❑ Yes - There's a need for more participating ASNs

- ## Can you question the quality of the data?
  - ❑ Yes - BGP is BGP – it's only "best path"

- ## Can you question the processing?
  - ❑ Yes - It only takes one route to show an adjacency exists

- ## Can you question a connection from CC_1 to CC_2?
  - ❑ Yes – in some cases peering could be in CC_3 (ie: USA)

Q&A

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