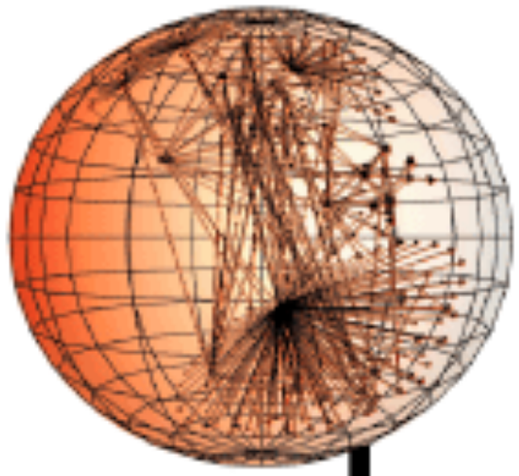

IPv6 Collection 2008
a View of the IPv6 Networks

cooperative association for internet data analysis

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Hawaii 2008 - WIDE/CAIDA

Motivation

Create an AS Core visualization

of the IPv6 AS level Topology

Data Sources

- traceroute
  - public request on NANOG for volunteers to run scamper on provided IPv6 destination list
  - collection window January 9th-16th, 2008
  - target list based on RIR IPv6 delegations

- RIPE's IPv6 BGP RIB
  - a single snap shot collected on 2008-01-01

traceroute's traces

- 56 contributors
- geographic sources
  - 53 cities
  - 9 countries
  - 3 continent
- topological sources
  - 97 IPv6 addresses
  - 68 IPv6 prefixes
  - 68 ASes

destination list

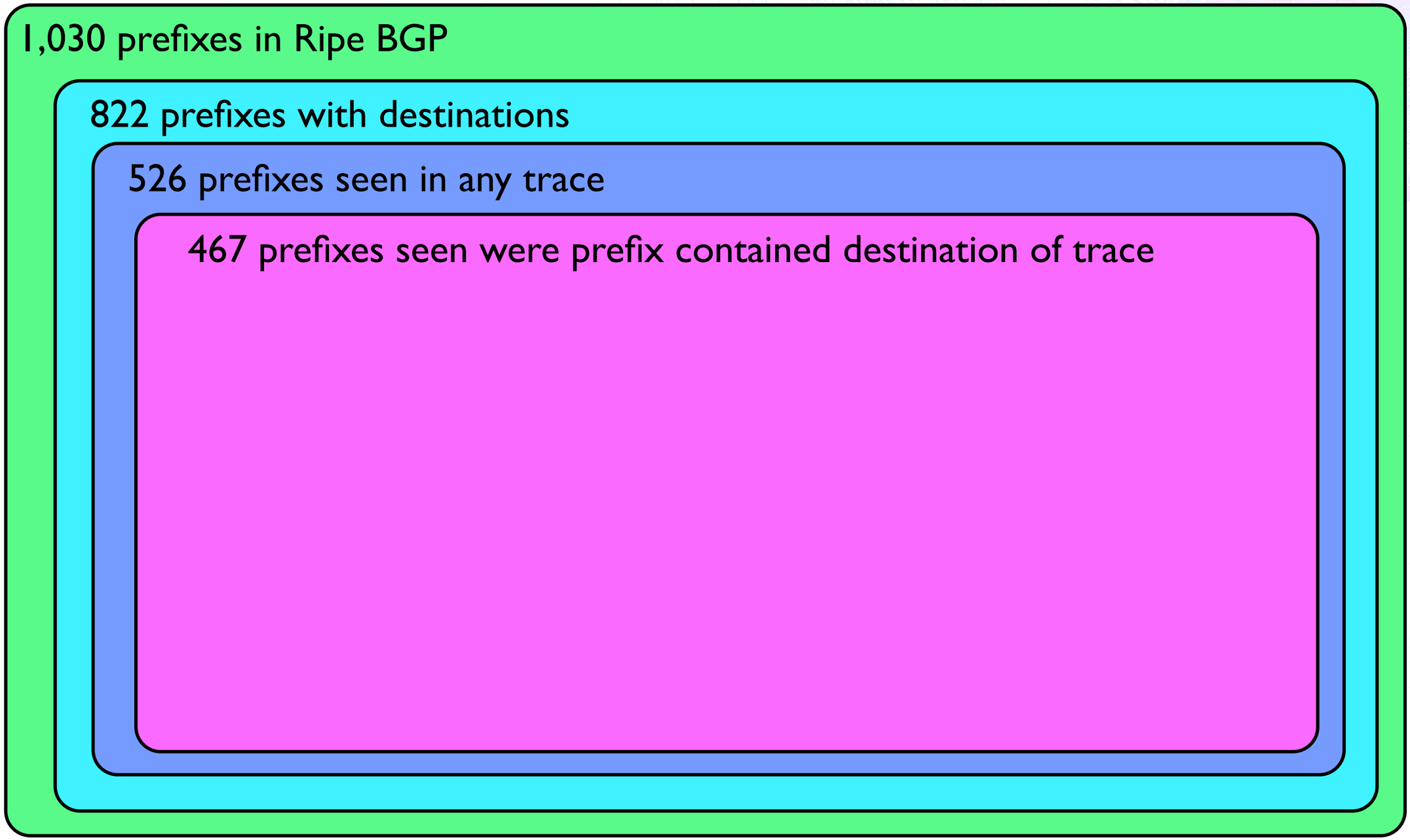
- One IPv6 address per RIR allocation
- IPv6 addresses
  - 2358 IPv6 address
  - 258 IPv6 addresses (21.5%) responded to ping
- prefixes
  - destinations in 822 prefixes
    - 81.1% coverage of Ripe BGP's 1013 prefixes

Seen in Graphs

	traceroute	Ripe BGP
IPv6 sources	97	-
ASes sources	68	14
IPv6 addresses	4,752	-
IPv6 prefixes	526	1013
ASes	489	833
AS links	1,904	1,704

Contains larger value

Prefixes


1,030 prefixes in Ripe BGP
822 prefixes with destinations
526 prefixes seen in any trace
467 prefixes seen were prefix contained destination of trace

Ranking - Outdegree

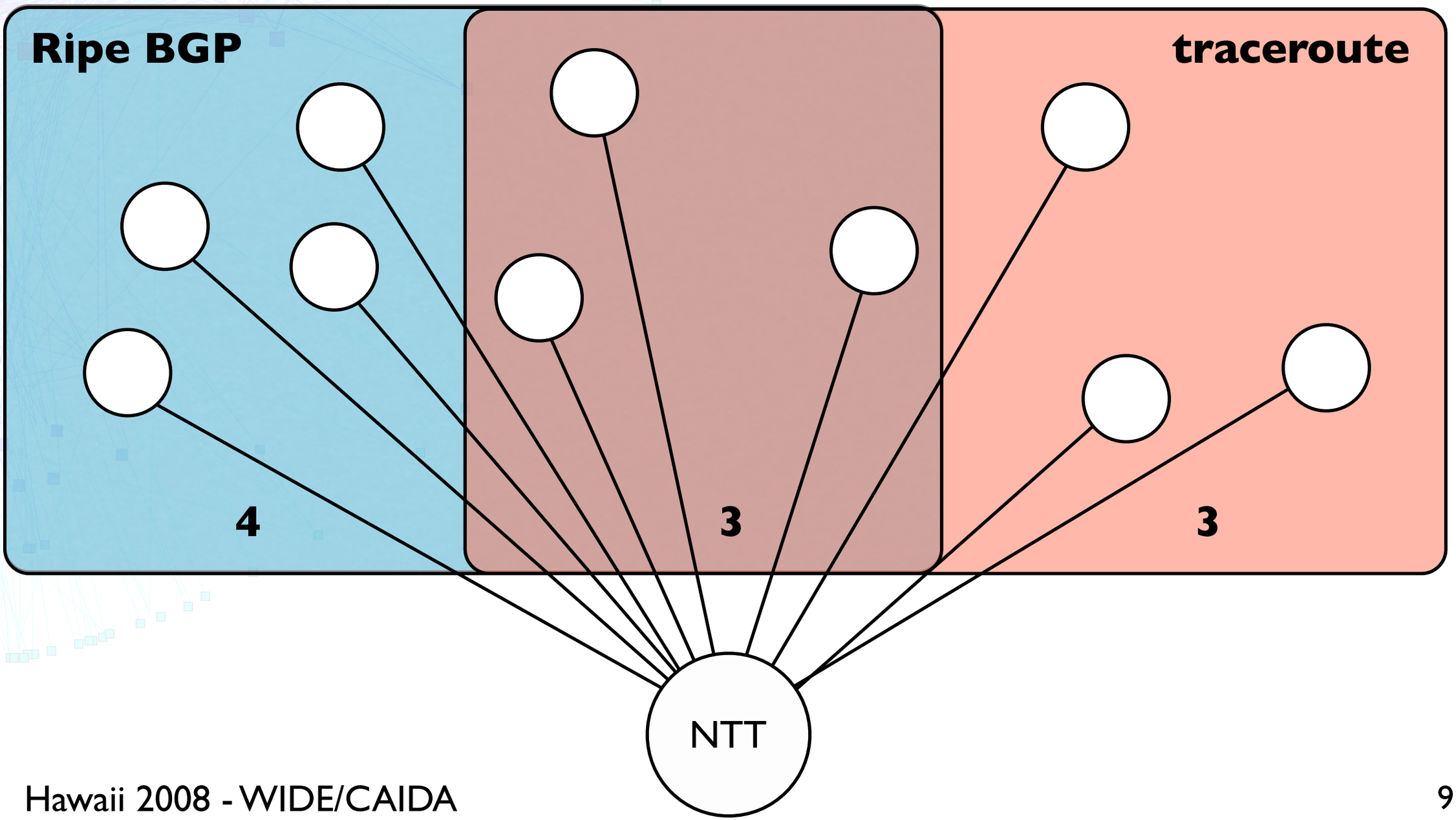
traceroute		Ripe BGP	
AS	**outdegree**	**outdegree**	**AS**
3257 Tiscali	115	157	3257 Tiscali
2914 NTT	85	150	2914 NTT
3549 Global Crossing	72	130	6939 Hurricane
1200 Amsterdam IX	72	102	30071 TowardEX
6175 Sprint	71	78	6175 Sprint
6695 German IX	58	65	13237 LambdaNet
30071 TowardEX	67	63	3549 Global Crossing
6939 Hurricane	58	60	6453 Teleglobe

AS Links

in ripe, but not traceroute

in traceroute and ripe

in traceroute, but not ripe



AS Links

	in ripe, but not traceroute	in traceroute and ripe	in traceroute, but not ripe
3257 Tiscali	78	80	35
2914 NTT	85	65	20
6963 Hurricane	89	41	17
30071 TowardEX	52	50	17
6175 Sprint	32	46	25

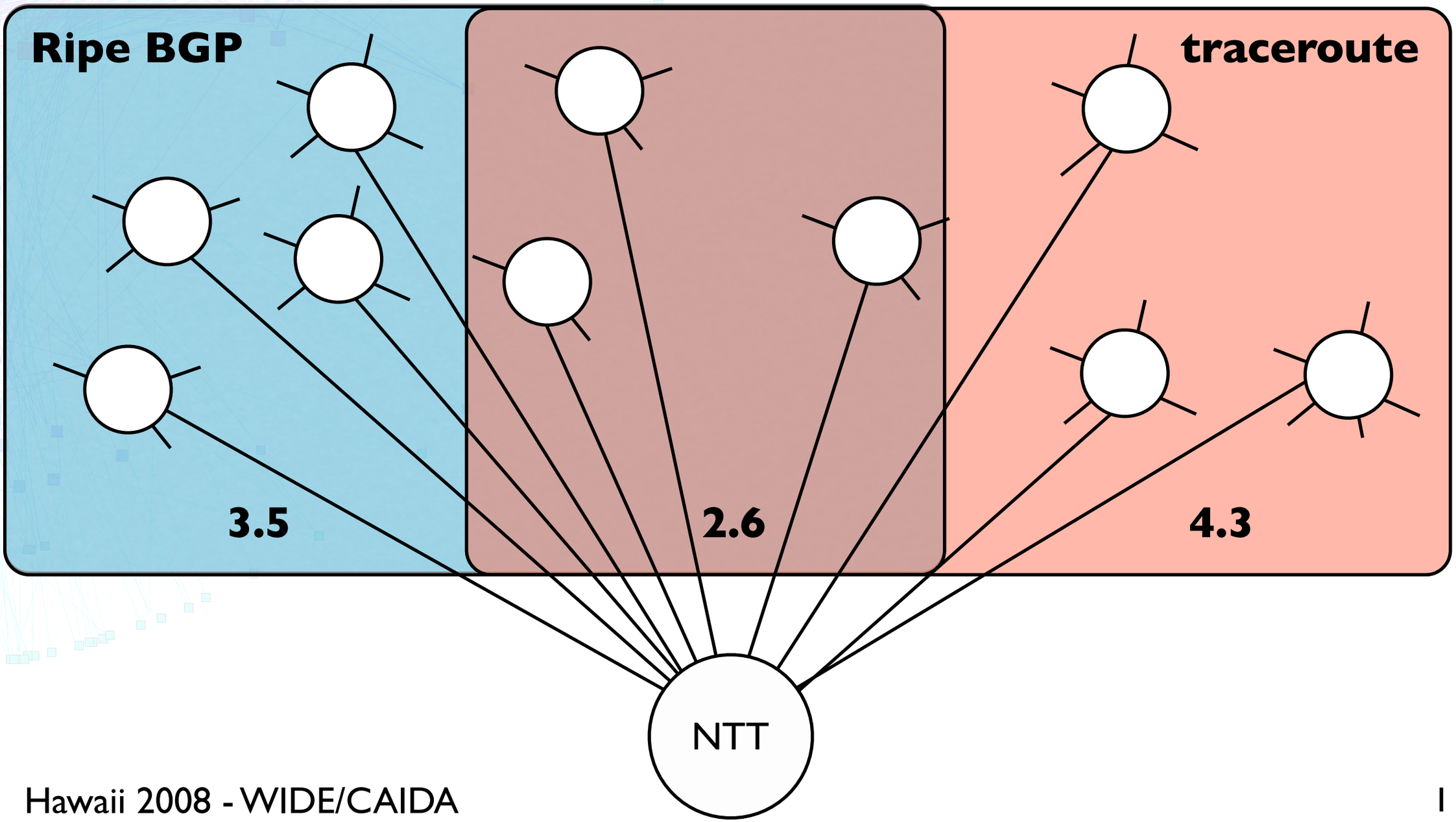
number of links	17 - 41	42 - 65	66 - 98

Neighbor avg. degree

in ripe, but not traceroute

in traceroute and ripe

in traceroute, but not ripe

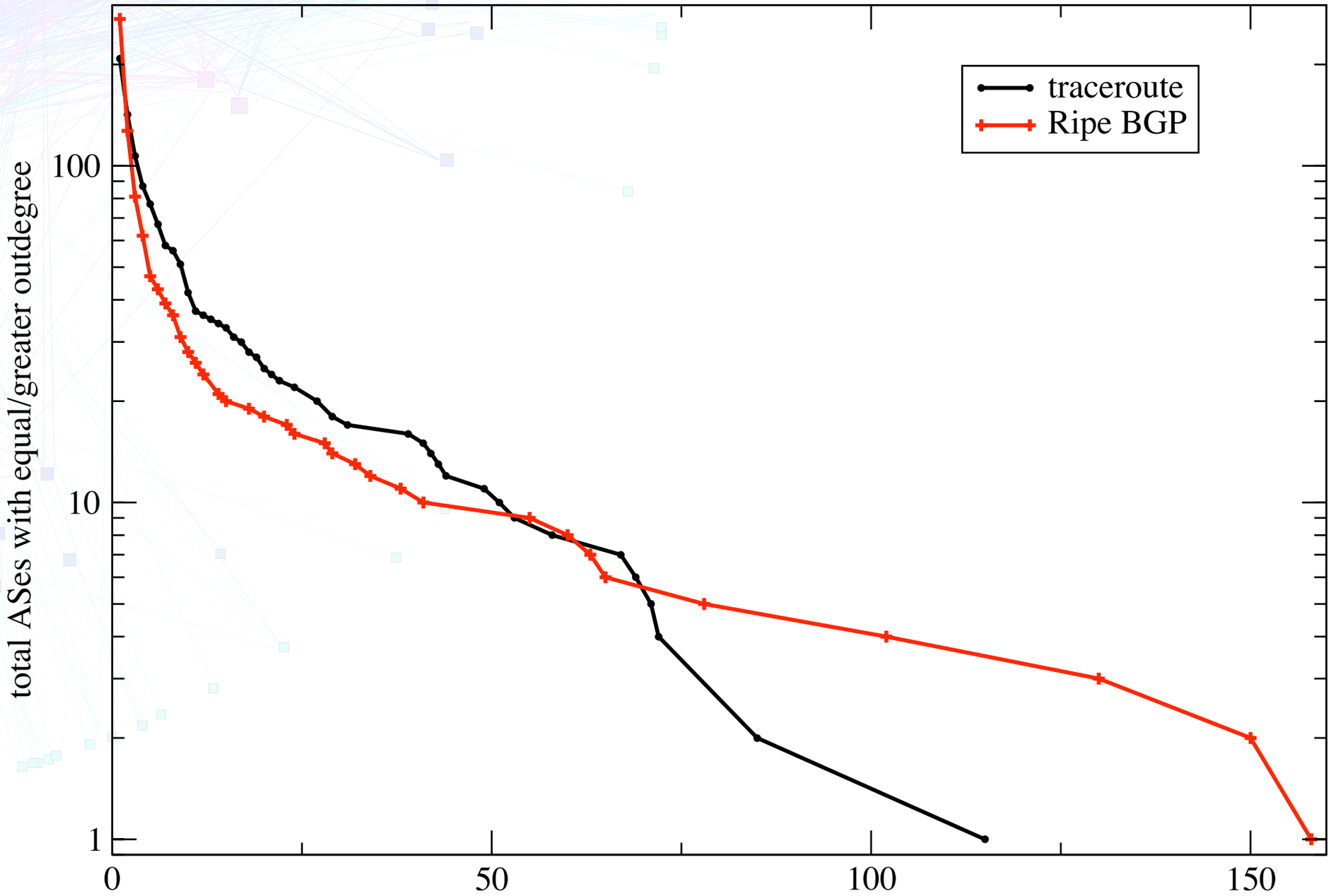


Neighbor avg. degree

	in ripe, but not traceroute	in traceroute and ripe	in traceroute, but not ripe
3257 Tiscali	6	15	5
2914 NTT	7	17	6
6963 Hurricane	5	21	14
30071 TowardEX	3	21	7
6175 Sprint	1	16	23

avg. degree	1 - 8	9 - 17	18-23

AS outdegree



IPv6 AS Core traceroute

caida

Peering: outdegree

0
19
39
58
78
98
117
137
157

Asia/Australia

Europe/Africa

North/South America

IIJ (2497)
WIDE (2500)
German-IX (6695)
Amsterdam-IX (1200)
London-IX (5459)
Tiscali (3257)
LavaNet (6435)
NTT (9214)
TowardEX (30071)
Hurricane (6939)
Teleglobe (6453)
Global (3549)
Sprint (6175)

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IPv6 AS Core Graph

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Peering: outdegree

0
19
39
58
78
98
117
137
157

Ripe BGP

WIDE (2500)
IIJ (2497)
Asia Netcom (18084)
OpenCarrier (41692)
LambdaNet (13237)
NTT (9214)
Tiscali (3257)
Cable & Wireless (1273)
Hurricane (6939)
TowardEX (30071)
Sprint (6175)
Teleglobe (6453)
Global (3549)
LavaNet (6435)

traceroute

IIJ (2497)
WIDE (2500)
German-IX (6695)
Amsterdam-IX (1200)
London-IX (5459)
Tiscali (3257)
LavaNet (6435)
NTT (9214)
TowardEX (30071)
Hurricane (6939)
Teleglobe (6453)
Global (3549)
Sprint (6175)

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Conclusions

- traceroute sees few links for top ASes, but sees more AS links over all
- Ripe sees more links from top AS to small ASes
- traceroute found more mid. level links
  - this likely reflects the large number of sources

Links

- If you would to participate in the next collection please mail topology-info@caida.org.

- http://www.caida.org/topology/as_core_network/ipv6.html
  - currently only 2005, 2008 will be there soon