AS-Path Analysis to Test Claims of "Tier 1" Status

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Background

Autonomous systems which claim "tier-1" status differentiate themselves from others by claiming that they do not receive transit from any other autonomous system.

Background

Autonomous systems which do not receive transit may reach other ASes by selling transit to them, or by peering with them.

Background

All AS-paths take one of two forms:
One in which the "center" is an AS which provides transit to two down-stream ASes:

1239

7823 / 7132 \

27291
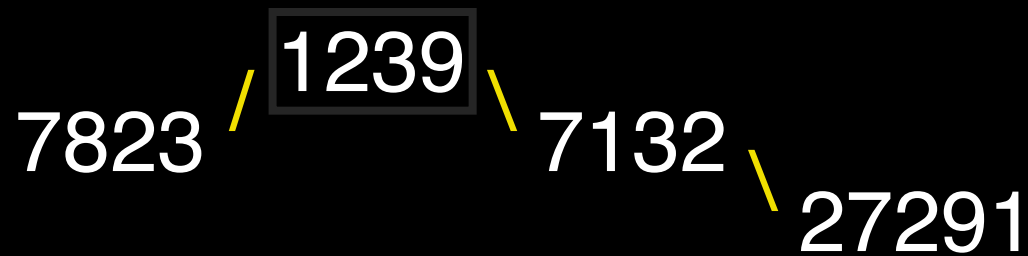
Dupont buys Sprint sells SBC sells Fry's

Background

All AS-paths take one of two forms:
Or one in which the "center" is a peering session between two ASes, each of which provides transit to one down-stream AS:

2914 | 1239

3856 / 7132

27291
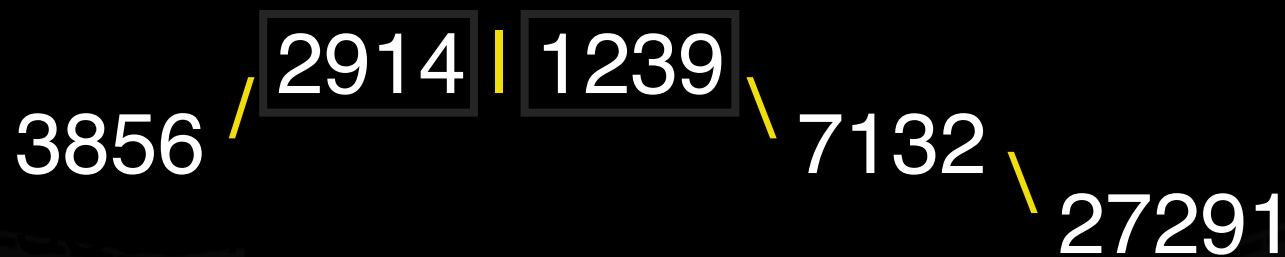
PCH buys Verio peers Sprint sells SBC sells Fry's

Proposition

Since there can exist no more than one peering session in any AS-path,
No more than two ASNs can make a legitimate claim to "tier-1" status with respect to any AS-path.

Seed-list to test

For an arbitrary starting-point to test our proposition, we took the intersection of the lists of most commonly-occurring transit ASes from a number of routers:

701	UUNet / MCI		1239	Sprint
3356	Level 3		2914	NTT / Verio
7018	AT&T		6461	MNF
209	Qwest		2828	XO Communications
3549	Global Crossing		4637	Reach

Testing the Proposition

We find anomalous cases, in which three or more ASNs from our test list occur in the same AS-path:

200.124.192.0/24   701 14551   11664   3549   1239   6057 14234

701 — UUNet
11664 — Telemax
3549 — Global Crossing
1239 — Sprint

Frequency of Anomalies

	Including Reach	Without Reach
January	114	2
February	105	2
March	128	2
April	155	2
May	129	37
June	125	2
July	85	5
August	141	6
September	83	5

Removing a Candidate

Reach may not be very "tier-1" since they appear in many other paths which already include two other "tier-1" candidates.

Adding a Candidate

The arbitrary method by which we seeded our list does not find content providers, only transit providers.

ATDN is reputed to be "tier-1" so we can test our proposition by adding them, and checking to see whether this yields additional anomalies...

Adding a Candidate

Adding ATDN (AOL Transit Data Network) to our list yields no additional observed anomalies. Thus they're probably fairly "tier-1."

Regional Differences

Reach was included in our seed list because it appeared frequently in Asian routing tables.

Looking only at Asian routing tables, Reach does not generate a significant number of anomalies.

Therefore, Reach is "tier-1" within the Asian region, but not globally.

Thanks, and Questions?

Copies of this presentation can be found
in PDF and QuickTime formats at:

http:// www.pch.net / resources / papers / testing-tier1-status

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