

Peering Wars

Lessons Learned from the Cogent-Telia De-peering

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Reasons to Peer

- Reduce transit costs (happier providers)
- Reduce latencies (happier customers)
 - Increased billable traffic to customers
- Enhance operational stability (perhaps)
 - Localize connectivity
- Roughly equal mutual benefit

Top of the Internet Food Chain: Tier 1

“A **Tier 1 network** is an IP network which connects to the entire Internet solely via Settlement Free Interconnection, commonly known as peering.”

Source: Wikipedia

For the Internet to maintain *global connectivity*, the Tier 1 providers must all peer with one another

Who are the Tier 1 providers?

- Sprint, AT&T, Level 3, ...?
- Due to “paid peering”, there are fewer than you think.
 - Tier 1 providers act like a cartel and have no incentive to add members
 - “Near” Tier 1 providers try to buy their way in via paid peering if they can’t get a settlement free interconnect.

Renesisys Classifies Business Relationships

- We observe over 7 million distinct AS paths from our 270+ full table peers.
- These paths are comprised of over 85,000 unique AS-AS adjacencies.
- Renesisys' algorithms daily classify these adjacencies,
 - e.g., Customer -> Provider, Provider -> Customer, Peer -> Peer, Transit swap, AS cluster, etc.
- Paid peering cannot be distinguished from settlement free peering from routing data.

Cogent and Telia are Tier 1 wannabes

- Cogent and Telia peer
- Cogent gets transit only from NTT to reach AOL
- Telia appeared to get transit from Verizon to reach certain networks
 - On February 27th, we stopped seeing evidence of transit
 - Renesys promotes Telia to “Tier 1” – no known providers
 - Telia could still be paying for some of these interconnections

Overview of Cogent-Telia Peering Dispute

- March 13th, Cogent de-peers Telia, claiming breach of contract
- Renesys observes routes from Telia to Cogent via Verizon for 12 hours.
- These routes then disappear, partitioning the Internet for some
 - Single homed customers behind Cogent and Telia could not reach one another.
- March 28th, peering link is restored.
- The Internet is once again whole.

Which regions were impacted?

Telia cannot reach Cogent

Country	# Prefixes
US	1868
Canada	232
France	98
Spain	41
Germany	31
UK	27
Others	86

Cogent cannot reach Telia

Country	# Prefixes
Sweden	444
Finland	322
Russia	153
Poland	113
US	73
Latvia	62
Bulgaria	52
Spain	40
Denmark	35
Norway	30
Others	249

What happened to the routes via Verizon?

- Cogent blocked them?
 - Guess: Wanted Telia to feel the pain
- Verizon screwed up?
 - Guess: Telia really is now a settlement free peer, so Verizon had been providing free transit for 12 hours
- Telia blocked them?
 - Guess: Telia still buys from Verizon after all and didn't want to suddenly pay to reach Cogent
 - Fact: Verizon has no paid peering offering

Why did this happen?

- Peering disputes with Cogent tend to be about peering ratios
 - Imbalanced ratios along with hot potato routing => one party is carrying the other's traffic longer distances
- Cogent is moving into Telia's "territory".
- Did Telia back Cogent into corner?
- Did Cogent view Telia as in a weaker position?
 - How many European customers want to reach Cogent hosted content?

Now what?

- Peering link has been restored
- Traffic ratios now balanced?
 - Dates of Interest:
 - Before: 13 March 2008, 16:00 UTC
 - After: 29 March 2008, 00:00 UTC
 - **Routes advertised to Telia from Cogent**
 - Before: 5686 prefixes
 - After: 8620 prefixes
 - **Routes advertised to Cogent from Telia**
 - Before: 2084 prefixes
 - After: 1449 prefixes

Where did the prefixes go / come from?

Routes advertised to Telia from Cogent

723 prefixes disappeared

– How does Telia get there now?

Provider	ASN	# Prefixes
Teleglobe	6453	225
Tiscali	3257	74
Global Crossing	3549	64
Not Seen	-	56
JSC	20485	31
Level 3	3356	25

3300 prefixes appeared

– How did Telia used to get there?

Provider	ASN	# Prefixes
Level 3	3356	1209
Global Crossing	3549	888
Sprint	1239	359
XO	2828	195
Not Seen	-	104
Time Warner	4323	88

Does Telia now send more traffic to Teleglobe and less to Level 3 and Global Crossing?

Where did the prefixes go / come from?

Routes advertised to Cogent from Telia

766 prefixes disappeared

- How does Cogent get there now?

Provider	ASN	# Prefixes
Level 3	3356	196
Not Seen	-	145
Comstar	8359	140
Internet Solutions	3741	32
Teleglobe	6453	29
Verizon	701	25

131 prefixes appeared

- How did Cogent used to get there?

Provider	ASN	# Prefixes
Not Seen	-	56
Teleglobe	6453	23
Deutsche Telekom	3320	10
Telekom So. Africa	5713	9
NASK	15606	6
Interoute Comm.	5588	3

Does Cogent now send more traffic to Level 3 and Comstar and a little less to Teleglobe?

New peerings established during the outage

In progress

Examples of impacted networks

In progress

Lessons Learned

- Being a Tier 1 is not easy
 - You depend on everyone else in the cartel
 - You will be punished if you are perceived to be in a position of weakness.
- Peering relationships are tricky
 - Depend on both objective measures (ratios) and perceptions
 - Disputes can take a long time to resolve. The only driver is market pressure.
- Being single-homed is dangerous
 - Especially behind a near Tier 1

Thank You

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