

# **D(3)peered: Just the Facts Ma'am**

## **A technical review of Level (3)'s Depeering of Cogent**

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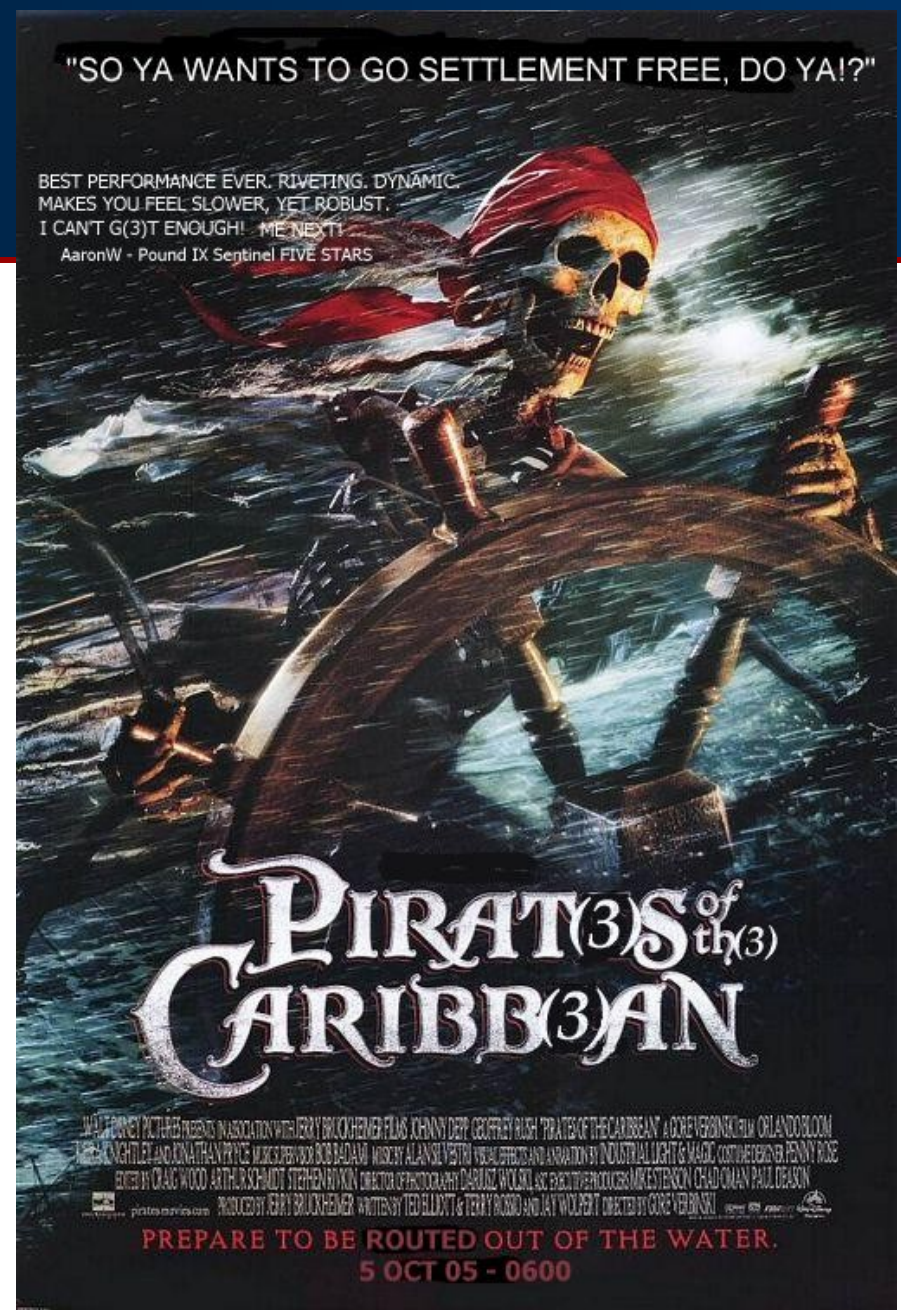
# Agenda

- What this is:
  - A technical description, from the perspective of the routing tables, of a large-scale depeering event.
- What this is not:
  - A political, ethical or financial evaluation of the event including: causes, fault, financial harm, or the role (or lack thereof) for government regulation
  - An education on the basics of what Settlement Free peering is. If you don't know, ask the person next to you.

# The Players

- Level (3)
  - AS3356 (and AS1 AS189 AS199 AS200 AS201...)
  - Weighing in at ~49K on-net prefixes and 1325 globally visible BGP adjacencies
  - Service provider to champions (sometimes). “The Carrier’s Carrier”
- Cogent
  - AS174 (and AS2149 AS4550 AS6259 AS6494...)
  - Weighing in at ~11K (***varies a lot***) on-net prefixes and 1332 globally visible BGP adjacencies
  - The scrappy underdog, training hard, bulking up fast. A contender.

- Credit to the inimitable Marty Hannigan

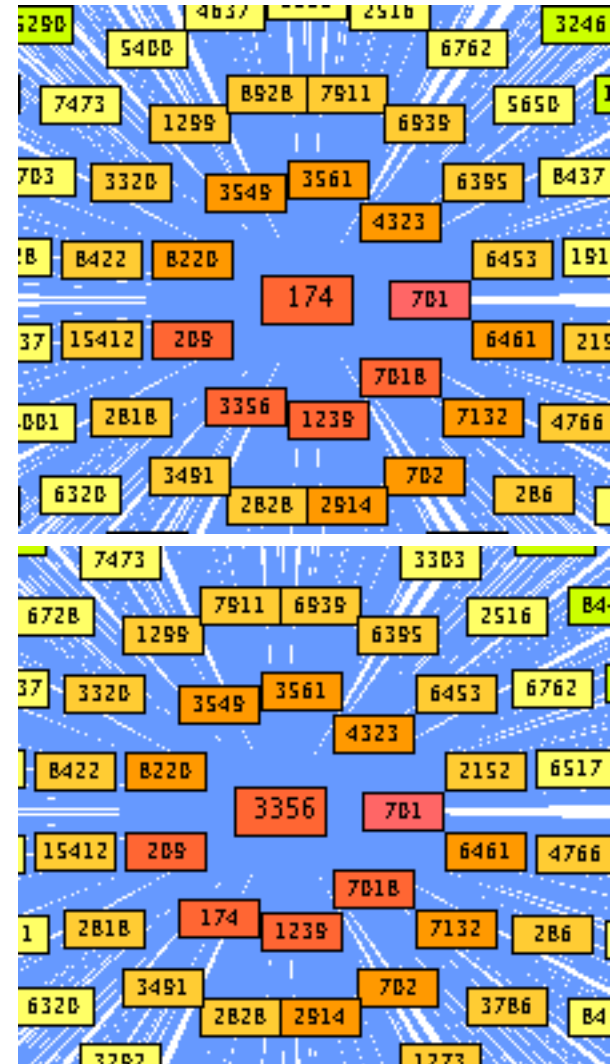


# •The Timeline

- **31 Jul 2005:** (3) Notifies Cogent of intent to disconnect (according to (3)). Cogent and (3) notify their respective sales departments. No one notifies customers.
- **16 Aug 2005:** Cogent begins massive sales effort and mentions a 15 Sept. expected depeering date.
- **31 Aug 2005:** (3) Notifies Cogent again of intent to disconnect (according to (3))
- **5 Oct 2005 9:50 UTC:** (3) disconnects Cogent. Mass hysteria ensues up to, and including policymakers in Washington, D.C.
- **7 Oct 2005 ~19:00 UTC:** (3) reconnects Cogent
- **9 Nov 2005 ~10:00 UTC:** (3) plans to re-depeer Cogent

# The Stakes

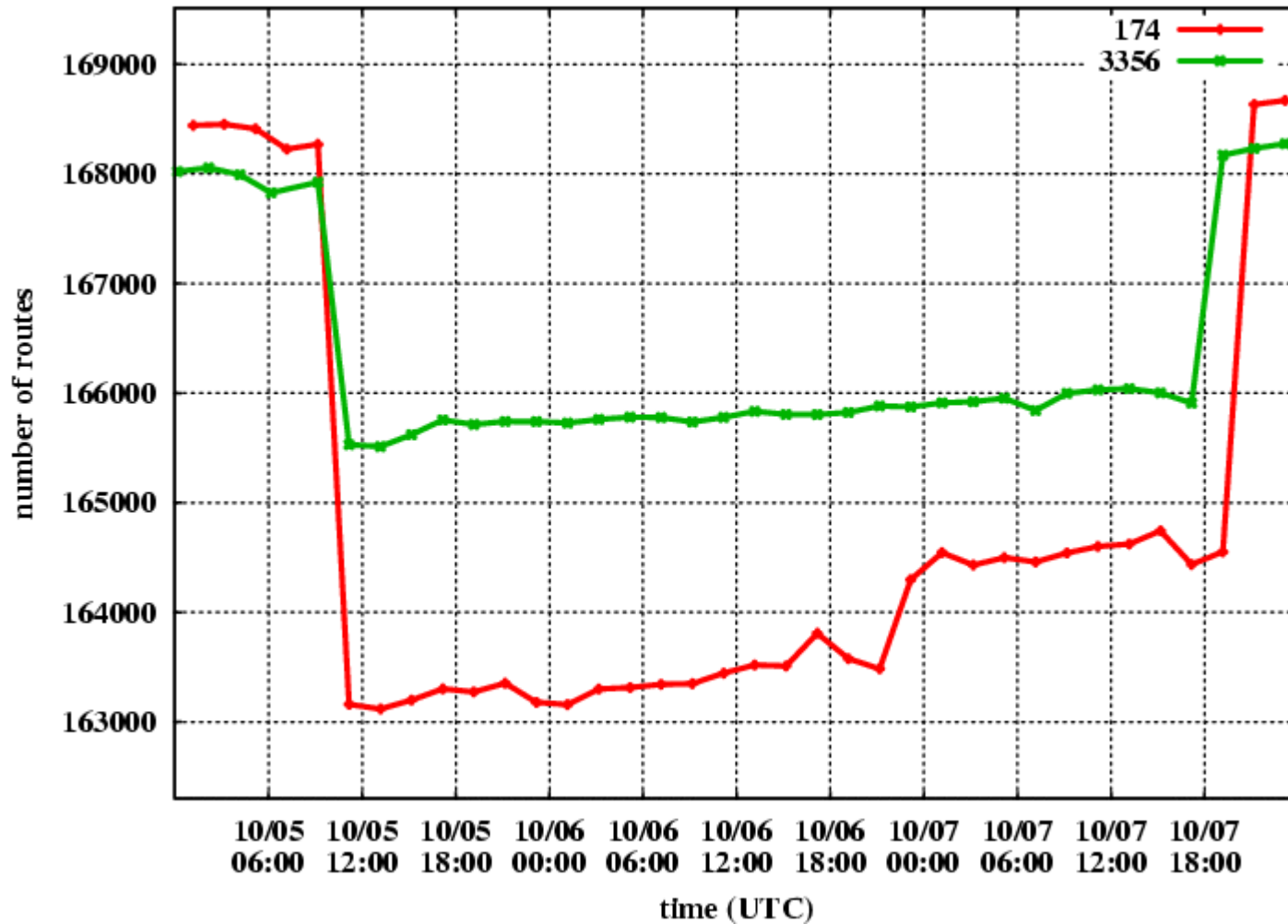
- Cogent:
  - 11K-14.5K on-net prefixes
  - ~2300 single-homed prefixes
  - 119 single-homed Ases
  - 38.0.0.0/8
- Level (3):
  - ~49K on-net prefixes
  - ~5100 single-homed prefixes
  - 121 single-homed Ases
  - 4.0.0.0/8 8.0.0.0/8



# The Event

- Between 9:00 (UTC) and 11:00 (UTC) on Oct 5:
  - Cogent lost 5081 routes from (3).
  - (3) lost 2322 routes from Cogent.
- Around 19:00 (UTC) on Oct 7:
  - Cogent regained 4070 routes from (3).
  - (3) regained 2210 routes from Cogent.
- ***During the outage period, (3) and Cogent each carried routes for the other's prefixes.***

# The Event



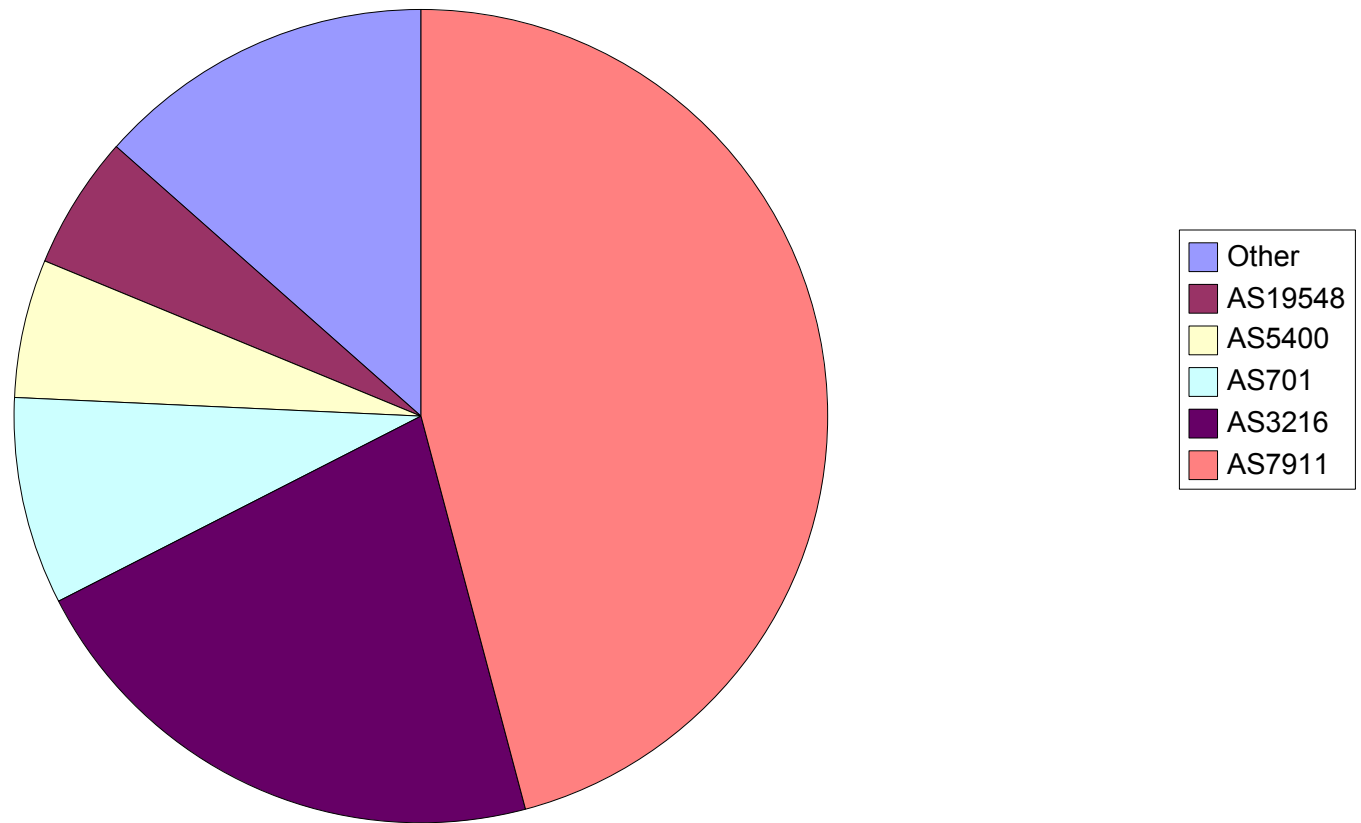


# Who Came Back for Cogent?

- Mostly RoadRunner
  - 45 ASes
  - 761 Prefixes
  - Previously Single-homed behind 3356, now with a transit path through AOL (1668) via Verio (2914)
  - *[Why were they single-homed 3356 in the first place?]*

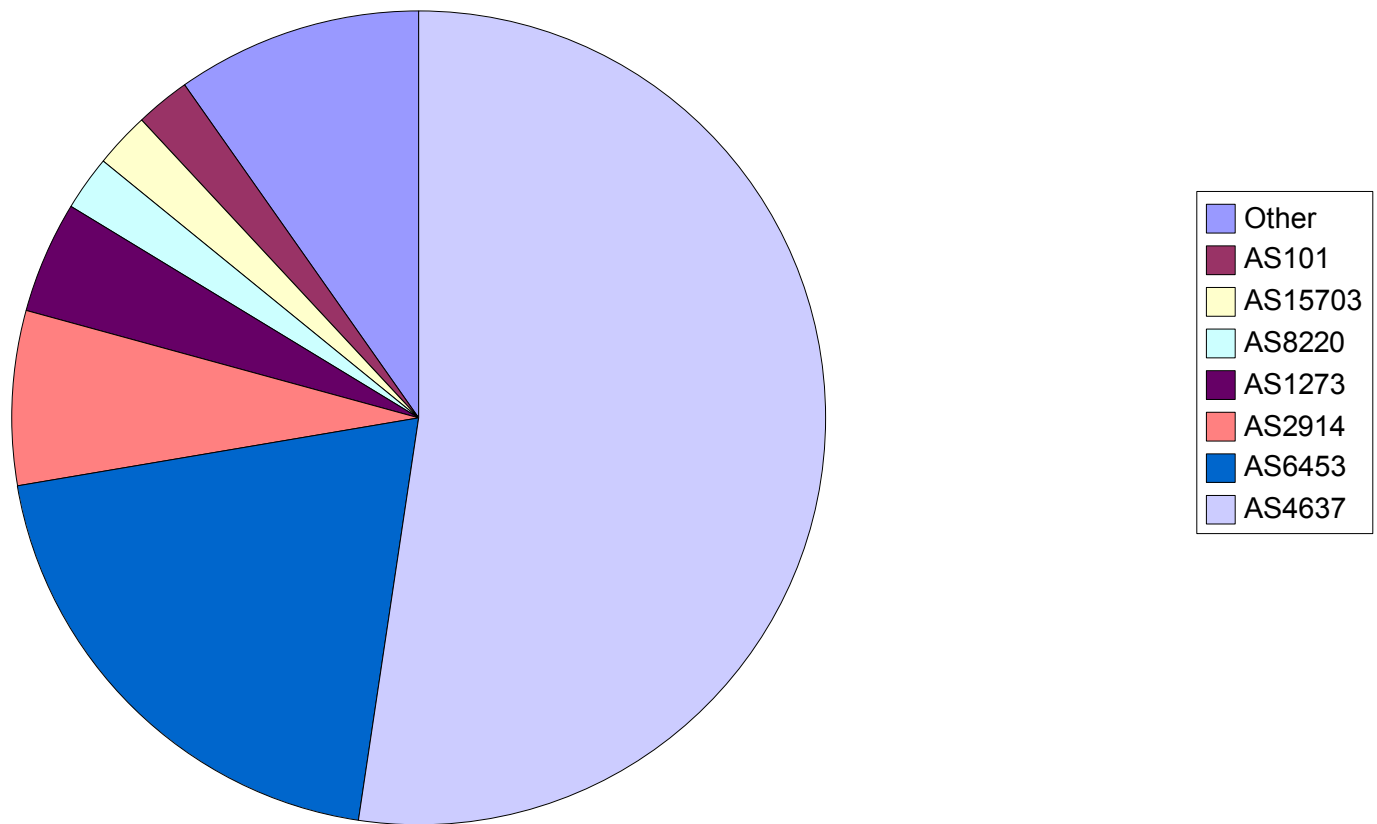
# The Leakers to 3356 (total 37 prefixes)

Main Leakers of 174 Routes to 3356



# The Leakers to 174 (total 134 prefixes)

Main Leakers of 3356 Routes to 174



# Sample Leaked Paths

38.97.66.0/24    **3356 701** 13490 **174** 32446

38.119.139.0/24 **3356 7911** 13490 **174** 32446

83.68.40.0/24    **3356 3216** 3216 3216 3216 3216  
20764 6850 3343 174 **174** 20485 31444

62.93.128.0/23    **174 4637** 13987 **3356** 15863

70.192.0.0/13    **174 22773 3356** 6167

194.32.125.0/24 **174 1273** 9121 3549 **3356** 1273  
9121 3549

63.204.205.0/24 **174 2914** 16467 16467 16467 **3356**  
7132 27291

# The Winners

- Who got the non-single-homed prefixes previously routed on this edge?
- Previous 174 routes at (3):
  - AS701—26 pfxs—18%
  - AS7018—20 pfxs—14%
  - AS3561—19 pfxs—13.3%
- Previously 3356 routes at Cogent:
  - AS2914—1011 pfxs—78%
  - AS701—135 pfxs—10%

# The Losers: Some Cogent Single Homed ASes

- Cogent in the Financial Industry

15299 Columbia Management

18714 Perry Capital

19040 FirstMerit N.A.

21953 ABN AMRO Sage Corporation

22288 Republic First Bancorp, Inc.

26264 Millennium Bank, N.A.

33378 CATHAY FINANCIAL

- Cogent in the Public Sector

20330 New York State Unified CourtSystem

# The Losers: Some Level (3) single Homed ASes

- Level (3) and the Media

11207 The Boston Globe

13553 CNET Networks Inc.

30281 Washington Post

- Level (3) in the Public Sector

2714 General Services Administration

26810 U.S. Dept. of Health and Human Services

2923 TIAA-CREF

# Repair During D(3)spar

During the outage concerted efforts were underway to restore connectivity.

- 1298 previously single-homed prefixes behind (3) regained connectivity to Cogent (Largely the 761 RR prefixes).
- 142 previously single-homed prefixes behind Cogent regained connectivity to level (3).



# •Conclusions

- Damage:
  - 4.3% of prefixes in the global table were isolated from each other
  - ~1% of globally visible ASes were affected
- Leaking:
  - Lots of networks not filtering customers properly
  - Lots of networks not filtering providers
  - No one filtering peers
- A few creative fixes (AOL for RR)
- November 9 to look forward to

# Thanks

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# Credits

- [www.routeviews.org](http://www.routeviews.org) For routing data supplementing Renesys routing data
- Martin Hannigan, Verisign, graphics
- Richard A. Steenbergen, nLayer, technical reviewer
- Guy Tal, Global Crossing, technical reviewer