

Zombie Routes

BGP Routes Getting Stuck

RIPE NCC Survey 2019

10 minutes can make a big difference

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#RIPENCCSurvey

<http://www.ripe.net/survey>

Why Do Internet Measurement?



“To measure is to improve”



Why Do Internet Measurement?



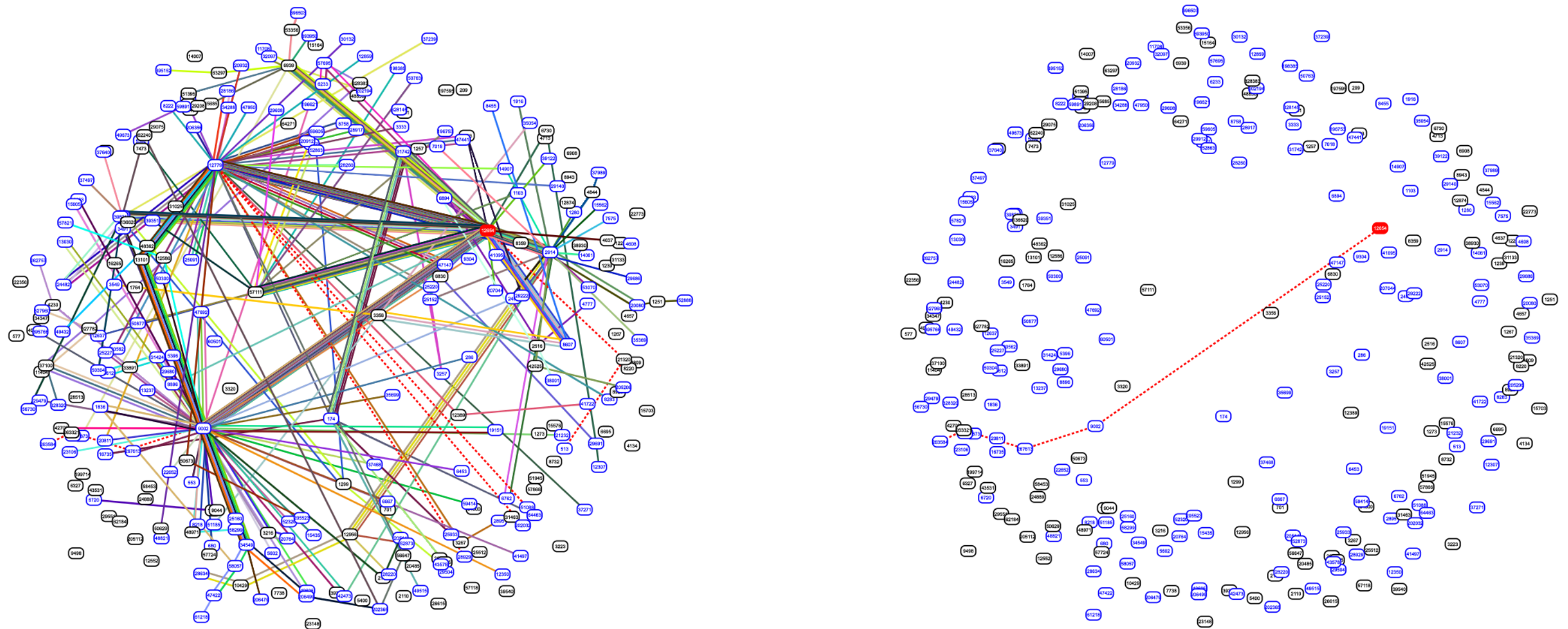
“To measure is to improve”



For The Good of The Internet!



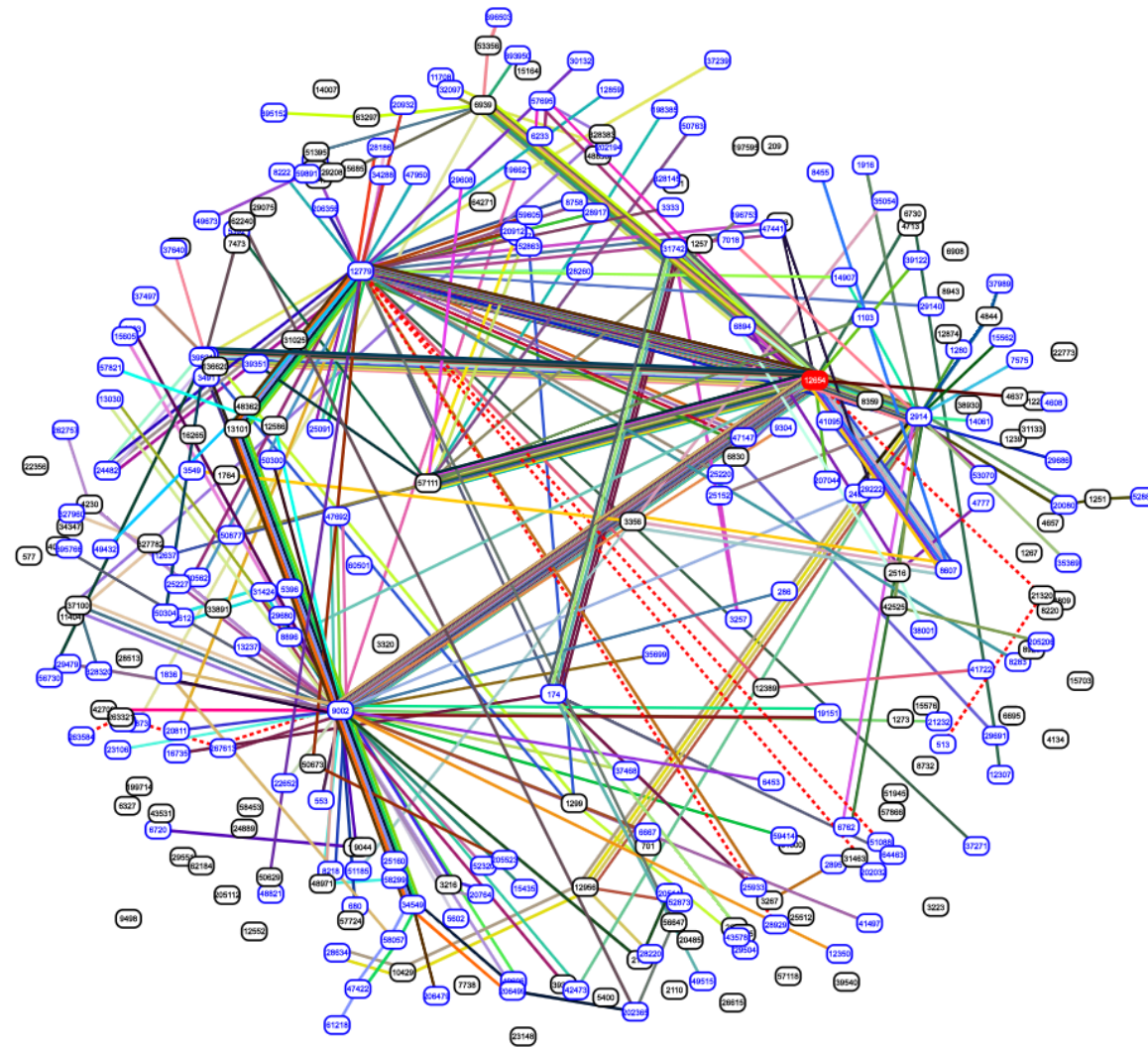
- RIS data collection
 - What is the health of the Internet control plane (BGP)?



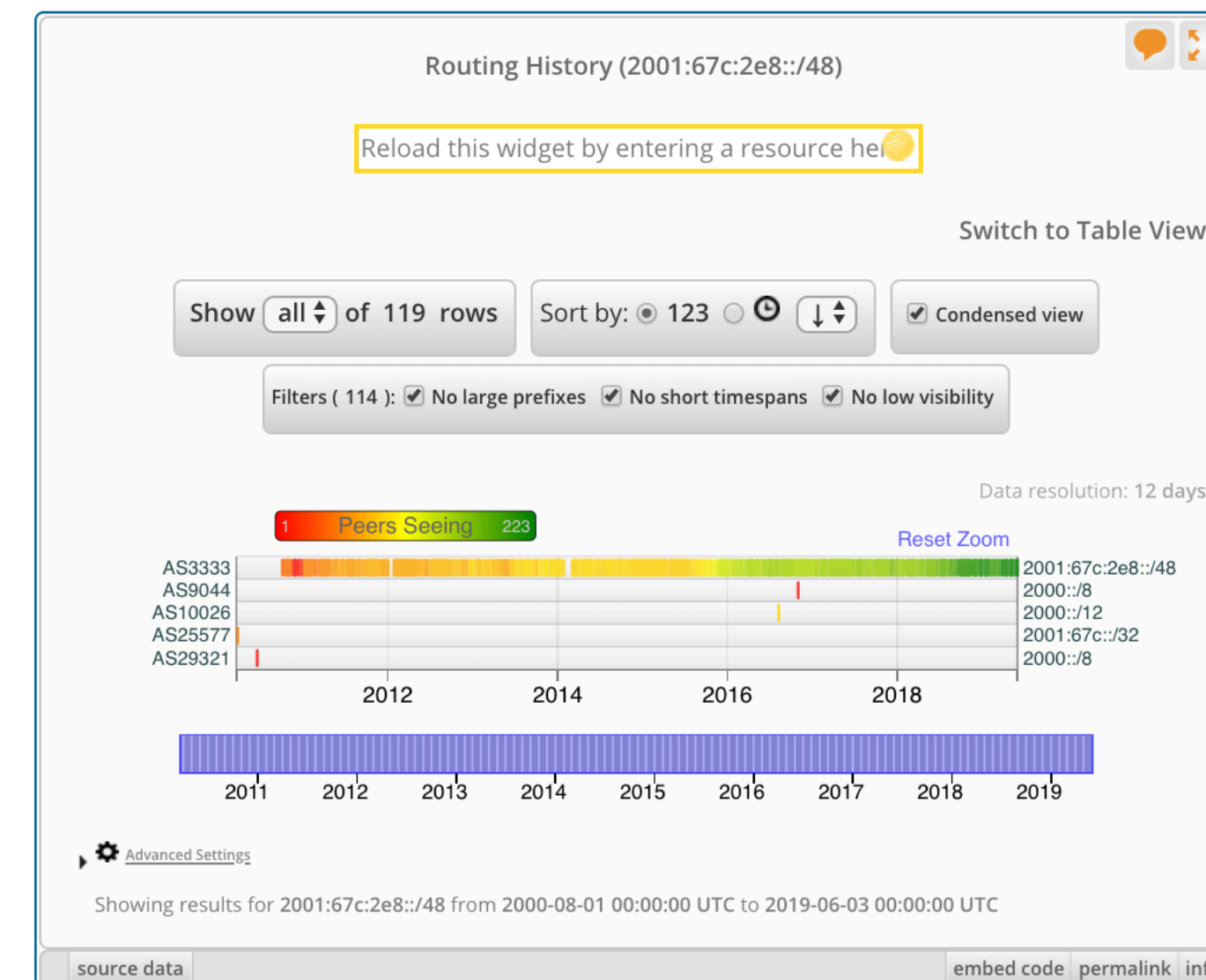
- When does BGP misbehave?

RIPEstat

- <https://stat.ripe.net/>
- All you want to know about an IP prefix or ASN



BGPPlay

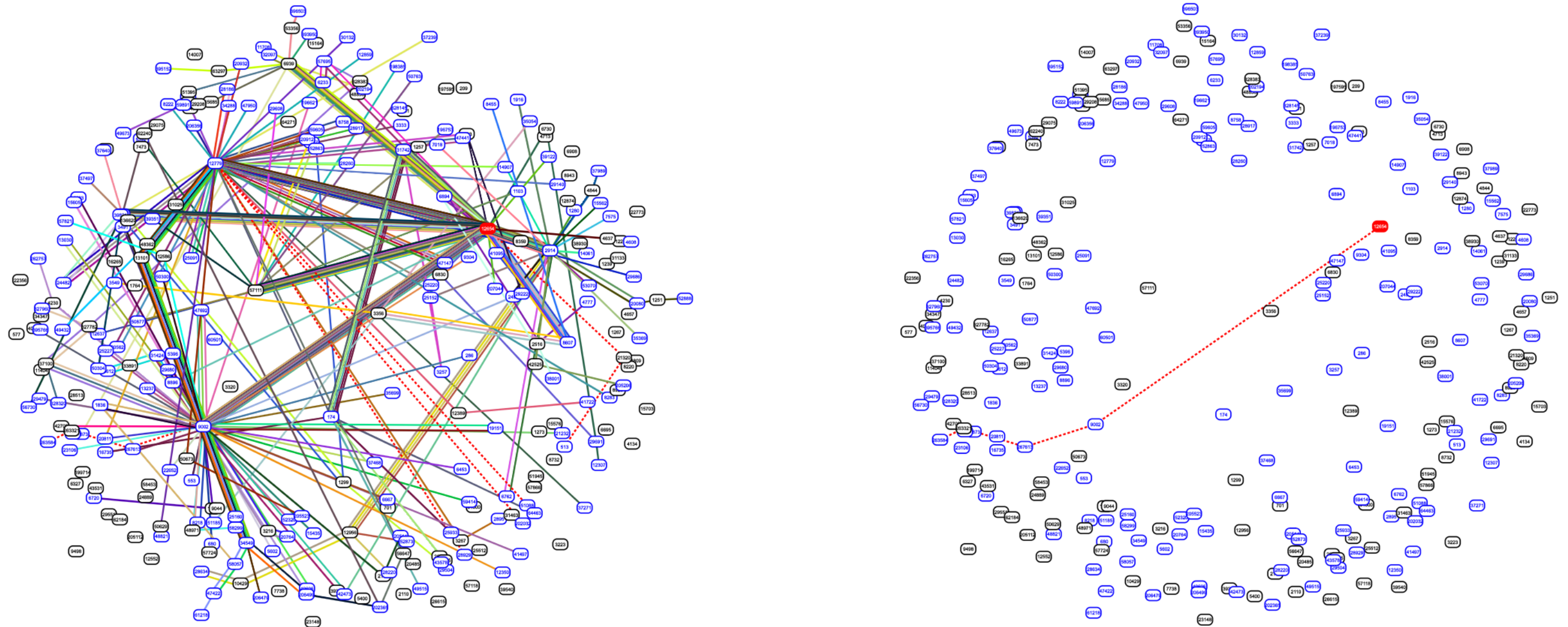


Routing History

Zombie aka. Ghost aka. Stuck Routes



- A piece of Internet disappeared,
... except from your router



Why Do Ghost Routes Matter?



- Debugability



- Routing Table Size

- 512k, 768k, router hardware has limits!



image credits:<https://alistapart.com/article/modern-debugging-tips-and-tricks/>

<https://timemanagementninja.com/2012/09/is-your-bucket-overflowing-with-todos-email-meetings/>

Even BGP-Nyancat was affected!



- <https://labs.ripe.net/Members/cteusche/bgp-meets-cat>

 **Bert Hubert/PowerDNS**
@PowerDNS_Bert [Follow](#)

After 3072 hours of manipulating BGP,
[@JobSnijders](#) has succeeded in drawing a
Nyancat on the RIPE statmon interface.
tinyurl.com/nyancatbgp



Retweets **1,420** Likes **1,663**

9:39 AM - 23 Jun 2017

20 1.4K 1.7K

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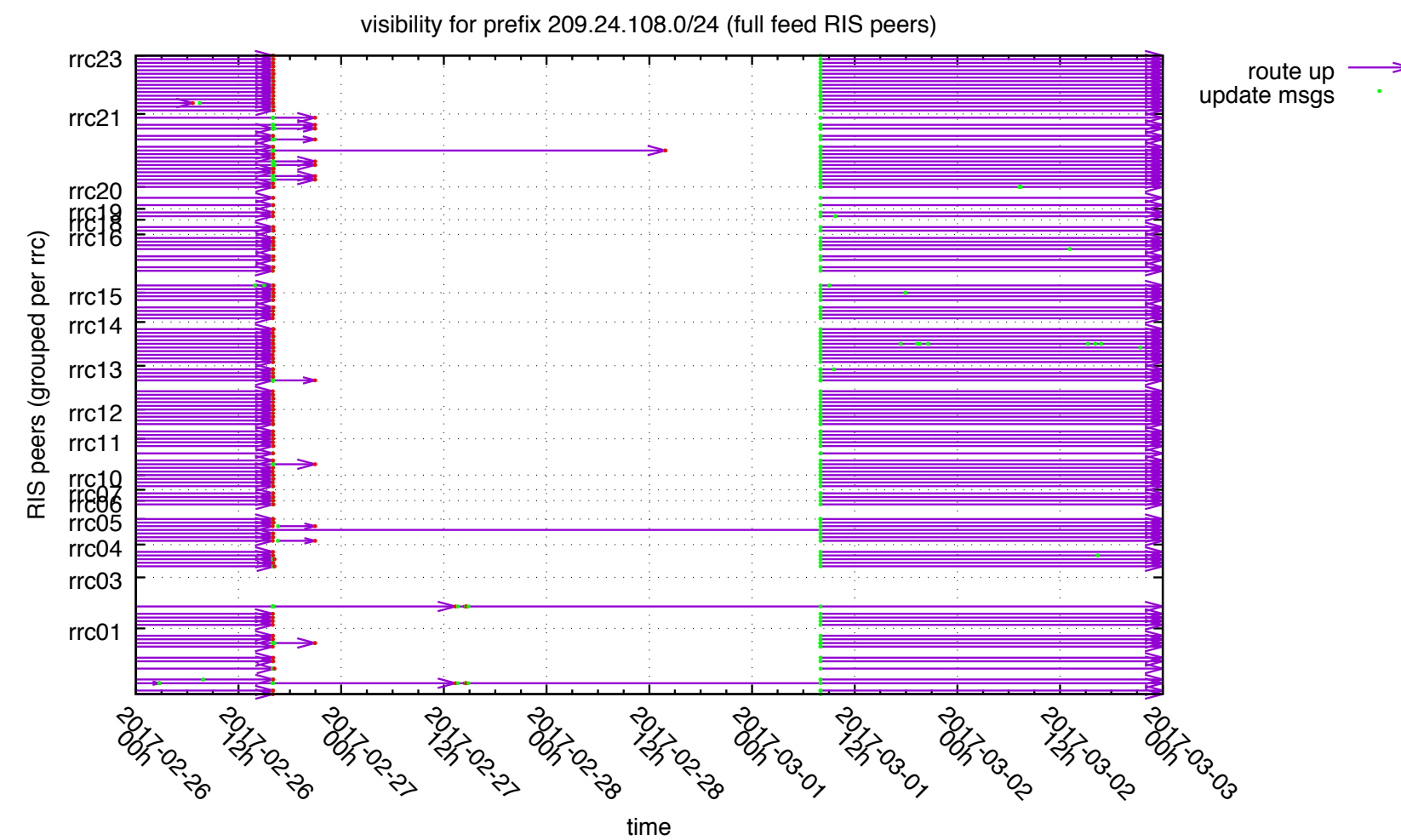
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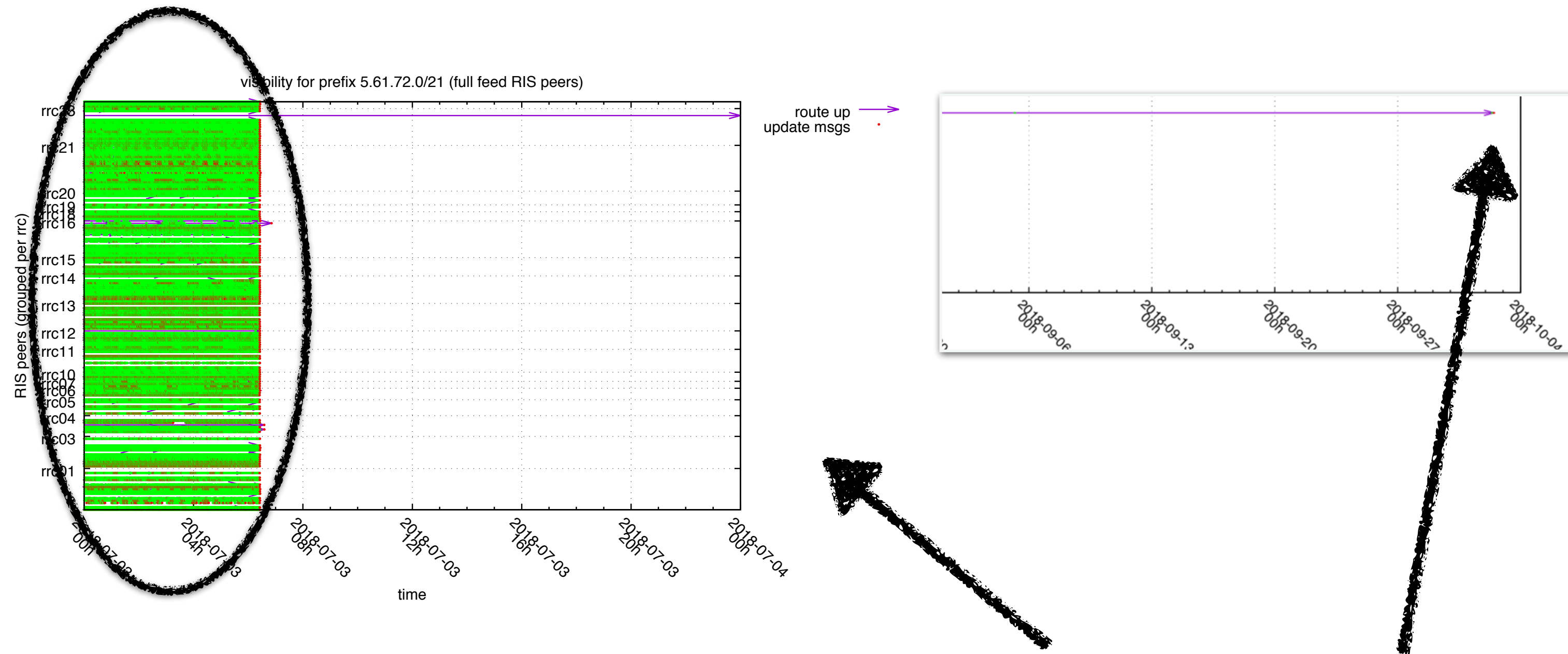
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Example: Long Lived Zombie



Tons of BGP updates

3 Months!

Route totally withdrawn only after manual intervention

Confusing if you want to know: Is this routed publicly?

This Was Seen Before ...

- Ghost Route Hunter project
 - Ghost Routes in IPv6
 - Closed down



How Often Does This Happen?



- For the whole Internet
 - We don't know!

- Controlled experiment
 - “RIS Beacons”



Current RIS Routing Beacons

Note: IPv6 beacons and anchors are now being announced from the RRCs. See below for details.

All RRCs:

- Announcements at 00:00, 04:00, 08:00, 12:00, 16:00, 20:00 (UTC)
- Withdrawals at 02:00, 06:00, 10:00, 14:00, 18:00, 22:00 (UTC)

BGP Beacons



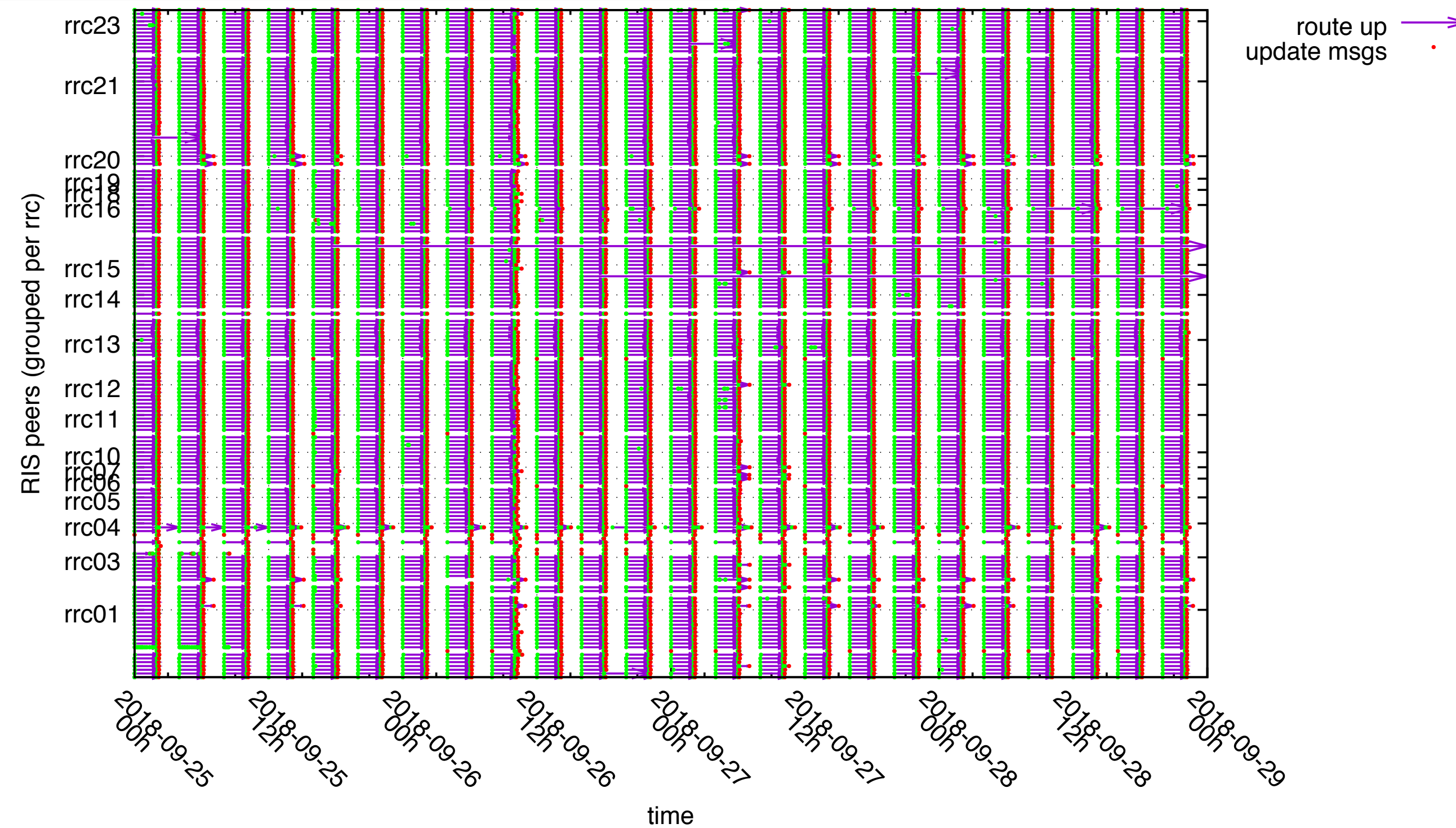
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visibility for prefix 84.205.67.0/24 (full feed RIS peers)



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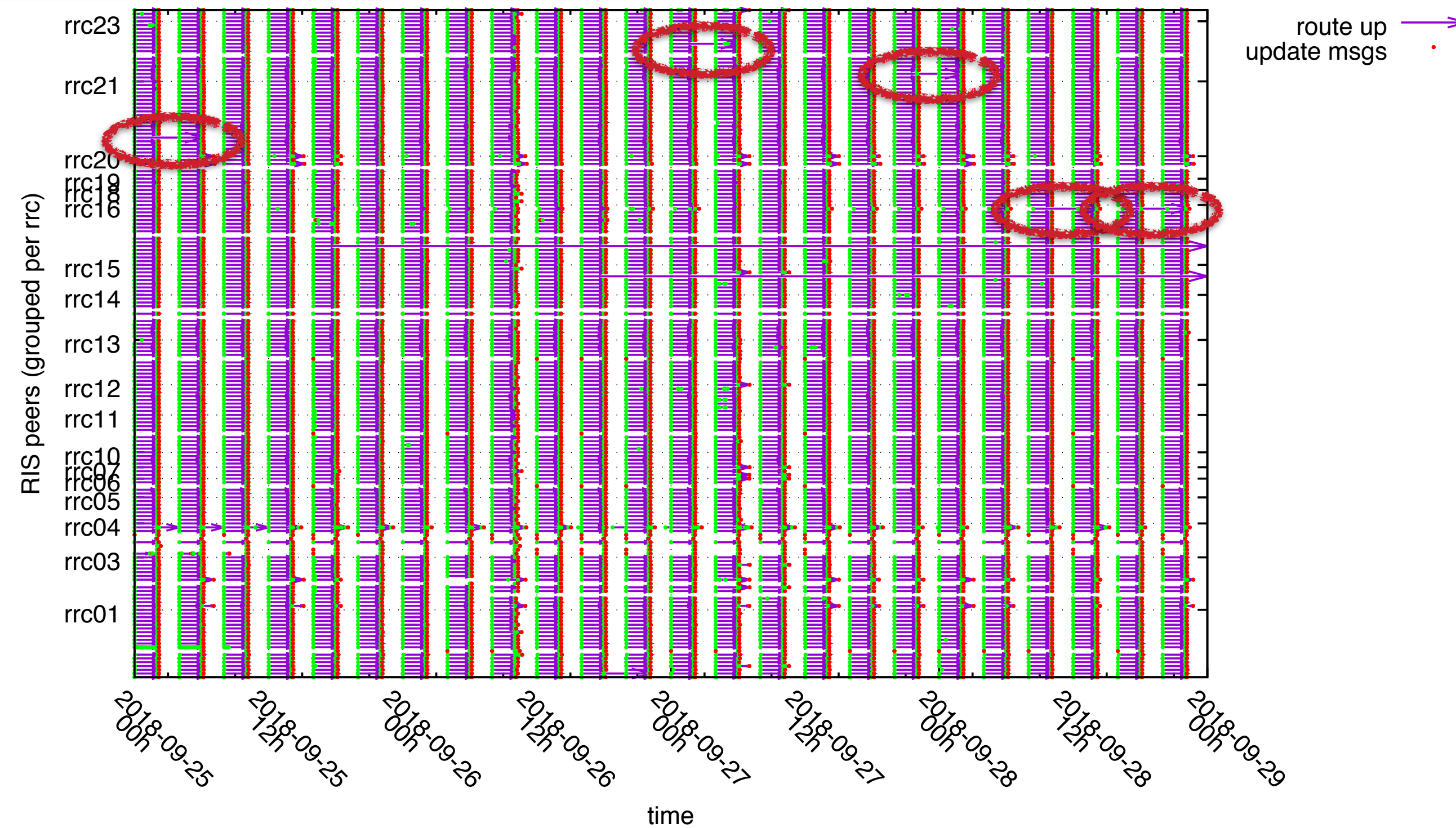
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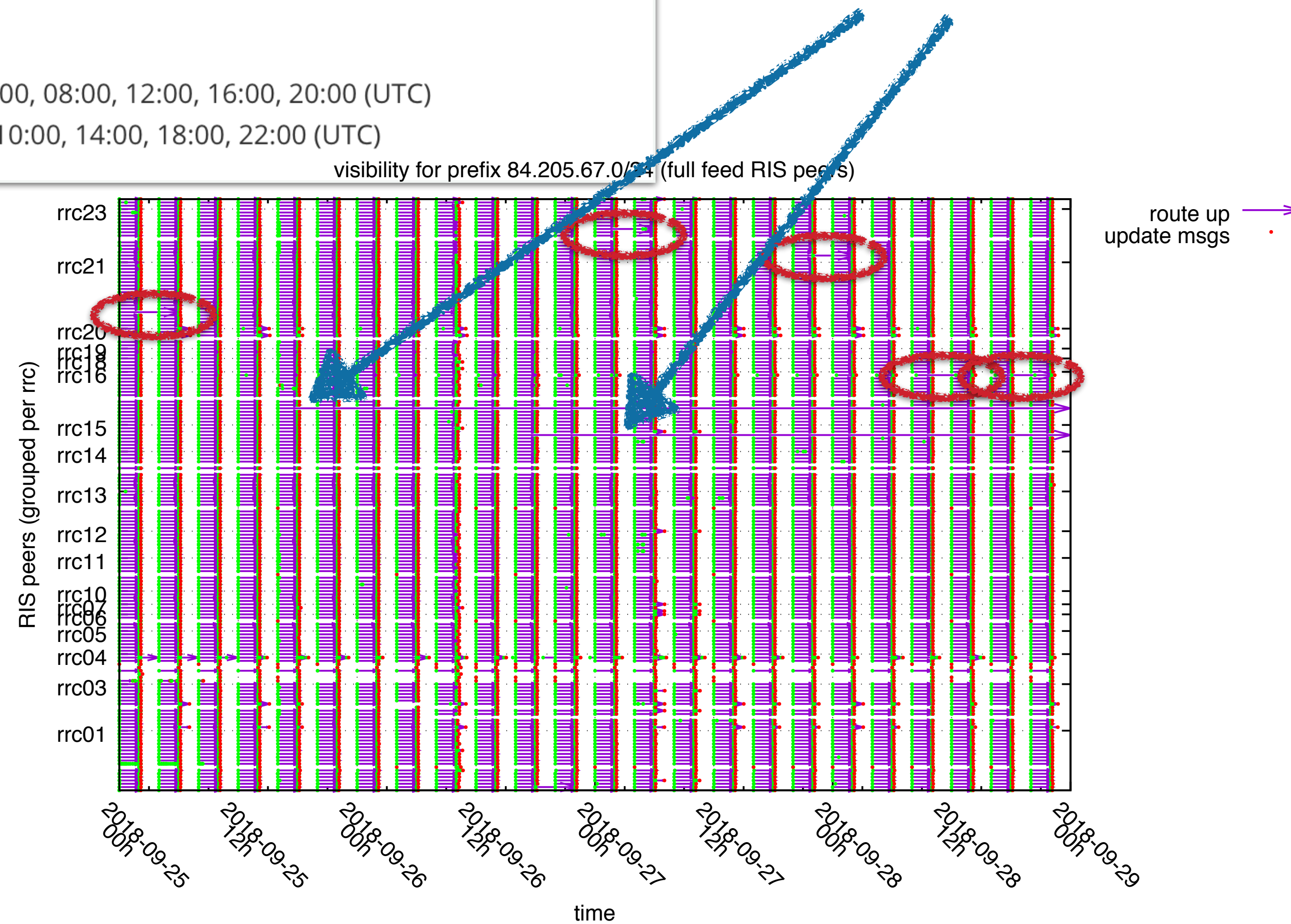


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Beacon Zombies



Likelihood for a RIS peer to see a beacon zombie route?

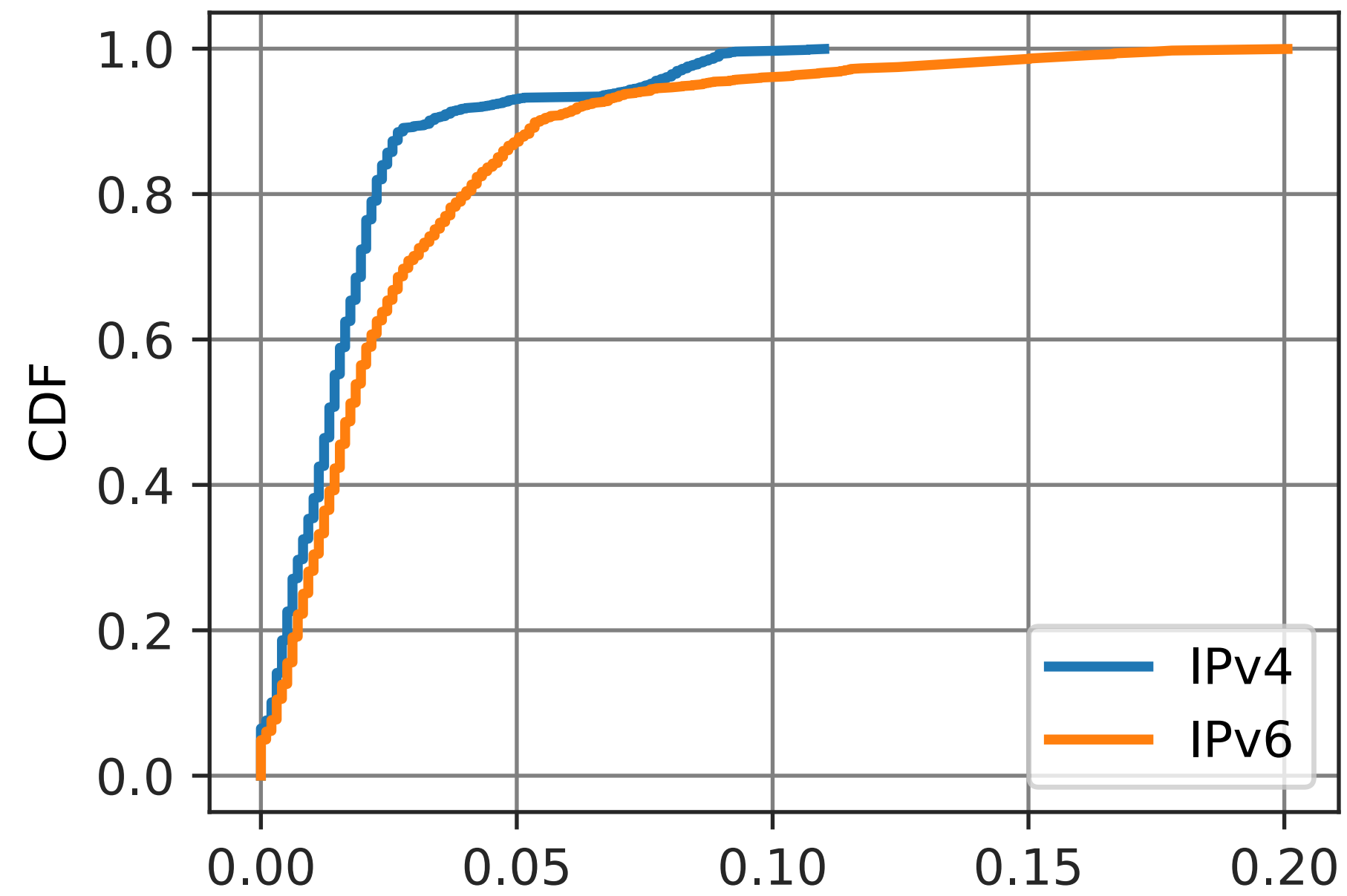
?

Beacon Zombies



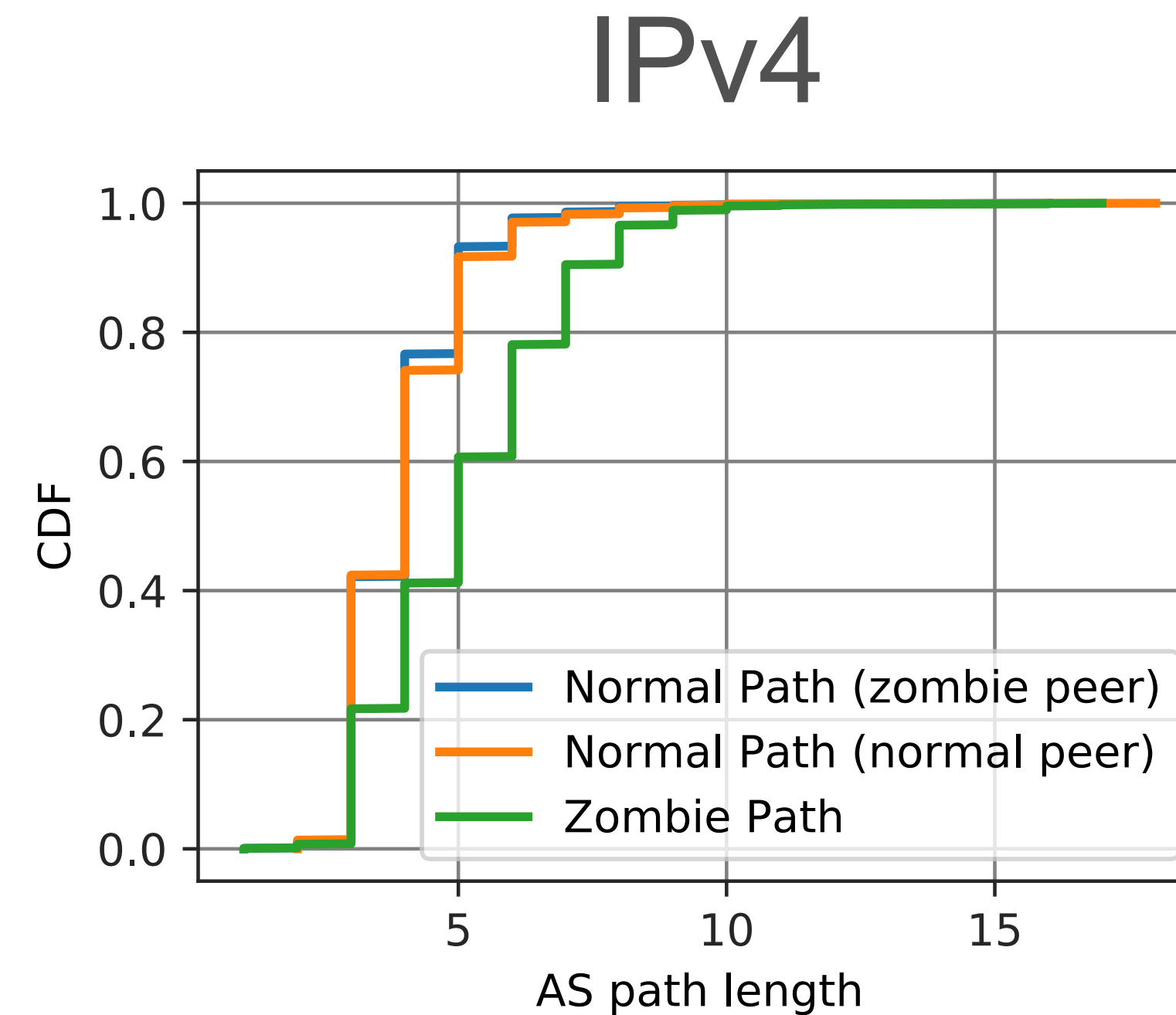
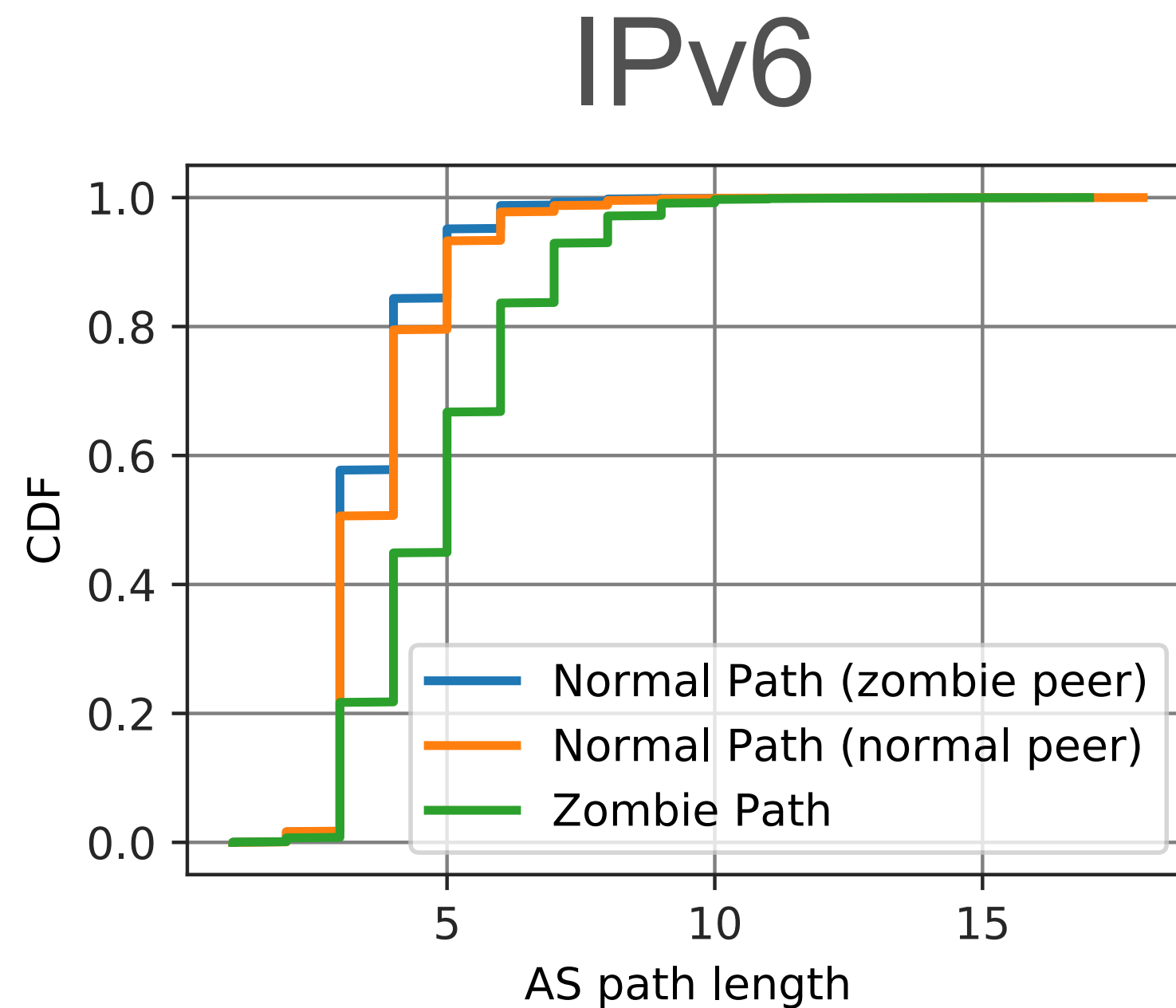
Likelihood for a RIS peer to see a beacon zombie route?

- IPv6: 2.8%
- IPv4: 1.8%



ratio zombie peers/all withdraws

Zombie paths are longer



- Zombie paths (green) are longer than best path
- Mitigate by reannounce/withdraw?

Zombie Apocalypse?



- Is this a canary in the coal-mine?
- Sign of things getting worse?
 - didn't increase over time (until now) at least
- What if:
 - More prefixes?
 - More updates?



What causes this?

- Software bugs
 - Routers
 - BGP optimisers?
 - Route reflector setups?
 - Route collector systems?
- Is this correlated to update rates?
 - another sign update rates are a problem?



Next Steps

- Create awareness
 - Researchers were typically not aware this exists
- Your feedback & involvement!
 - Do you know how much trouble (tickets) this causes?
 - Easy tools for detecting zombies in the wild (also in BGPlay?)



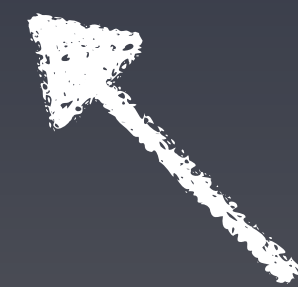


Questions



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not a typo

Additional Resources

- https://labs.ripe.net/Members/romain_fontugne/bgp-zombies
- RIPEstat: <https://stat.ripe.net/>
- RIS: <https://ris.ripe.net/>