RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIS Beacons Revisited

Emile Aben 2023-05-25 RIPE86

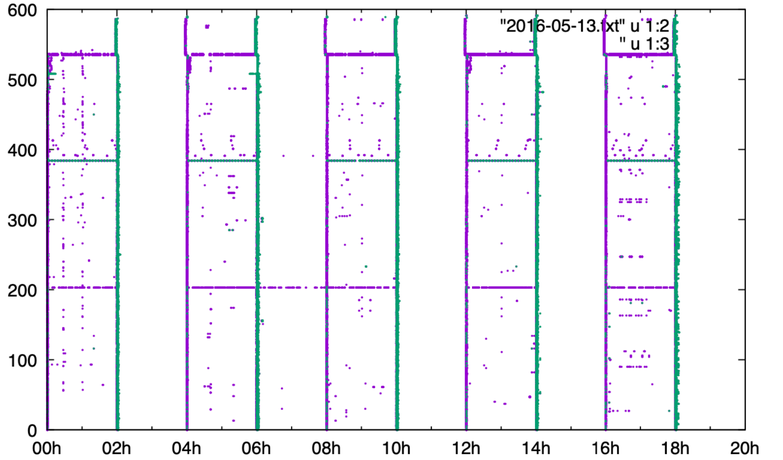
Why This Presentation?

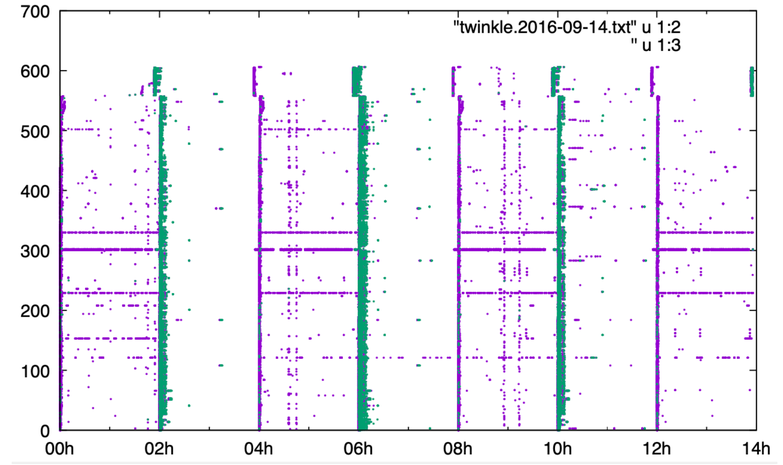
- TL:DR;
  - We are planning to revamp RIS beacons, tentative plan Q3
  - We want your input

What Are RIS Beacons?

- https://ris.ripe.net/docs/30_routing_beacons.html#current-beaconing-setup
- 2 Flavours:
  - Per RRC anchor/beacon
  - Specials:
    - RPKI valid/invalid/notfound
    - Anycast failover (2 RRCs)
    - Fast beacon (20 mins)

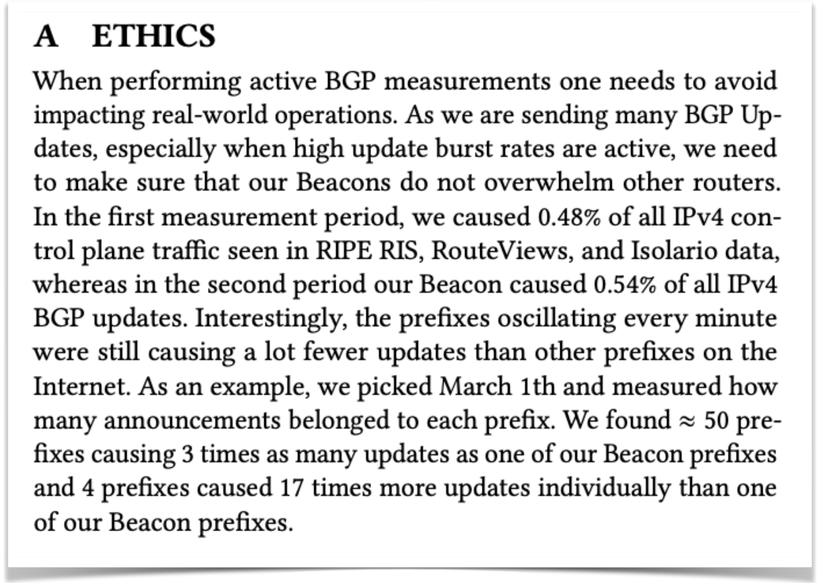
IPv4 prefix	IPv6 prefix	type	origin RRC (IXP/multihop)	peer location(s)
84.205.64.0/24	2001:7FB:FE00::/48	beacon	RRC00 (multihop)	global
84.205.80.0/24	2001:7FB:FF00::/48	anchor	"	"
84.205.65.0/24	2001:7FB:FE01::/48	beacon	RRC01 (LINX/LONAP)	GB
84.205.81.0/24	2001:7FB:FF01::/48	anchor	"	"
84.205.67.0/24	2001:7FB:FE03::/48	beacon	RRC03 (AMS-IX, NL-IX)	NL,DK
84.205.83.0/24	2001:7FB:FF03::/48	anchor	"	"
84.205.68.0/24	2001:7FB:FE04::/48	beacon	RRC04 (CIXP)	CH,FR
84.205.84.0/24	2001:7FB:FF04::/48	anchor	"	"
84.205.69.0/24	2001:7FB:FE05::/48	beacon	RRC05 (VIX)	AT
84.205.85.0/24	2001:7FB:FF05::/48	anchor	"	"
84.205.70.0/24	2001:7FB:FE06::/48	beacon	RRC06 (DIX-IE)	JP
84.205.86.0/24	2001:7FB:FF06::/48	anchor	"	"
84.205.71.0/24	2001:7FB:FE07::/48	beacon	RRC07 (NETNOD)	SE
84.205.87.0/24	2001:7FB:FF07::/48	anchor	"	"
84.205.74.0/24	2001:7FB:FE0A::/48	beacon	RRC10 (MIX)	IT
84.205.90.0/24	2001:7FB:FF0A::/48	anchor	"	"
84.205.75.0/24	2001:7FB:FE0B::/48	beacon	RRC11 (NYIIX)	US
84.205.91.0/24	2001:7FB:FF0B::/48	anchor	"	"
84.205.76.0/24	2001:7FB:FE0C::/48	beacon	RRC12 (DE-CIX)	DE
84.205.92.0/24	2001:7FB:FF0C::/48	anchor	"	"
84.205.77.0/24	2001:7FB:FE0D::/48	beacon	RRC13 (MSK-IX)	RU
84.205.93.0/24	2001:7FB:FF0D::/48	anchor	"	"
84.205.78.0/24	2001:7FB:FE0E::/48	beacon	RRC14 (PAIX)	US
84.205.94.0/24	2001:7FB:FF0E::/48	anchor	"	"
84.205.79.0/24	2001:7FB:FE0F::/48	beacon	RRC15 (PTTMetro-SP)	BR
84.205.95.0/24	2001:7FB:FF0F::/48	anchor	"	"
84.205.73.0/24	2001:7FB:FE10::/48	beacon	RRC16 (NOTA Miami)	US
84.205.89.0/24	2001:7FB:FF10::/48	anchor	"	"
	2001:7FB:FE12::/48	beacon	RRC18 (CATNIX)	ES
	2001:7FB:FF12::/48	anchor	"	"
84.205.82.0/24	2001:7FB:FE13::/48	beacon	RRC19 (NAP Africa JB)	ZA
84.205.88.0/24	2001:7FB:FF13::/48	anchor	"	"
	2001:7FB:FE14::/48	beacon	RRC20 (SwissIX)	CH
	2001:7FB:FF14::/48	anchor	"	"
93.175.149.0/24	2001:7FB:FE15::/48	beacon	RRC21 (FranceIX PAR/MAR)	FR
93.175.148.0/24	2001:7FB:FF15::/48	anchor	"	"
	2001:7FB:FE16::/48	beacon	RRC22 (InterLAN)	RO
	2001:7FB:FF16::/48	anchor	"	"
93.175.151.0/24	2001:7FB:FE17::/48	beacon	RRC23 (Equinix Singapore)	SG
93.175.150.0/24	2001:7FB:FF17::/48	anchor	"	"
93.175.153.0/24	2001:7FB:FE18::/48	beacon	RRC24 (multihop)	LACNIC region
93.175.152.0/24	2001:7FB:FF18::/48	anchor	"	"





Why revamp RIS beacons?

- IPv4 address space (46 /24s) we use for this is almost all used
- Is all we do useful enough?
- Are there new things we could be doing that are more useful?
  - Occasional request, mostly from researchers
  - Cool research papers with setups that get torn down
- Responsible stewardship:
  - How much BGP churn is acceptable?



A ETHICS

When performing active BGP measurements one needs to avoid impacting real-world operations. As we are sending many BGP Updates, especially when high update burst rates are active, we need to make sure that our Beacons do not overwhelm other routers. In the first measurement period, we caused 0.48% of all IPv4 control plane traffic seen in RIPE RIS, RouteViews, and Isolario data, whereas in the second period our Beacon caused 0.54% of all IPv4 BGP updates. Interestingly, the prefixes oscillating every minute were still causing a lot fewer updates than other prefixes on the Internet. As an example, we picked March 1th and measured how many announcements belonged to each prefix. We found ≈ 50 prefixes causing 3 times as many updates as one of our Beacon prefixes and 4 prefixes caused 17 times more updates individually than one of our Beacon prefixes.

BGP Beacons, Network Tomography, and Bayesian Computation to Locate Route Flap Damping
Gray et. Al. , IMC2020
https://ilab-pub.imp.fu-berlin.de/papers/gmbpr-bbntb-20.pdf

Current Beacons - Upstream Diversity

- How diverse are upstreams per RRC?
- Low diversity = Less useful?
  - Where to draw the line?
- Keep doing IPv6 for each one

Beacon on:	IPv4 Upstreams	IPv6 Upstreams
RRC00 (MH)	64	9
RRC01/LON	33	27
RRC03/AMS	30	29
RRC04/GVA	5	3
RRC05/VIE	13	10
RRC06/TYO	1	1
RRC07/STO	10	8
RRC10/MIL	12	10
RRC11/NYC	11	9
RRC12/FRA	35	33
RRC13/MSK	6	5
RRC14/PAO	5	5
RRC15/SPO	9	8
RRC16/MIA	0	0
RRC18/BCE	-	3
RRC19/JNB	6	5
RRC20/ZHR	-	15
RRC21/PAR	16	14
RRC22/BUC	-	14
RRC23/SIN	0	0
RRC24/LAC (MH)	3	3

Some Ideas

- Longer than /24 prefixes in IPv4
  - Non-overlapping so we can ping them from Atlas?
- RPKI / ASPA
  - Valid/invalid/unknown exists already
  - Announce a prefix where the RPKI state changes, not the announcement (Fontugne et al. PAM '23)
- Anycast
- Ghost/zombie routes characterisation
- Unknown BGP attributes (we did this in 2010, with unintended consequences)
- Fast beacon: Every 20 mins (nice for demo purposes?)
- Even faster: Route Flap Damping (RFD)
- *<blink>Insert your idea here</blink>*

Questions

emile.aben@ripe.net

ris-users@ripe.net