

IXP Route Server Prefix Validation at LINX – Progress & Challenges

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LINX Route-Server History

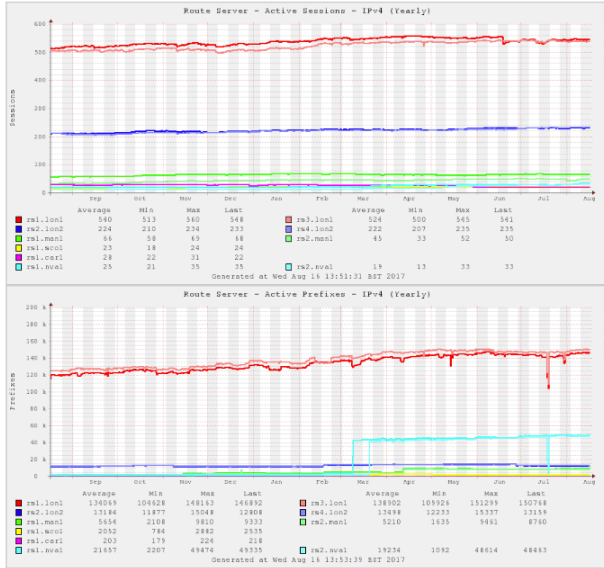
- Route-Servers have been at LINX since 2002/2003 using AS8714.
- Started with using Quagga/BGPd as most IXP's did.
- No filtering was done except for Bogons/Martians.
- Members used a community model to enforce policy.
- 2009-2010 Route-Servers became unstable due to scaling issues at around 300 peers. Other IXP's were seeing the same issues.
- 2010 LINX migrated to BIRD and Euro-IX Quagga fork

LINX Route-Servers

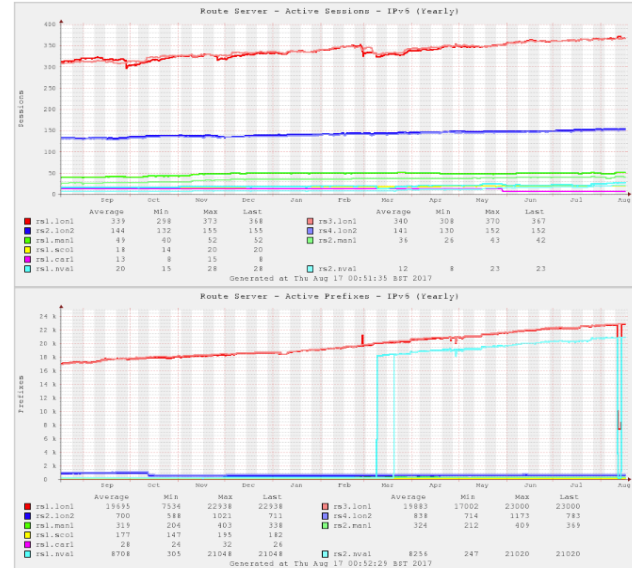
- Currently 10 route-servers deployed around LINX, IXManchester, IXCardiff, IXScotland & LINX-NoVa
- LAN's with multiples sites will have 2 route-servers for redundancy.
- Each Route-Server runs a separate instance for IPv4 and IPv6.
- Due to member feedback and a few incidents in 2016/2017 LINX decided to do something to avoid future prefix/AS issues.

LINX Route-Servers Stats

All LINX Route Servers - IPv4 Combined Statistics



All LINX Route Servers - IPv6 Combined Statistics



Prefix Validation & Criteria

- Part of a larger program to enhance route server platforms based on member feedback.
- Phased rollout of prefix validation:
 - Internal testing started, processes being defined
 - Systems changes to track per member settings
 - Phase1: Tagging of invalid prefixes with defined community
 - Phase2: Optional filtering of invalid prefixes at egress
- Validation criteria:
 - Prefix validation based on IRRDB entries
 - Origin ASN validation based on IRRDB entries

Prefix Validation & Criteria

Route-Server Prefix Validation Communities

8714:65011 = Prefix is present in an AS's announced AS/AS-SET

8714:65021 = Prefix is not present in an AS's announced AS/AS-SET

8714:65010 = Prefix has valid Origin AS in AS-SET

8714:65020 = Prefix has no valid Origin AS in AS-SET

8714:65030 = Prefix not validated

Challenges

- Testing other tools, eg. AROUTESEREVR, BGPQ3, IXPManager or create our own.
- Collecting IRR data, AS-SET's.
- Checking validity of the collected AS/AS-SET data.
- Keeping all collected data up to date with current live data.
- Automation and configuration generation with no GUI.
- Seeing what other IXP's are doing.
- Migrating scripts from Perl to Python/Jinja2.

Challenges

- Ensuring BIRD and Quagga work the same in filtering.
- Working on reducing the number of prefixes failing validation in testing before deployment goes ahead.
 - Fixing anomalies such as prefixes that should pass validation but fail.
 - Contacting 200+ members to confirm AS-SET details.
 - Training the NOC on IRR things.
 - Asking members to correct IRR/PeeringDB records.

Collecting the data

- Collected AS-SET names from PeeringDB API using a simple python script
- Not all LINX members have registered profiles on PeeringDB.
- For registered members peering with LINX route-servers most of them either shared incorrect AS-SET names or had no AS-SET name listed.
- Initially this was about 200+ members.

| | |
|-------------------|------|
| IRR Record | RADB |
| Route Server URL | |
| Peering Group URL | |

| | |
|-------------------|--------------------------|
| IRR Record | RADB::AS-STARHUBINTERNET |
| Route Server URL | |
| Peering Group URL | |

| | |
|-------------------|---|
| IRR Record | Superonline Tellcom Iletisim Hizmetleri |
| Route Server URL | |
| Peering Group URL | |

Collecting the Data

- The NOC opened 200+ support tickets asking members too either:
 - Create a PeeringDB profile for their organisation.
 - Correct the IRR record in their profile to obtain their AS-SET name.
 - NOC also checked to see if the AS-SET was valid.
- For members who did not respond we looked for their AS-SET's by querying either:
 - RADB
 - IRRExplorer
 - bgp.he.net

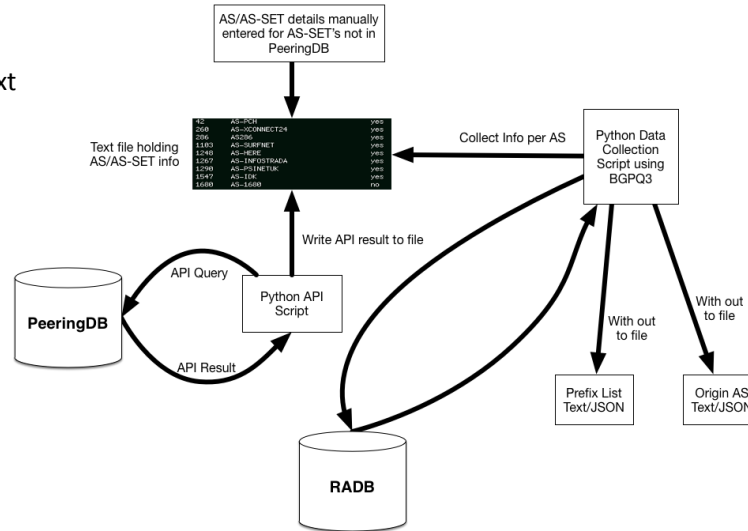
Collecting the Data

- Once AS-SET names are known IRR data is collected using BGPQ3. Data for each AS peering with a route-server is stored in both text and JSON files
- For unknown AS-SET's we just query the AS.
- At present data is only collected once per day in a central repository rather than on each route-server.
- Collection of data takes around 10-12 minutes to complete for 622 AS's.

Collecting the Data

Process is in 2 parts:

- Data collected from PeeringDB API or manually entered into text file.
- Text file is pulled for AS/AS-SET data and BGQ3 used to extract prefix/origin data from AS-SET.



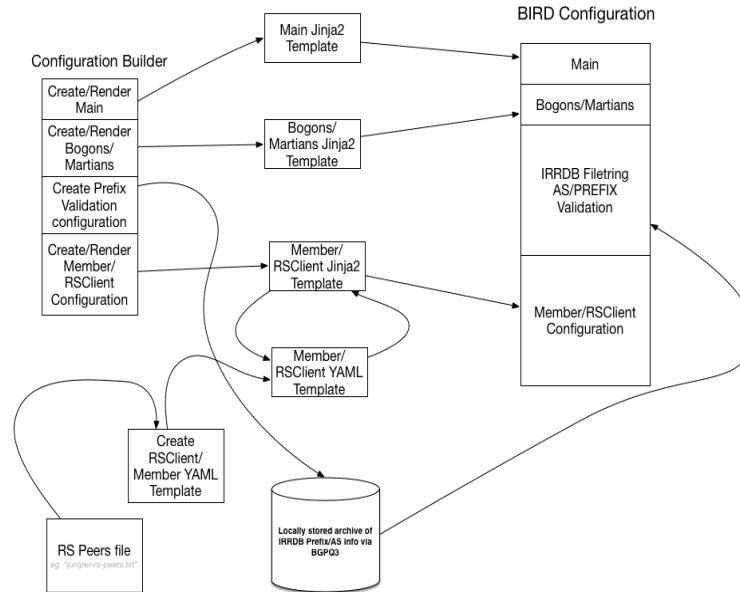
Progress

- Internal Testing has included lots of writing of scripting and data analysis of BGP tables.
- We are now collecting IRR data for all members who peer with all LINX Route-Servers using BGPQ3.
- LINX NOC contacted 200+ members whose AS-SET's were unknown to us or had either empty or incorrect IRR info in PeeringDB.
- Used NOC as some were US/Asia members.
- LINX hosted a Euro-IX Workshop in June 2017, ideas were exchanged with other IXP's.

Progress & Observations

- Initial testing for RS1.LON1 saw only some 40,000 prefixes passing validation from approx. 116,500 prefixes.
- More specifics of valid prefixes are tagged as invalid.
- There is still about 100 members who have no/incorrect AS-SET listed in PeeringDB.

Gathering Data into Configuration



Prefix Validation Test Results (LINX98/August 2017)

| | |
|-------------------------------------|---------|
| Total unique prefixes | 146,080 |
| Valid origin | 118,320 |
| Valid prefix | 94,946 |
| Failed origin | 38,837 |
| Failed prefix | 56,981 |
| More specifics of valid prefixes | 22,611 |
| Blocked prefixes | 58,949 |
| Valid prefixes announced | 87,131 |

Prefix Validation Test Results (Sept 2017)

| | <u>Quagga</u> | <u>BIRD</u> |
|--|---------------|-------------|
| Total unique prefixes for 518 peers | 144,701 | 144,924 |
| Valid origin | 118,541 | 148,720 |
| Valid prefix | 94,600 | 122,087 |
| Failed origin | 33,806 | 43,364 |
| Failed prefix | 55,411 | 70,049 |
| More specifics of valid prefixes | 34,577 | |
| Blocked prefixes | 56,508 | 25,171 |
| Valid prefixes announced | 88,131 | 119,753 |

Whats Next ?

- First deployment will be on the IXManchester Route-Servers with Phase 1 of tagging prefixes around late-September 2017.
- Test Results for Route-servers at IXManchester :

| | BIRD | QUAGGA |
|--|------|--------|
| Unique prefixes : | 8437 | 8443 |
| Valid Prefixes in AS/AS-SET is approx. : | 4029 | 4041 |
| Valid Origin for prefixes in AS/AS-SET is approx : | 4239 | 4240 |
| Prefixes valid in AS-SET and origin: | 3944 | 3948 |

Whats Next ?

- Deploy to other route-servers.
- Decide to continue onto Phase 2.
- Improve/Integrate RS automation into our current system.
- Continue to contact members whose AS-SET's are unknown and persist them to use PeeringDB.

Questions ?

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