

IXP Route Server Prefix Validation at LINX – Progress & Challenges

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Contents

- LINX Route-Server History
- Prefix Validation & Criteria
- Challenges
- Collecting the data
- Prefix Validation Test Results
- Progress
- Whats next ?

LINX Route-Server History

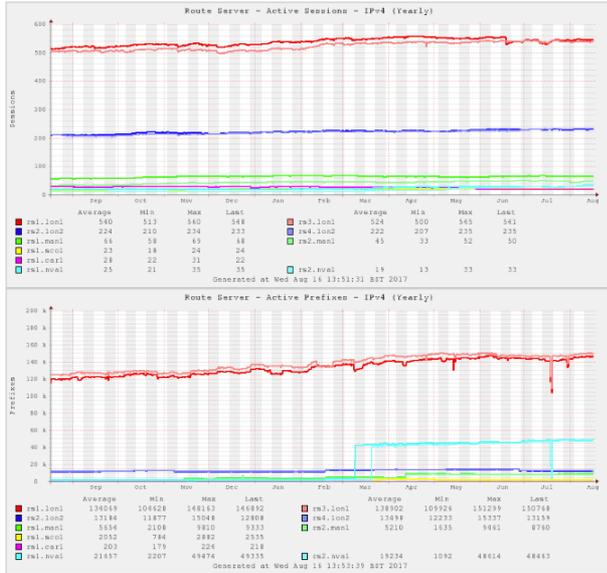
- Route-Servers have been at LINX since 2002/2003 using AS8714.
- Started with using Quagga/BGPd as most IXP's did.
- No filtering was done except for Bogons/Martians.
- Members used a community model to enforce policy.
- 2009-2010 Route-Servers became unstable due to scaling issues at around 300 peers. 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 Class URL	

IRR Record	RADB::AS-STARHUBINTERNET
Route Server URL	
Peering Class URL	

IRR Record	Superonline Tellcom Iletisim Hizmetleri
Route Server 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

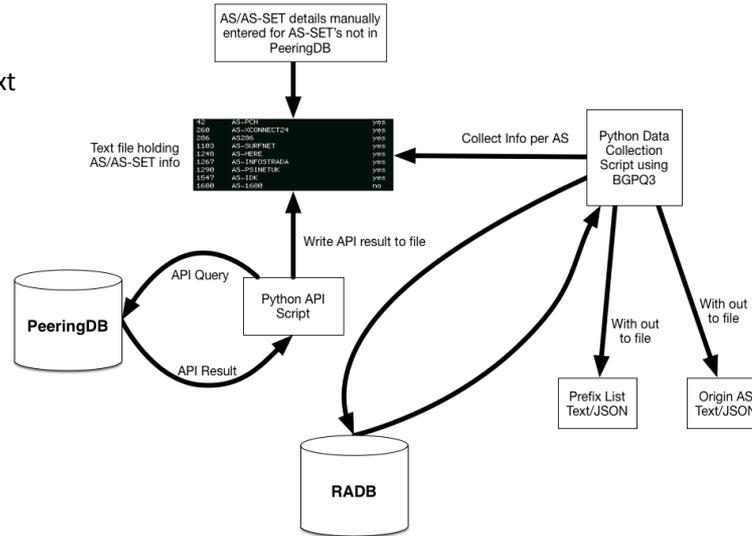
Collecting the Data

- 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.



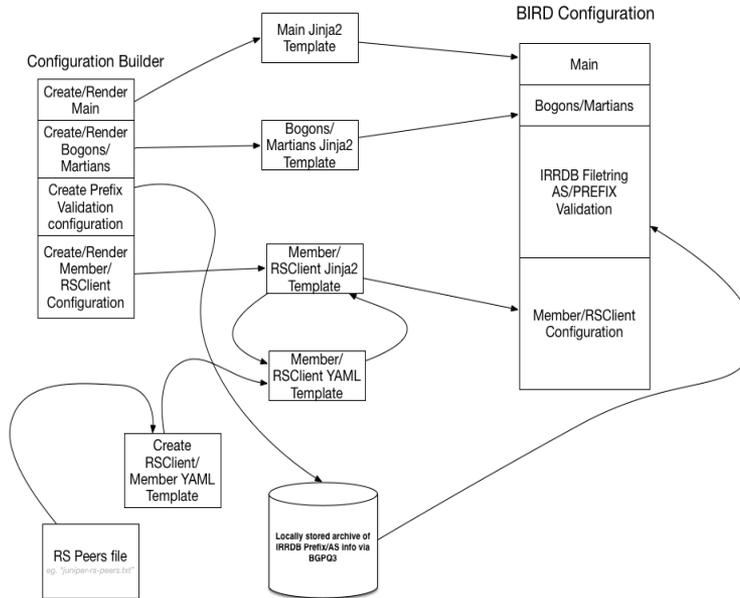
Progress

- 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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