RouteViews
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• Data archives began in 1997, 19TB (compressed) today.
• Currently run by the network engineering group at the University of Oregon
RouteViews Footprint

- Atlanta (digital realty)
- Chicago (equinix)
- Chile
- DC (eqix)
- Eugene (multihop)
- Johannesburg (jinx, napafrica)
- London (linx)
- Miami (flix)
- Nairobi (kixp)
- Palo Alto (paix)
- Perth (waix)
- Portland (nwax)
- Sao Paulo (ix.br x2)
- San Francisco (sfmix)
- Singapore (equinix sg)
- Serbia (sox)
- Sydney (equinix)
- Tokyo (dix-ie)
RouteViews Peering Stats

- Peering Sessions: 549
- Unique ASes: 221
- Detailed peering info can be found at http://www.routeviews.org/peers/peering-status.html
Infrastructure
Hardware
• Off the shelf server hardware
  • 8-16 Cores
  • 32G-64G Ram
  • 400GB-1TB SSD
• ASR 1004

Software
• OpenSource Software
  • Linux/Centos
• Routing Suites
  • Quagga – bgpd
  • FRR – bgpd
  • Gobgp
• IOS XE
Collector Operations

- Multi-Hop
  - Pros:
    - If you can reach the collector, you can peer.
  - Cons:
    - Multi-hop peerings are subject to the routing anomalies RouteViews seeks to observe and archive.

- IX
  - Pros:
    - Better positioned to address multi-hop issues.
    - Geographic diversity.
    - Peering diversity.
    - Scalable.
  - Cons:
    - More infrastructure to manage.
Collector Data

• Multi-Threaded Routing Toolkit (MRT)
  • MRT provides a standard for dumping routing information to a binary file.
  • RouteViews dumps consist of BGP RIBs and UPDATEs.
    • RIBs are dumped every 2 hours.
    • UPDATEs are dumped every 15 minutes.
Data Access

• MRT files are bzipped and rsynced back to http://archive.routeviews.org/ on a regular basis.
• They can be access via, http, ftp and rsync.
MRT Tools

• RIPE libbpgdump, UCLA BGP Parser, NTT bgpdump2, etc.
  • https://bitbucket.org/ripencc/bgpdump/wiki/Home
  • https://github.com/cawka/bgpparser
  • https://github.com/yasuhiro-ohara-ntt/bgpdump2
  • https://github.com/t2mune/mrtparse (python)
  • https://github.com/rfc1036/zebra-dump-parser (perl)
How can I access a collector

- telnet://route-views*.routeviews.org
  - No username necessary.
  - Users are able to run show commands, e.g. show ip bgp x.x.x.x/x.

Gotchas

- Why not SSH?!
  - RouteViews data is publicly available. We’ve got nothing to hide.
  - This would conflict with management of the box
- show ip route x.x.x.x next-hop is incorrect!
  - Remember, this is a collector. There’s no data-plane, thus no true FIB, only the default route seen by the kernel.
RouteViews Use Cases

• Operations
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• Network Operations
  • BGP is the backbone of the Global Routing System.
  • To ensure it's stability, the GRS needs to be constantly monitored.
  • RouteViews provides:
    • Command-Line/ Looking Glass
    • Prefix Visibility, Verify Convergence, Path Stability
    • Comparing Local/Regional/Global Views
    • Troubleshooting Reachability
RouteViews Use Cases

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    • Network Topology Monitoring
    • Route Leaks/Hi-Jacks (ex. https://cyclops.cs.ucla.edu)
    • Network Optimization
    • Growth, Aggregation, etc. In AS/V4/V6
    • Address Provenance
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- A great deal of research has been published using RouteViews data
  - Example 1
  - Example 2
Evolution of BGP Data Distribution

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  - File-Based storage, MRT data format
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• New feature will enable better monitoring and open up new avenues of research.
Next Steps: BMP and openBMP

• BGP Monitoring Protocol (BMP)
  • https://tools.ietf.org/html/rfc7854
  • Available now – Cisco, Juniper, (FRR coming soon)
• In addition to MRT attributes BMPs adds
  • Start, Stop, Peer Up, Peer Down
  • Collector Identification
  • Statistics
Next Steps: BMP and openBMP

• BMP is the IETF standard for BGP monitoring
• OpenBMPd is OpenSource (part of the Linux Foundation)
  • Consolidates peers/collectors
  • Splits collector, peer and update messages into separate streams
• Apache Kafka comprises the message bus for openbmp
  • Addresses producer/consumer problems
  • Proven to scale
  • Mature client API
    • Clients in 16 different programming languages.
OpenBMP Architecture
BMP Tools


• Languages:
  • [https://cwiki.apache.org/confluence/display/KAFKA/Clients](https://cwiki.apache.org/confluence/display/KAFKA/Clients)
Potential Issues

• OpenBMP Issues
  • Where to filter?
  • Where to select?
  • Which distribution pipeline works best.
  • Adj-RIB-in, Adj-RIB-out: no pre-policy/post-policy controls
  • Analytics/Notification tools still Scarce

• RouteViews Issues
  • Live-Data Peering/Data-Sharing Policy?
  • Live-Data Peer Selection—how many/which peers?
  • Cloud Development
  • Cloud Integration/Access — allowing remote sites to contribute