

# RouteViews

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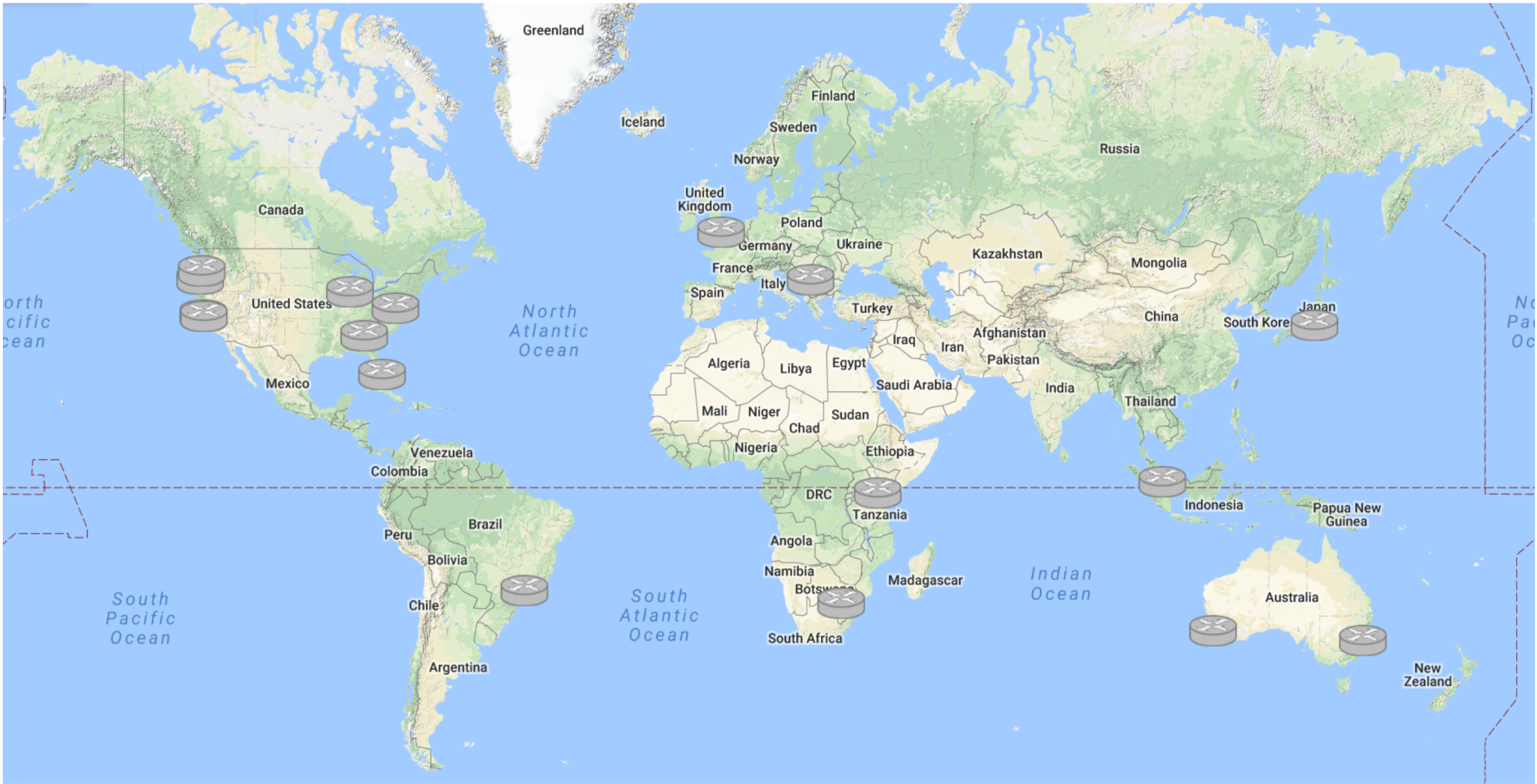
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- Started in 1995 at the University of Oregon, Advanced Network Technology Center (ANTC).
- Data archives began in 1997, 19TB (compressed) today.
- Currently run by the network engineering group at the University of Oregon

# RouteViews Footprint

- Atlanta (digital realty)
- Chicago (equinx)
- Chile
- DC (eqix)
- Eugene (multihop)
- Johannesburg (jinx, napafrika)
- 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
  - Gobgpd
- 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)
  - <https://tools.ietf.org/html/rfc6396>
  - 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 bziped and rsynced back to <http://archive.routeviews.org/> on a regular basis.
- They can be access via, http, ftp and rsync.

# MRT Tools

- RIPE libbgpdump, UCLA BGP Parser, NTT bgpdump2, etc.
  - <https://bitbucket.org/ripenc/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.

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  - 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

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    - Network Topology Monitoring
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    - Network Optimization
    - Growth, Aggregation, etc. In AS/V4/V6
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    - Address Provenance
  - A great deal of research has been published using RouteViews data
    - Example 1
    - Example 2
    - <http://www.routeviews.org/routeviews/index.php/papers/> for more

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  - Manual retrieval, sequencing, and consolidation
  - No post-processing
  - Centralized model

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  - RESTful interfaces
  - Real-time streaming telemetry
  - Middle-layer abstraction, multi-client access (facilitates analysis and services)
  - Flexible deployment model
- New feature will enable better monitoring and open up new avenues of research.

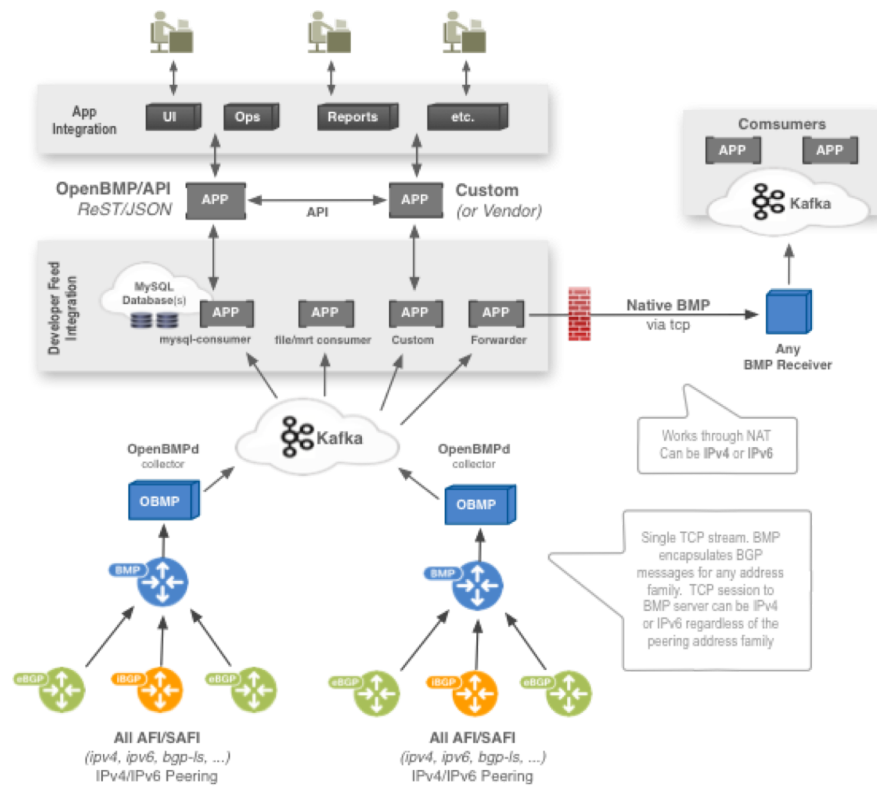
# Next Steps: BMP and openBMP

- 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

- <http://bgpstream.caida.org/>
- Languages:
  - <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