Enhancements to BMP implementation in FRRouting

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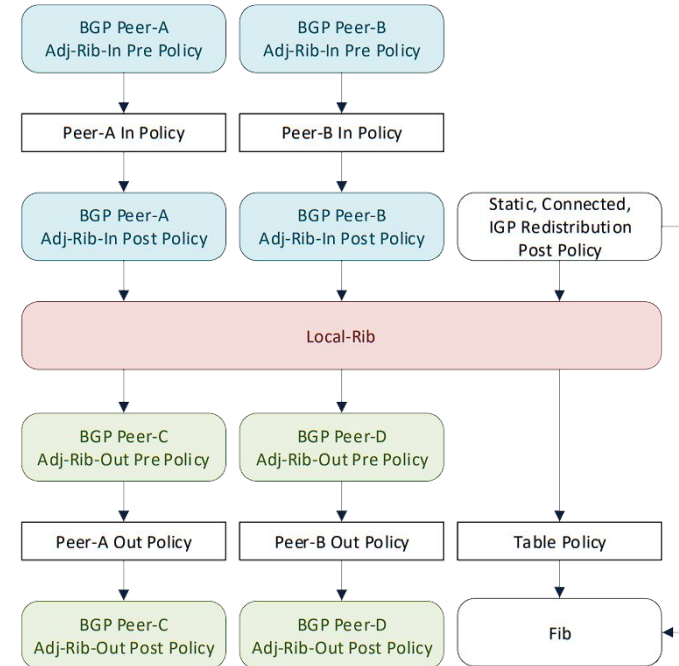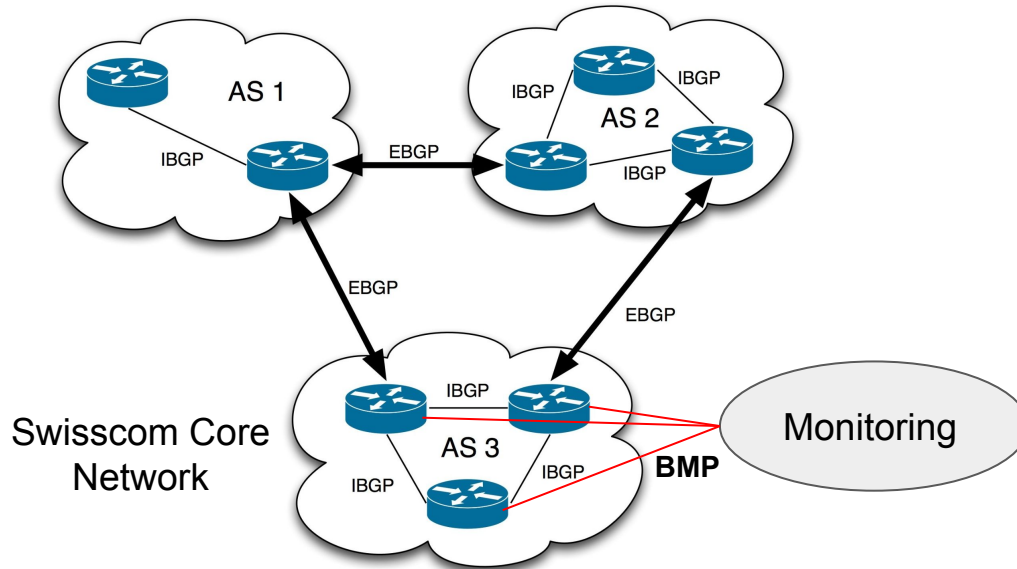
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Getting Visibility into BGP RIBs with BMP

Border Gateway Protocol (BGP) and BGP Monitoring Protocol (BMP)

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Internet Network

Getting Visibility into BGP RIBs with BMP
BGP Monitoring Protocol (BMP)

- Allows to monitor the BGP behaviour of a router
  - Received Paths (BMP Adj-RIB-In) -- RFC 7854
  - Best Path (BMP Loc-RIB) -- RFC 9069
  - Advertised Paths (BMP Adj-RIB-Out) -- RFC8671
  - Statistics
- FRRouting
  - Basic support of BMP
- Project
  - Support all RFC's
  - Support of ongoing GROW WG items
  - Wireshark dissectors
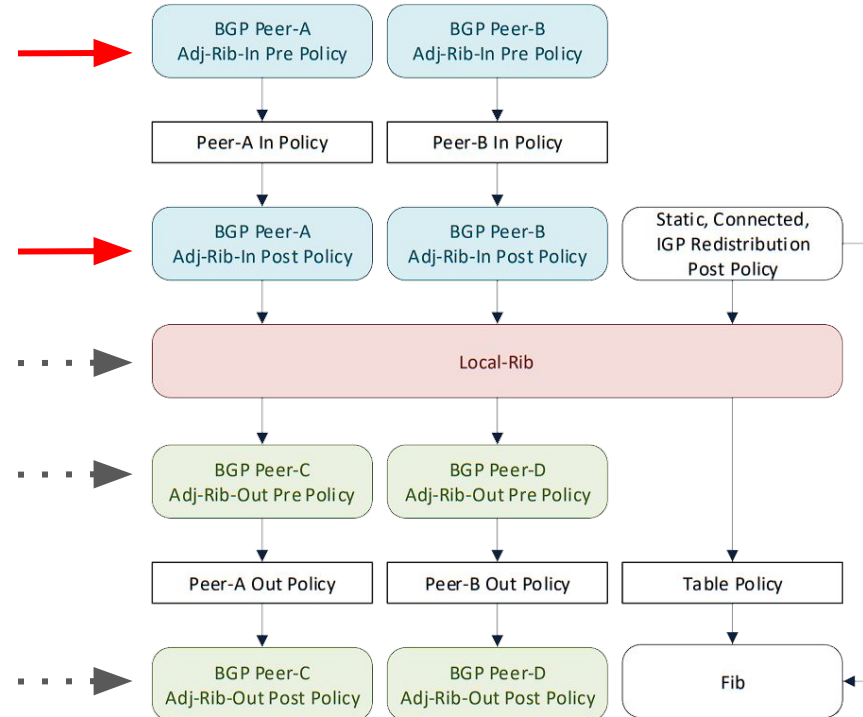
BMP in FRRouting

Initial status

- RFCs
  - Adj-RIB-In
    - No Add-Path Support
  - Loc-RIB
    - No Support
  - Adj-RIB-Out
    - No Support
- Drafts
  - BMPv4
    - No Support
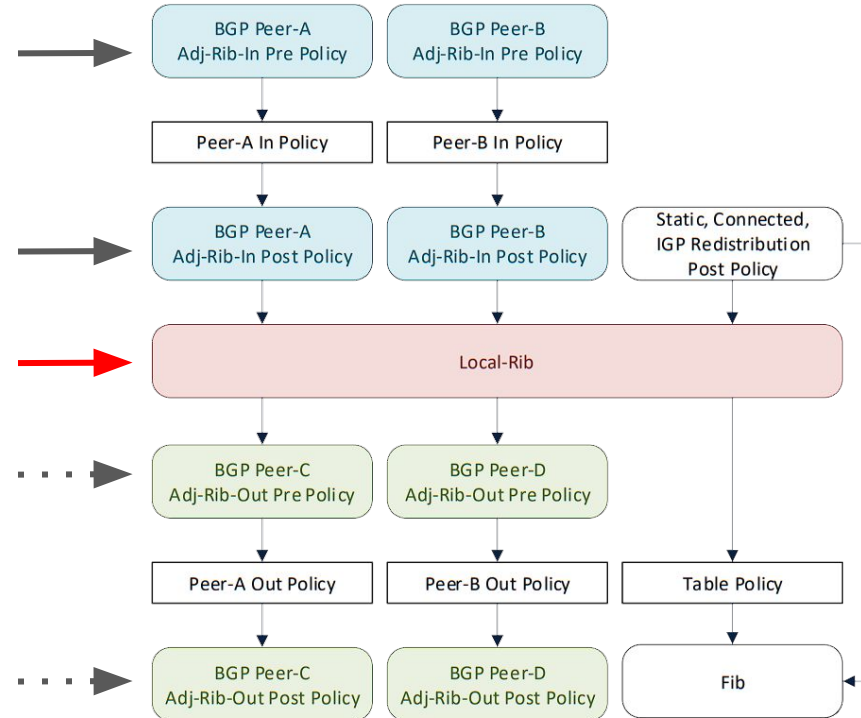 - Path Marking
    - No Support
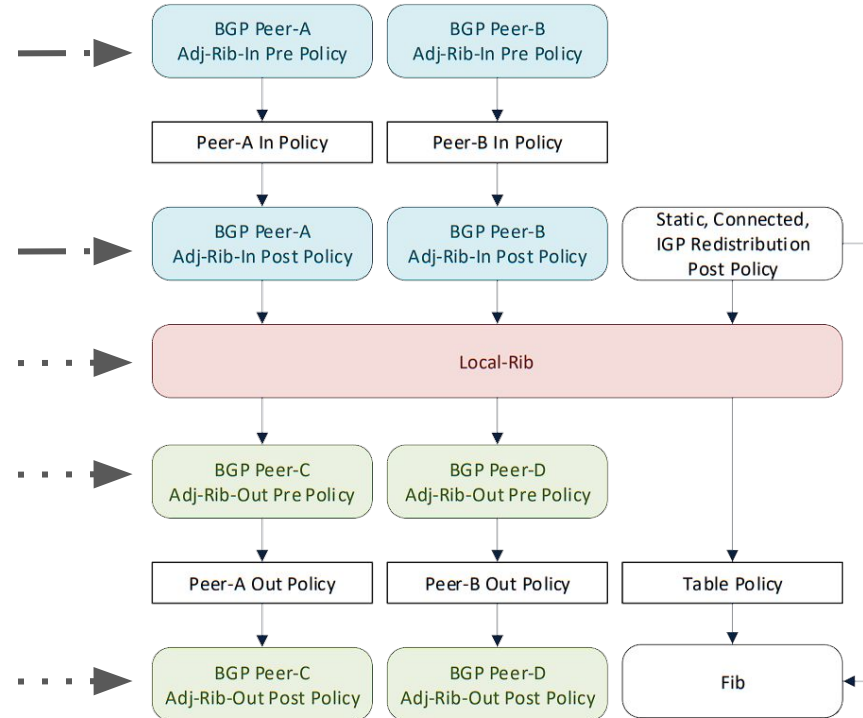
BMP Adj-RIB-In -- RFC 7854

- Added Add-Path support
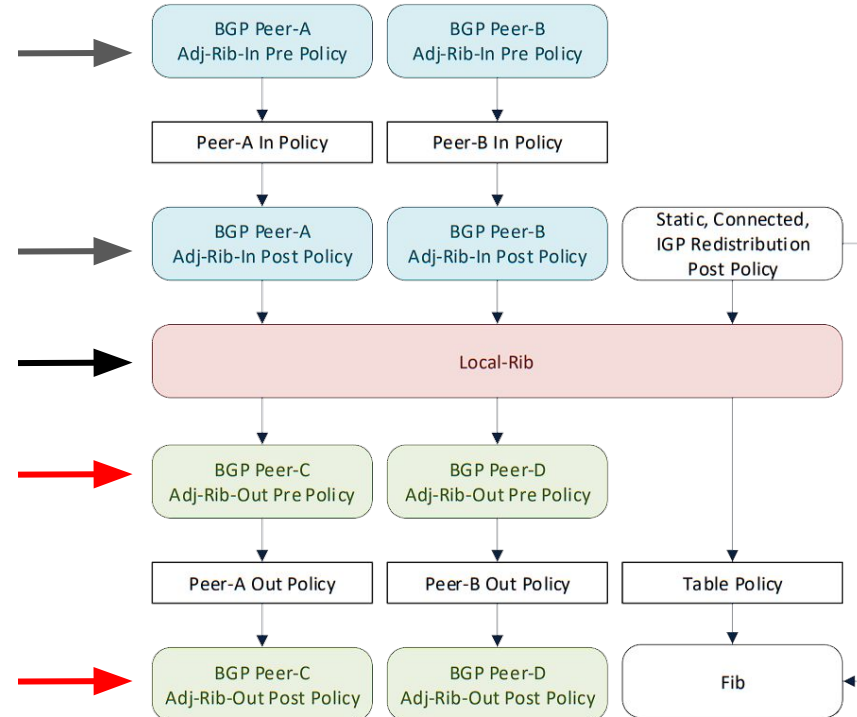- Add-Path RX ID in Adj-In NLRI
- VRF Identification

Best Path (BMP Loc-RIB) -- RFC 9069

- Now supported
- Supports BGP Multipath
- Supports VRF identification

Advertised Paths (BMP Adj-RIB-Out) -- RFC8671

- Now supported
  - Supports BGP Add-Path
  - Supports VRF identification

BMP v4 TLV

draft-ietf-grow-bmp-tlv

- Added TLV for BGP PDUs in Route Monitoring Messages

- Added Group TLV code, not leveraged by a feature

- Added Capability TLV code, not leveraged by a feature

```
▼ BGP Monitoring Protocol, Type Route Monitoring
     Version: 4
     Length: 195
     Type: Route Monitoring (0)
   ▶ Per Peer Header
   ▼ BMPv4 TLV: BGP_PDU
       Type: BGP_PDU (4)
       Length: 122
       Index: 0
     ▼ Value: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff 00 7a 02 00 00 00 63 40 …
       ▼ Border Gateway Protocol - UPDATE Message
           Marker: ffffffffffffffffffffffffffffffff
           Length: 122
           Type: UPDATE Message (2)
           Withdrawn Routes Length: 0
           Total Path Attribute Length: 99
         ▶ Path attributes
   ▶ BMPv4 TLV: VRF_TABLE_NAME
   ▶ BMPv4 TLV: BGP_PATH_STATUS
```

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BMP Path Marking
Path status and Reason codes

- Added most status and all reason codes

- Missing

  - Invalid ROV

  - Backup

  - Best-external

```
▼ BMPv4 TLV: BGP_PATH_STATUS
    Type: BGP_PATH_STATUS (9)
    Length: 4
    Index: 0
  ▼ .... .... .... .... .... 0000 1010 = Status: 0x0a, best, primary
      .... .... ...0 = invalid: Not set
      .... .... .1. = best: Set
      .... .... 0.. = non_selected: Not set
      .... ...1 ... = primary: Set
      .... ..0. ... = backup: Not set
      .... .0.. ... = non_installed: Not set
      .... 0... ... = best_external: Not set
      ...0 .... ... = addpath: Not set
      ..0. .... ... = filtered_in: Not set
      .0.. .... ... = filtered_out: Not set
      0... .... ... = invalid_rov: Not set
```

Wireshark

- BMP v4 TLV https://github.com/network-analytics/wireshark/tree/draft-ietf-grow-bmp-tlv

- BMP Path-Marking

  https://github.com/network-analytics/wireshark/tree/draft-cppy-grow-bmp-path-marking-tlv

References
FRRouting Links

- BMP Local-RIB Pull Request https://github.com/FRRouting/frr/pull/11800

- BMP Adj-RIB-Out https://github.com/mxyns/frr/tree/bmp-riboutmon

- BMP Multi-Path https://github.com/mxyns/frr/tree/bmp-multipath

- BMP v4 TLV https://github.com/mxyns/frr/tree/bmp-draft-tlv

- BMP Path-Marking https://github.com/mxyns/frr/tree/bmp-draft-path-marking

- BMP Loc-RIB Peer https://github.com/mxyns/frr/tree/bmp-draft-francois-grow-bmp-loc-peer

- BMP Fix Per-Peer Header Ports https://github.com/FRRouting/frr/pull/13198

Thanks !

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Best Path (BMP Loc-RIB) -- RFC 9069

- Collection issue
  - Received Add-Path IDs are unique for a BGP peer
  - RFC9069 does **not** provide the Peer Address

- Possible solutions
  - Regenerate Path-IDs unique for BMP but lose correlation with BGP
  - Provide Peer Address with draft-francois-grow-bmp-loc-peer

Advertised Paths (BMP Adj-RIB-Out) -- RFC8671

Implementation challenges

- FRRouting does not retain RIB-out Pre-Policy paths

    ⇒

- Some statistics are not possible without relevant resource impact