Operational Requirements for Enhanced BGP Error Handling in BGP-4

draft-shakir-idr-ops-reqs-for-bgp-error-handling

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Problem Statement.

- NOTIFICATION based on errors in BGP-4 UPDATE messages cause disproportionate failures in Service Provider Networks.

**iBGP**
- Multiple AFIs (services) affected.
- Discrete routing topologies affected (e.g. different L3VPNs)

**eBGP**
- Paths to all NLRI affected despite error in single UPDATE.
Avoiding sending NOTIFICATION.

- Operator’s deployments mean compromises to protocol correctness resulting in invalid routing may be acceptable.
  - Particularly with multiple AFI – some carrying many discrete topologies.

- Requirement is to avoid sending NOTIFICATION where possible.
  - Do not send for erroneous UPDATEs (and hence avoid teardown).
  - Session failure affects all NLRI, where negative impact affects a subset.
  - Required for both eBGP and iBGP.
Recover RIB Consistency.

• **Inconsistent RIB (by treating UPDATE as withdraw) compromises protocol correctness.**
  – The resulting RIB inconsistency may have resulted in forwarding loops or black-holes.
  – BGP speaker is aware of this case, if using “treat-as-withdraw”.

• **Whilst such inconsistencies are acceptable, they are clearly sub-optimal.**
  – Mechanism required to recover consistency of the RIB, and remove invalid routing.

• **Whole RIB or specific RIB subset?**
  – ROUTE REFRESH is inefficient where a BGP speaker knows the NLRI transmitted in the invalid UPDATE.
  – Requirement for mechanism(s) to request specific RIB subsets – reduce control-plane load.
  – Allow for such requests to be automatically or manually generated.
Session Reset whilst Maintaining RIB/FIB.

- **Currently NOTIFICATION** and session reset is the reaction to an error.
  - Deals with resetting state that may have resulted in erroneous UPDATE.
  - Major operational issue is the forwarding disruption caused.

- **Benefits of resetting all session state** whilst allowing forwarding to continue.
  - Identical recovery mechanism as is implemented currently, with lower impact to operation of the network.
• **Additional complexity in the protocol requires further operational visibility.**
  - Let our NOCs know about BGP-4 errors, and respond.
  - Previously NOTIFICATION/tear-down was very visible due to forwarding outages.

• **Enhance monitoring toolset.**
  - Capability to transmit error information between BGP neighbours.
  - Further visibility to determine where errors have occurred, and what they are.
Caveats of Requirements.

- React to errors (and recover) within available control-plane resource.
  - Ensure that we do not reach looped scenarios where automatic recovery is available.

- Exponential (?) Back-Off for RIB recovery requests.
  - Don’t overload neighbour and/or local BGP speaker with recovery requests.

- Avoid constant session restarts.
  - Identify a point at which a session is “bad” if using automatic mechanisms to recover.
• Draft has been presented and discussed at a number of operational forums.
  – NANOG, UKNOF, LINX.
  – Well supported as a set of requirements for operators (see GROW and IDR mailing lists).

• Would like WG adoption.
  – Provides a framework to which IDR/GROW work items can be tied.
  – Intends to avoid “partial solutions” that do not meet the toolset required by operators.

• Thoughts as to which WG is most suitable?