Boosting the BGP Convergence in SDXes in SWIFT

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1. Motivation

- BGP converges slowly [1], for 2 reasons:
  - Learning about a failure is slow, especially for remote failures
  - Updating thousands of forwarding entries takes time
- Existing fast reroute solutions only partially solve the problem
  - Using hardware-based signals
  - Using a hierarchical forwarding table
  - But they only work upon local outages
- SWIFT [2] is a new fast reroute framework that works upon local and remote outages
- We show that deploying SWIFT at SDXes can boost the convergence time of hundreds of networks
  - SDX and SWIFT architectures are compatible with each other

2. SWIFT in a nutshell

- SWIFT uses inference techniques to quickly locate a failure
  - Using a subset of the control-plane messages
- SWIFT matches on preprovisioned dataplane tags to quickly reroute traffic
  - Using a 2-stage forwarding table

3. Integrating SWIFT into SDXes

- Both SWIFT and the SDX rely on a 2-stage forwarding table
  - The first stage groups packets using a tag
  - The second stage forwards packets according to their tags’ values
- Yet, SWIFT and the SDX group packets differently
  - SWIFT groups packets based on the resources they are sharing (AS path)
  - SDX groups packets based on their forwarding equivalence class
- We show that SWIFT and the SDX can share the same data-plane tag

4. Demonstration

- We modified the current implementation of iSDX to support SWIFT
  - Source code available at https://github.com/nsg-ethz/iSDX
- We built the network depicted on the right with Mininet [4]
  - We configured AS4 to advertise 5k, 10k, 50k, 100k, 250 and 500k prefixes
  - and made sure AS1 prefers AS2 to reach AS4
- We simulate a remote failure on the link between AS2 and AS4

Without SWIFT, BGP takes 90 seconds to converge with 500k prefixes

With SWIFT, BGP always converges within 1.4 seconds
- Irrespective of the number of prefixes affected by the failure

5. Conclusion

1. SWIFT is a fast reroute framework that works upon remote outages
2. SDX platforms converge slowly upon remote outages
3. SWIFT can be deployed at SDX with a simple software update
4. We deployed SWIFT in an SDX and showed that the convergence time is always within 1.4s

6. References