Evaluating the Effect of Centralization on Routing Convergence on a Hybrid BGP-SDN Emulation Framework

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Motivation

➢ BGP routing has problems
  ▷ Can take several minutes to converge
  ▷ Does not support QoS
  ▷ Is complex to manage

➢ Can SDN help improve BGP?
  ▷ SDN centralization at the inter-domain level [1]
  ▷ Software Defined Internet Exchanges (SDX) [2]

➢ BUT: No hybrid BGP-SDN emulator to test ideas!

Objectives

➢ Develop hybrid BGP-SDN emulation framework
  ▷ Use real router software
  ▷ Emulate multiple Autonomous Systems (AS)
  ▷ Simplify experiment management

➢ Evaluate effect of SDN centralization on BGP convergence time
  ▷ Design centralized multi-AS controller [1]
  ▷ Run over emulation framework

Features

➢ Based on Mininet, Quagga, POX, and ExaBGP
➢ Automated configuration generation
➢ Experiment management over computing nodes
➢ Live visualization of routing changes
➢ Log collection and analysis
➢ Packet loss measurements between end-points

Live Visualization

Use-case: effect of SDN centralization on BGP convergence time

Multi-AS cluster controller

➢ Centralized controller speaks BGP and OpenFlow
➢ Transparent to the BGP world
➢ Hybrid path vector / link state inter-domain routing
➢ Route advertisements delayed for stability

➢ Insight: SDN can help reduce BGP convergence time in certain cases

Download at: https://bitbucket.org/gaadrian/siren

References
