Architecture of Traffic Engineering module for reconfigurable data-plane routers

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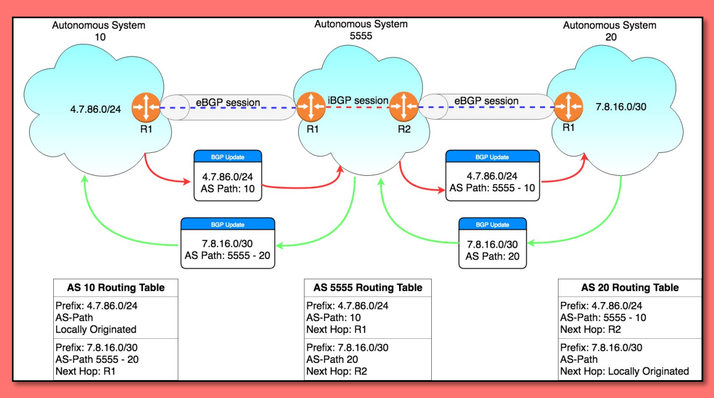
OBJECTIVE

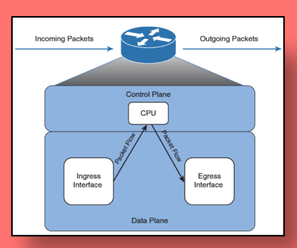
Perform application specific traffic engineering by introducing Software Defined Network elements into the BGP routing model over Transit Networks.

Research Introduction

- BGP routers deliver traffic between Autonomous Systems by querying a forwarding table, which is populated by the Border Gateway Protocol routing information base.



- Policy/Filter-based routing
  - Overrides BGP peering agreements
  - Static Configuration
  - Compromise performance



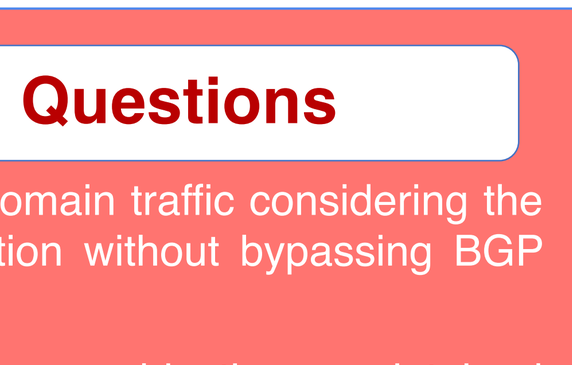
- QoS Policy Propagation through BGP
  - Traffic classification based on network prefix

Research Questions

- How can we route inter-domain traffic considering the application layer information without bypassing BGP routing policies?
- How are target performance objectives maintained between Autonomous Systems?
  - Volume of traffic exchanged
  - Network failures

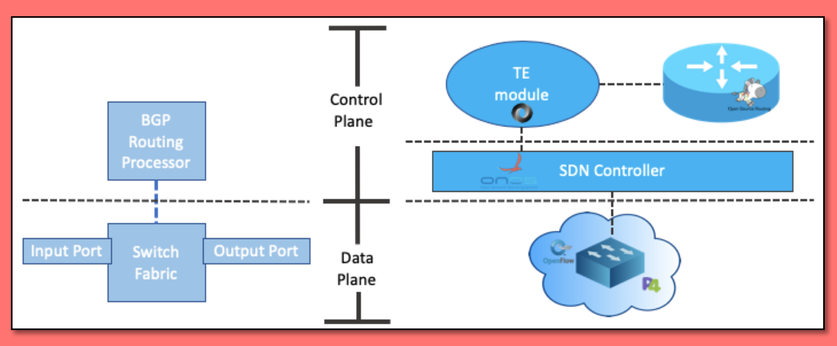
TE Module Organization

- Management Interface
  - Route visualization
  - Route removal
- BGP Interface
  - Feeds BGP Route Information
  - Dynamic BGP peering updates
- Path Compiler
  - Push intents to the SDN Controller
  - Aware of network topology changes

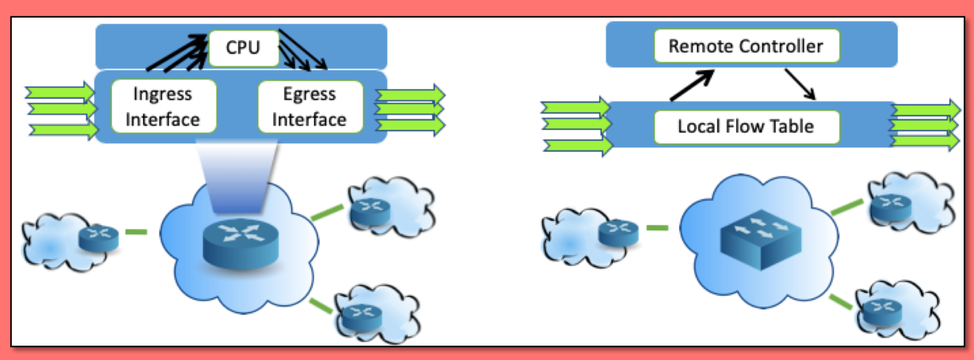


Architecture Overview

- Application-aware packet Forwarding process
  - Traffic Engineering Module
  - Programmable Data-plane
  - External BGP Routing Function

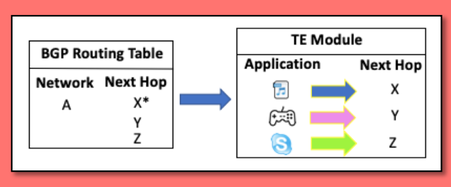


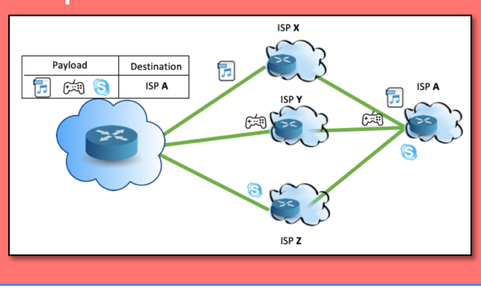
- Packet Forwarding criteria persists in the data plane
  - Queries against the control plane
    - First inbound packet of interest traffic



Traffic Engineering Module

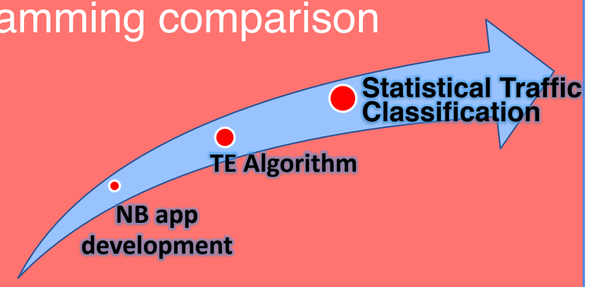
- Learn available routes from BGP speaker
- Match routes with applications port number
- Push preferred routes into the packet switch





Work in Progress

- Dynamic data-plane programming comparison
  - OpenFlow
  - P4
- Network failures response
  - Link failure
  - Peer failure



Acknowledgements

This work was supported by JSPS KAKENHI Grant Numbers JP16H02802, and JP26330145.

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