

TECH CLUB 2017
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NETWORKS

BUILD MORE THAN A NETWORK.



Leveraging High-Frequency Analytics in a WAN SDN Controller

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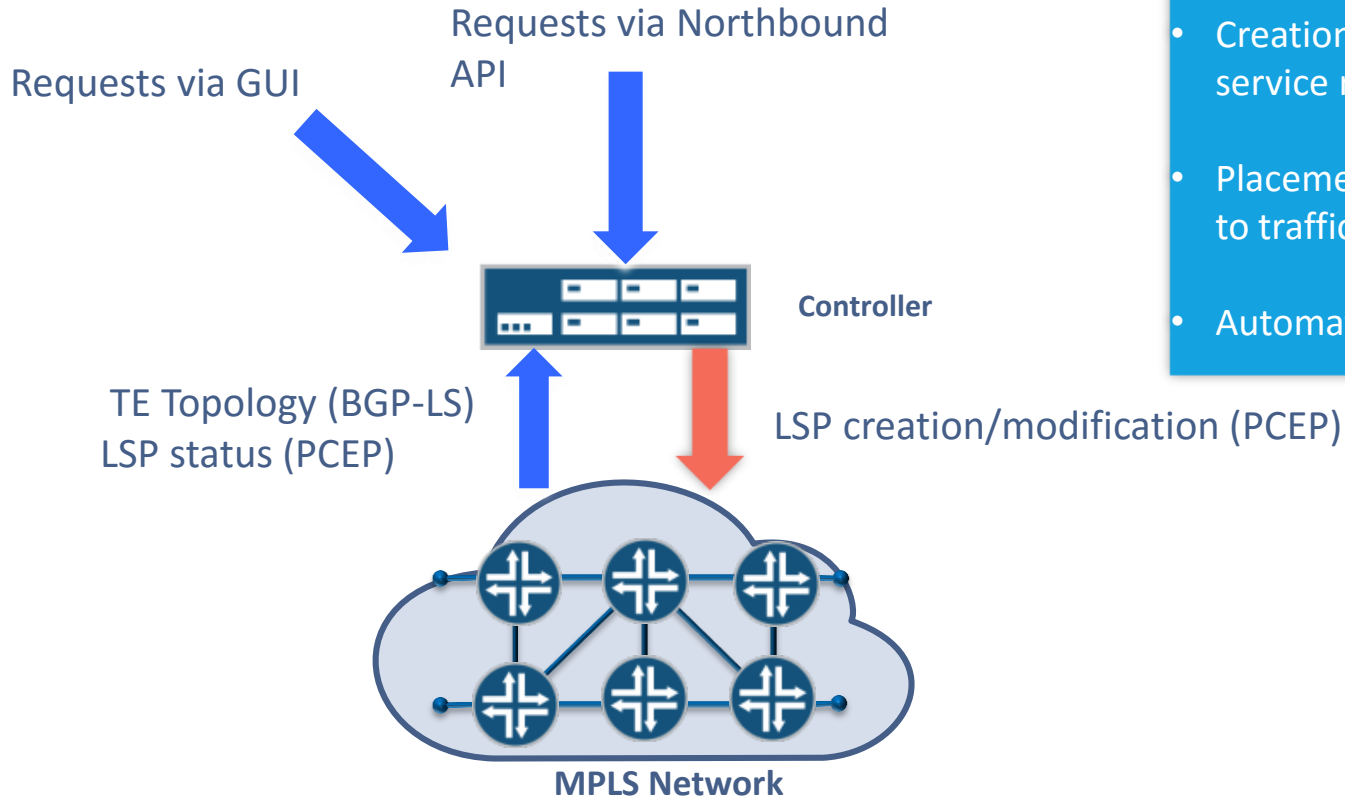
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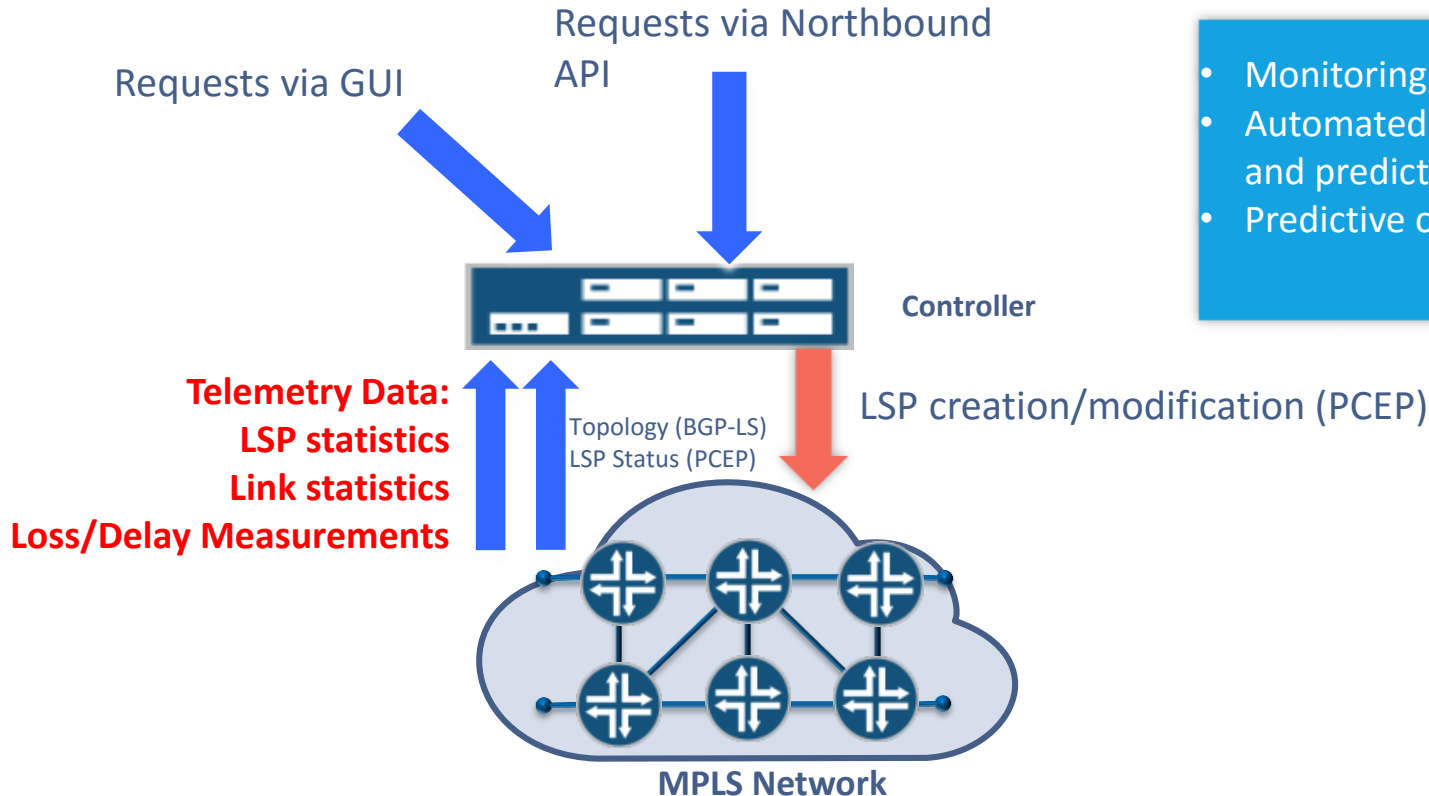
1. are not being made based upon reliance of timeframes or specifics outlined in the SOPD; and
2. would not be affected if Juniper Networks delays or never introduces the future products, features or enhancements.

SDN WAN Controller Concept



- Creation of LSPs according to service requirements.
- Placement of LSP paths according to traffic demands.
- Automation of network operations.

SDN WAN Controller with Analytics

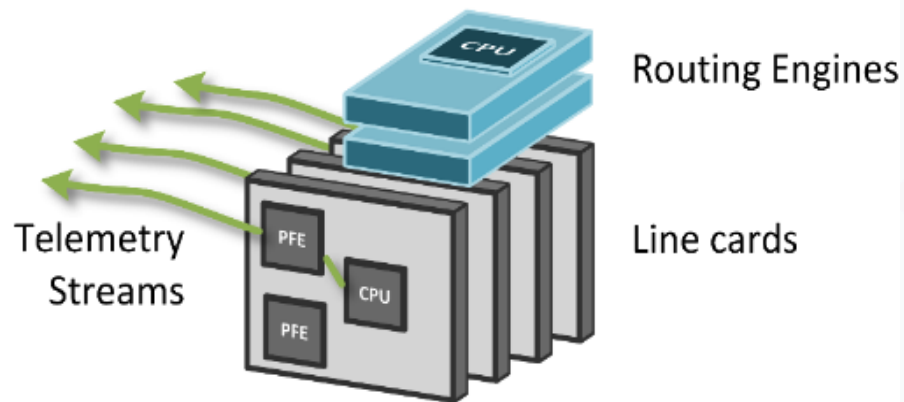


- Monitoring/Visualization
- Automated actions, based on current and predictive analytics
- Predictive capacity planning

Network to Controller statistics reporting methods

- PCEP
 - PCEP extensions to report LSP-related parameters
 - draft-gandhi-pce-pm-04.txt
- SNMP
 - Has large overhead, but is the only option for some legacy routers
- Syslog
- Streaming Telemetry...

Streaming Telemetry



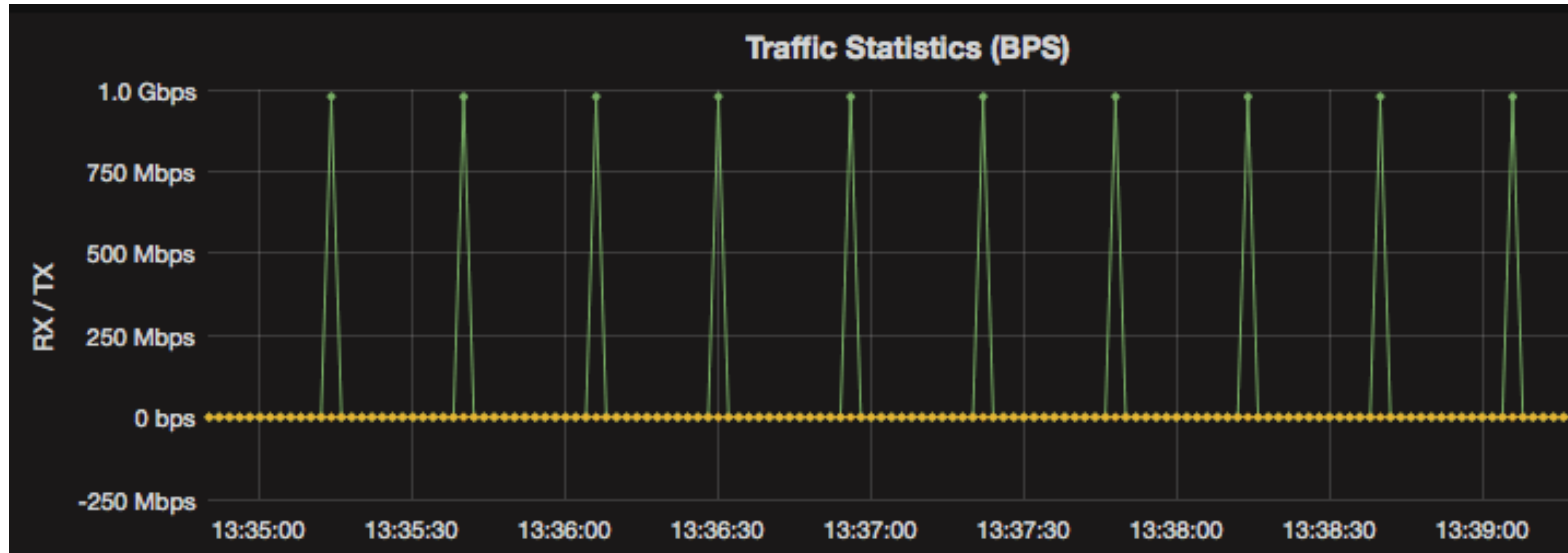
Traditionally, SNMP used to retrieve statistics

- Quite heavy-weight: poll/respond paradigm, via control processor on network device

Streaming Telemetry

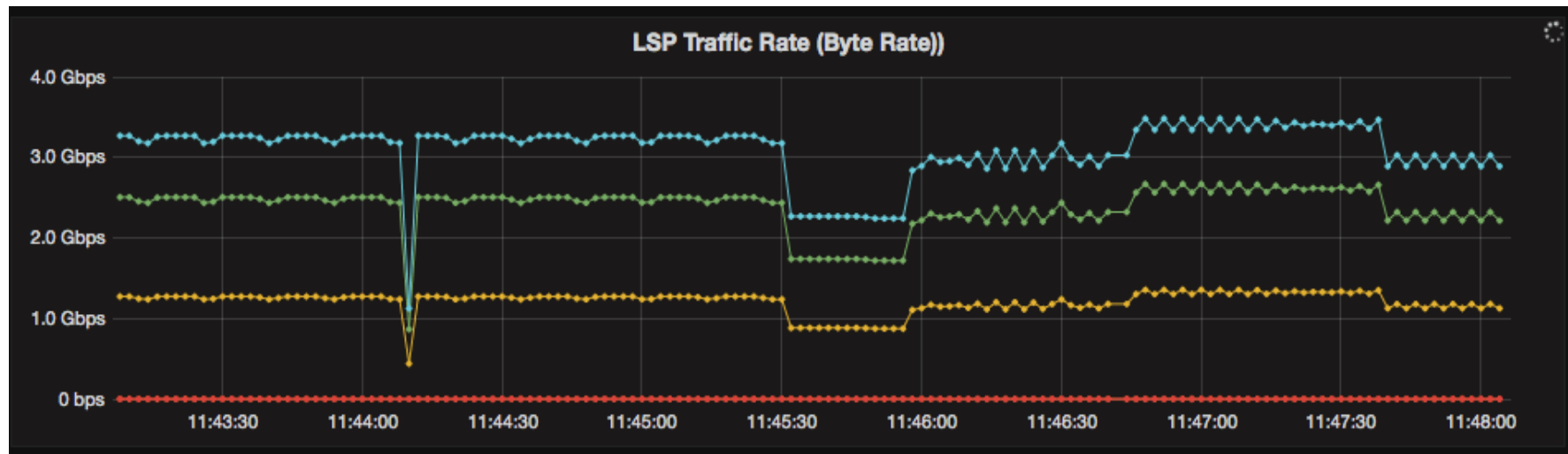
- Statistics sent at high frequency (e.g. every few seconds) without any polling needed from collector
- Statistics collected on line-cards (e.g. interface/queue stats, LSP stats) sent directly from line-cards to collector
 - no bottleneck from control processor

High-Resolution Interface Statistics



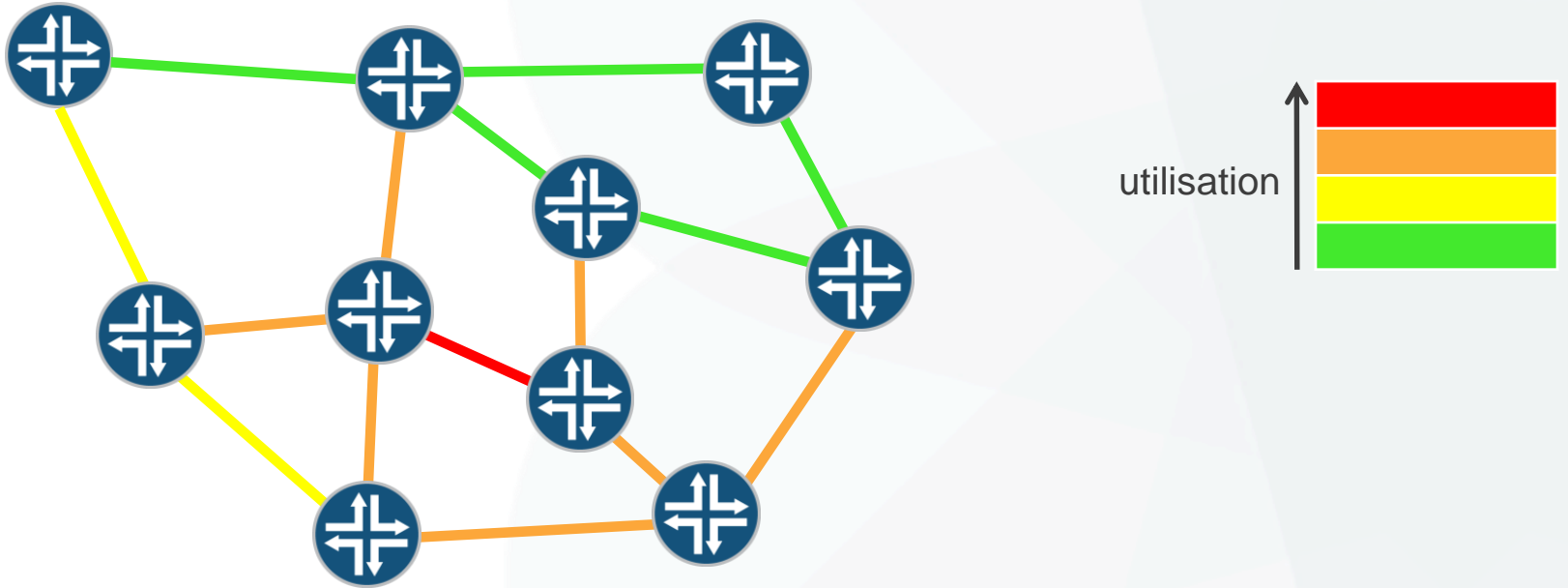
↔
30 seconds

High-Resolution LSP Statistics



↔
30 seconds

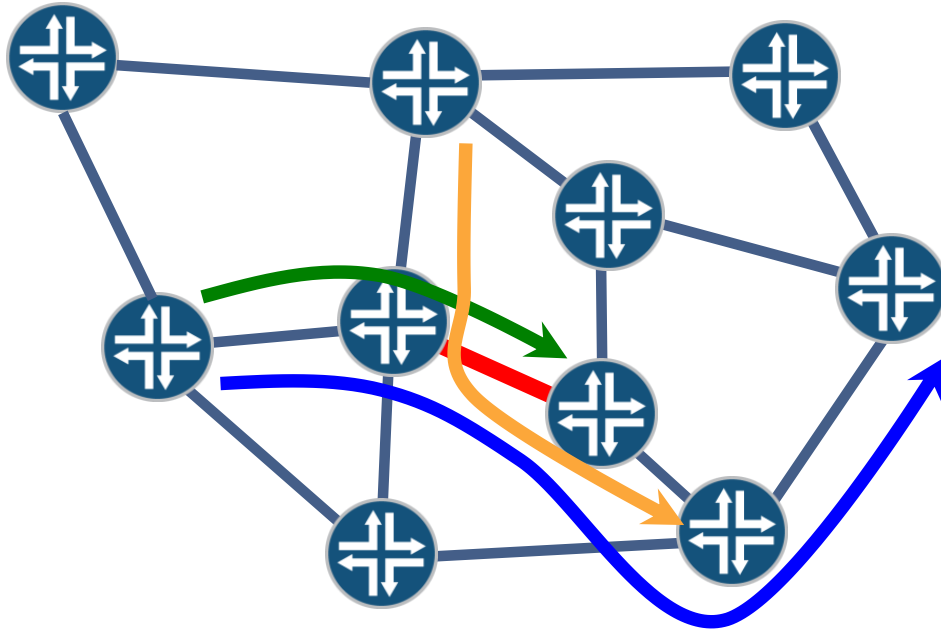
Link utilisation heatmap



Per-LSP statistics



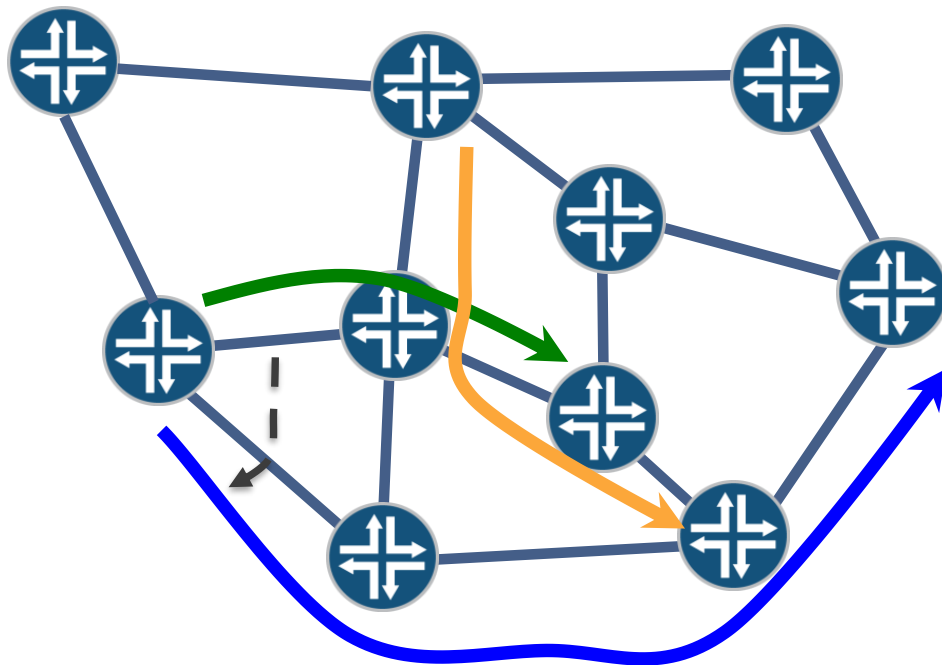
Automated actions, based on link utilisation (1)



Red link is currently experiencing high utilisation

Or is *anticipated* to experience high utilisation in near future

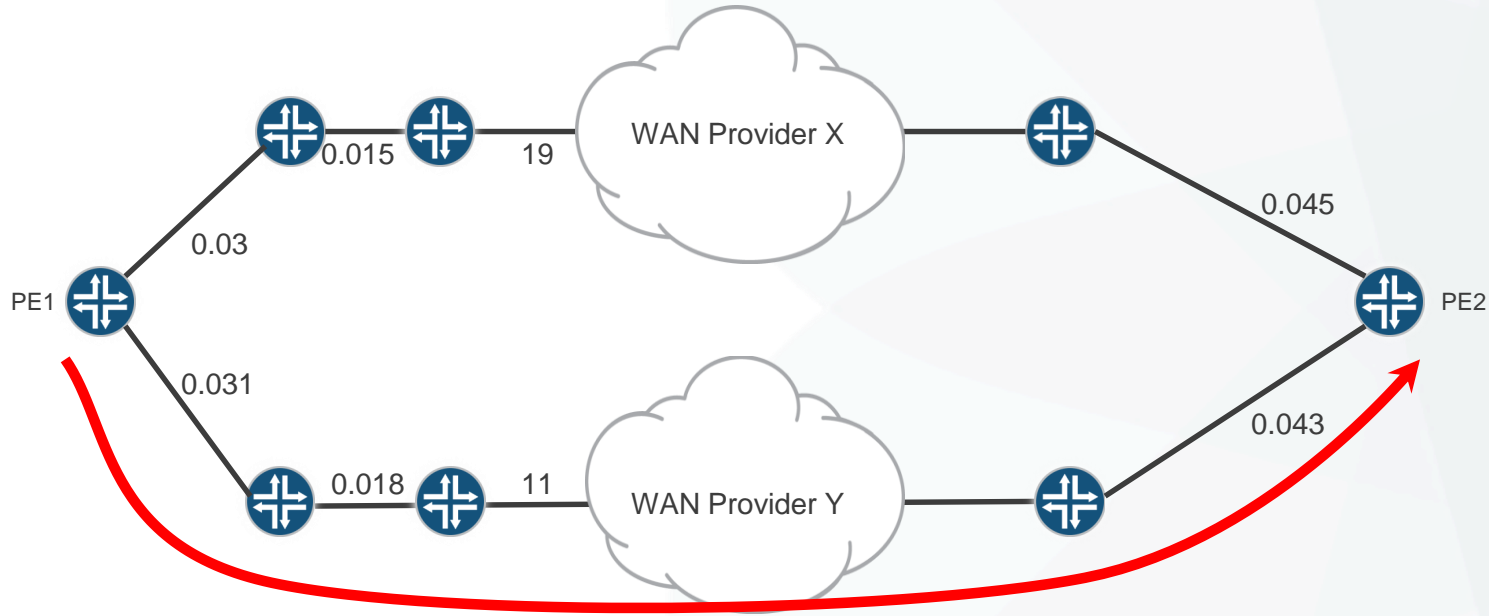
Automated actions, based on link utilisation (2)



Controller knows how much traffic is travelling on each LSP

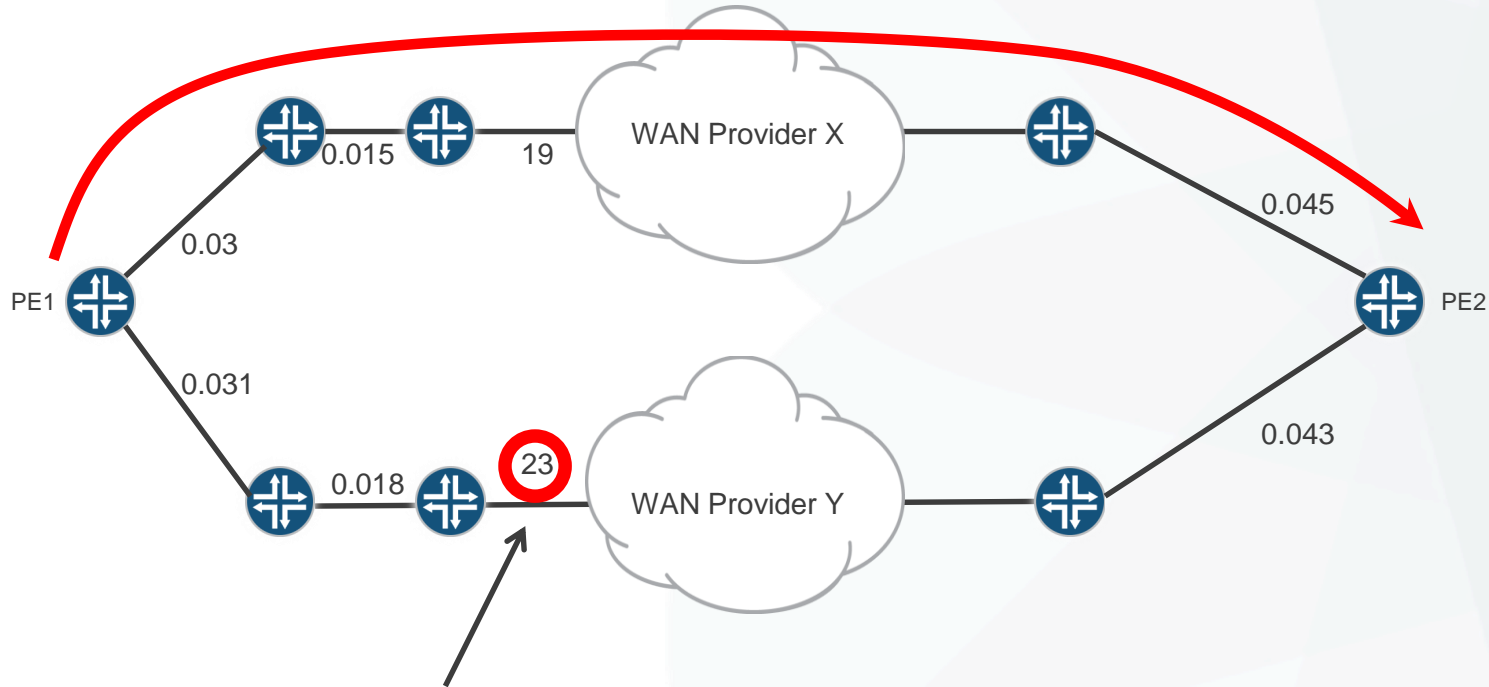
So can automatically move away some LSPs from congested link

Automated actions, based on delay measurements (1)



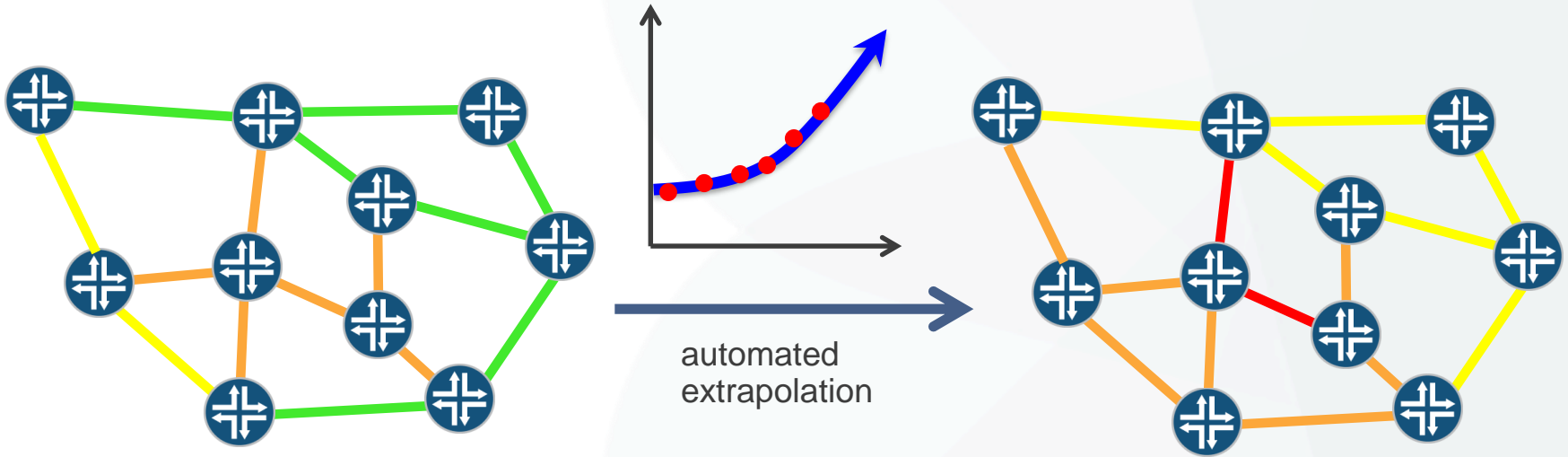
Link delay values are measured by routers and reported to Controller periodically. Red LSP carries delay-sensitive traffic so Controller uses delay as the cost function when computing the path.

Automated actions, based on delay measurements (2)



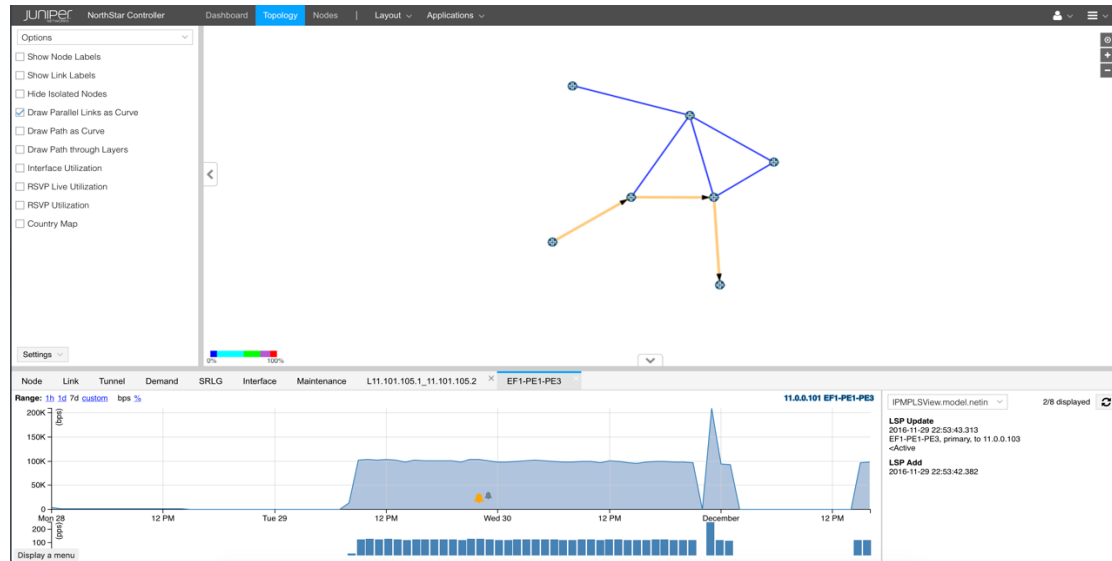
Step change in delay via Provider Y (due to reroute or protection event within Provider Y)
Controller reroutes red LSP via Provider X.

Predictive Capacity Planning



NorthStar Analytics live demo

- Come and see live demos of our NorthStar WAN SDN Controller at the Juniper exhibition booth

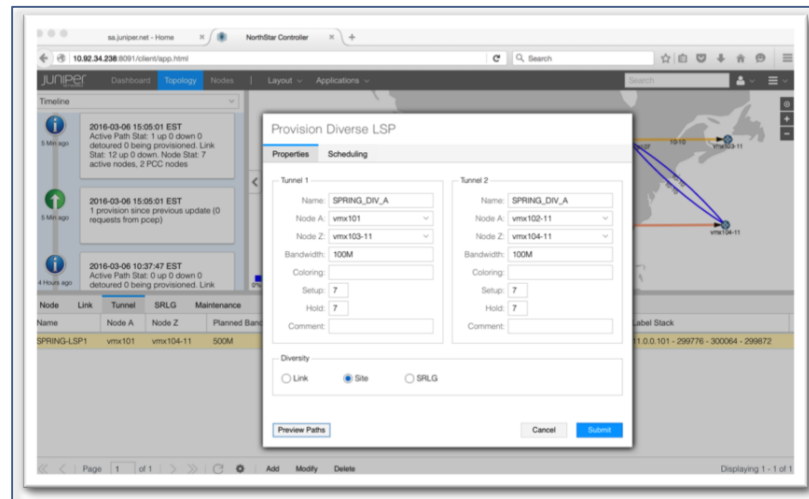
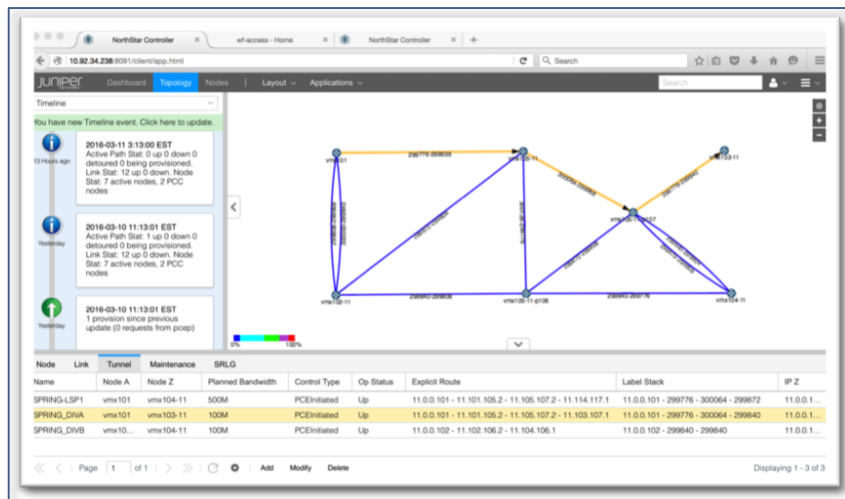


NorthStar and Segment Routing/SPRING

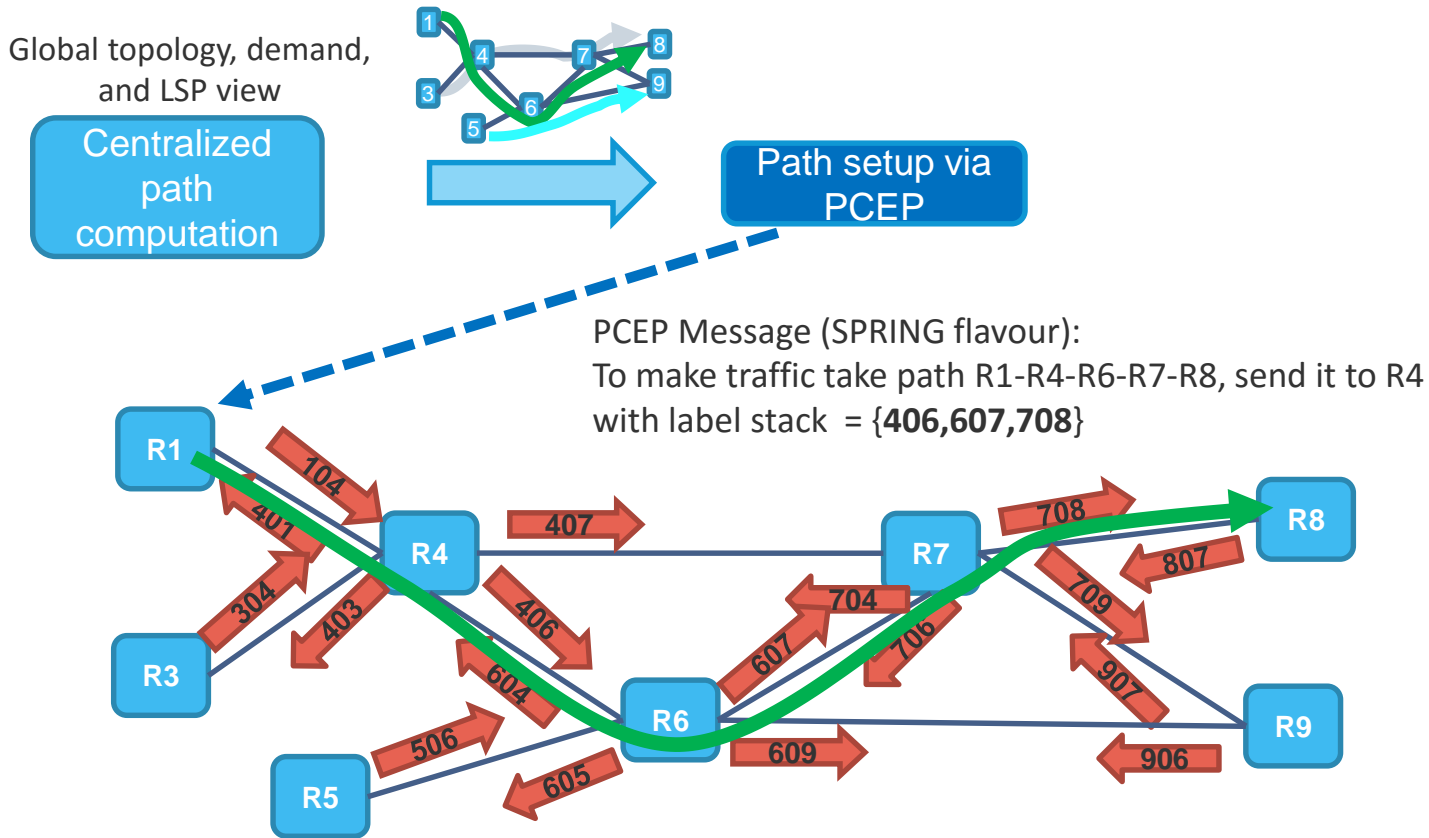


NorthStar 3.0: SEGMENT ROUTING (SPRING) TE OVERVIEW

- Prefix & node SID learning via ISIS or BGP-LS
- PCEP extensions for Segment Routing
 - draft-ietf-pce-segment-routing
- SR-TE LSP creation, visualization & optimization



SR/Spring and PCEP



NorthStar 3.0 SR/Spring-TE

- NorthStar supports similar use-cases to RSVP-TE including:
 - Constraint-based path computation, including admin-groups (colours), bandwidth etc
 - Path diversity
 - link diverse, node diverse, SRLG diverse
 - Maintenance Mode
 - Bandwidth Calendaring
 - NorthStar keeps track of BW allocation, since there is no bandwidth reservation at network layer
 - Full REST API support

NorthStar 3.0 SR/Spring-TE

- Path can be defined as a set of strict hops defined by adjacency labels
- Also can define a path with loose hops, or a mixture of strict and loose hops
 - Loose hops are defined by Node-SIDs: NorthStar is aware of these, so can include them in the label stack

See our NorthStar Spring/SR-TE demo on the Juniper booth

Juniper Networks NorthStar Controller Dashboard Topology Nodes Layout Applications

Options Show Node Labels

Provision Diverse LSP

Properties Scheduling

Tunnel 1

Name: diverse-1a

Node A: vmx101

Node Z: vmx103

IP Z:

Provisioning Type: SR

Planned Bandwidth: 50m

Coloring:

Setup: 7

Hold: 7

Comment:

Tunnel 2

Name: diverse-1b

Node A: vmx102

Node Z: vmx104

IP Z:

Provisioning Type: SR

Planned Bandwidth: 50m

Coloring:

Setup: 7

Hold: 7

Comment:

Diversity

☐ Link ☒ Site ☐ SRLG

Preview Paths Cancel Submit

Settings 0% 100%

