



Cisco 思科演示云dCloud系列培训

如何使用dCloud 来做思科广域网自动化引擎 (WAE)7.0, 分段路由, XTC, 以及网络服务编排(NSO)的演示

dCloud – 思科的演示云



**思科演示云将其产品解决方案架构的
软件和硬件虚拟化，让思科与合作伙
伴的销售团队在任何地方，任何时间
都可以做产品演示。**

什么是Cisco dCloud?

服务

思科, 合作伙伴, 客户

自服务, Managed Service

Instant(实时), Scheduled(预约), 企划书

Demo, Lab, 沙盘, POV, Events

可定制化, 保持, 共享

创建content

平台

5 个数据中心

云, 基础架构, 自动化, 用户 UI

管理员Admin, 开发工具

Cisco on Cisco

内容

超过250 offerings, 所有的架构

预配置有文档提供

虚拟机, 硬件, 用户设备, licensing

认证, 可信

可选的终端

Operations 和技术支持

24x5* chat, email, web, phone

Self help, event support, metrics

Cisco dCloud – 使用小技巧



- **请随时给我们反馈**
- **共享给你的客户**
- 定制化保存
- 和技术支持联系来Extend sessions
- 超过5个sessions可使用Event scheduling
- 多种 RDP连接的方式
- 将本地应用和云服务加入demo
- 使用多个数据中心来 capacity/redundancy

dCloud 满足你的要求

<http://dcloud.cisco.com>

As Easy As...



- 思科员工和合作伙伴
- 完整脚本
- 定制化, 本地化, 共享
- 可选的终端 (BYOD)
- 可使用你自己的设备



dCloud
Data Centers

US East
US West
EMEAR
APJ
GC

As Complete As...



- Virtual desktops
- Local clients on laptops
- Room based configuration
- 可添加你本地的服务器
- 多种使用案例

思科广域网自动化引擎 (WAE)7.0, 分段路由, XTC, 以及网络服务编排(NSO)的演示

■ 现在就让我们运营商的专家 **Jianteng**一起开始吧:

- 转去dcloud.cisco.com
- 使用CCO帐户SSO登陆
- 选择大中华区GC数据中心
- 马上就跟随**Jianteng**开始学习吧, 你可以随时提问题



Network Automation & Programmability

SR, PCE (XTC, WAE), NSO

Jianteng Gao

GVE SP

11th December 2018

Agenda

- Segment Routing RFC8402
- SR-PCE (SDN Policy Compute Engine)
- Wan Automation Engine (SDN Network Planning)
- Network Services Orchestrator

Segment Routing - RFC8402

<https://tools.ietf.org/html/rfc8402>

Operators' Desire from the Network

- Simplicity

- Less numbers of protocols to operate & troubleshoot

- Less numbers of protocol interactions to deal with

- Deliver automated FRR for any topology

- Scale

- Avoid thousands of labels in LDP database

- Avoid thousands of MPLS Traffic Engineering LSP's in the network

- Avoid thousands of tunnels to configure

- Leverage all services supported over MPLS today (L3/L2 VPN, TE, IPv6)

- Requires evolution and not revolution

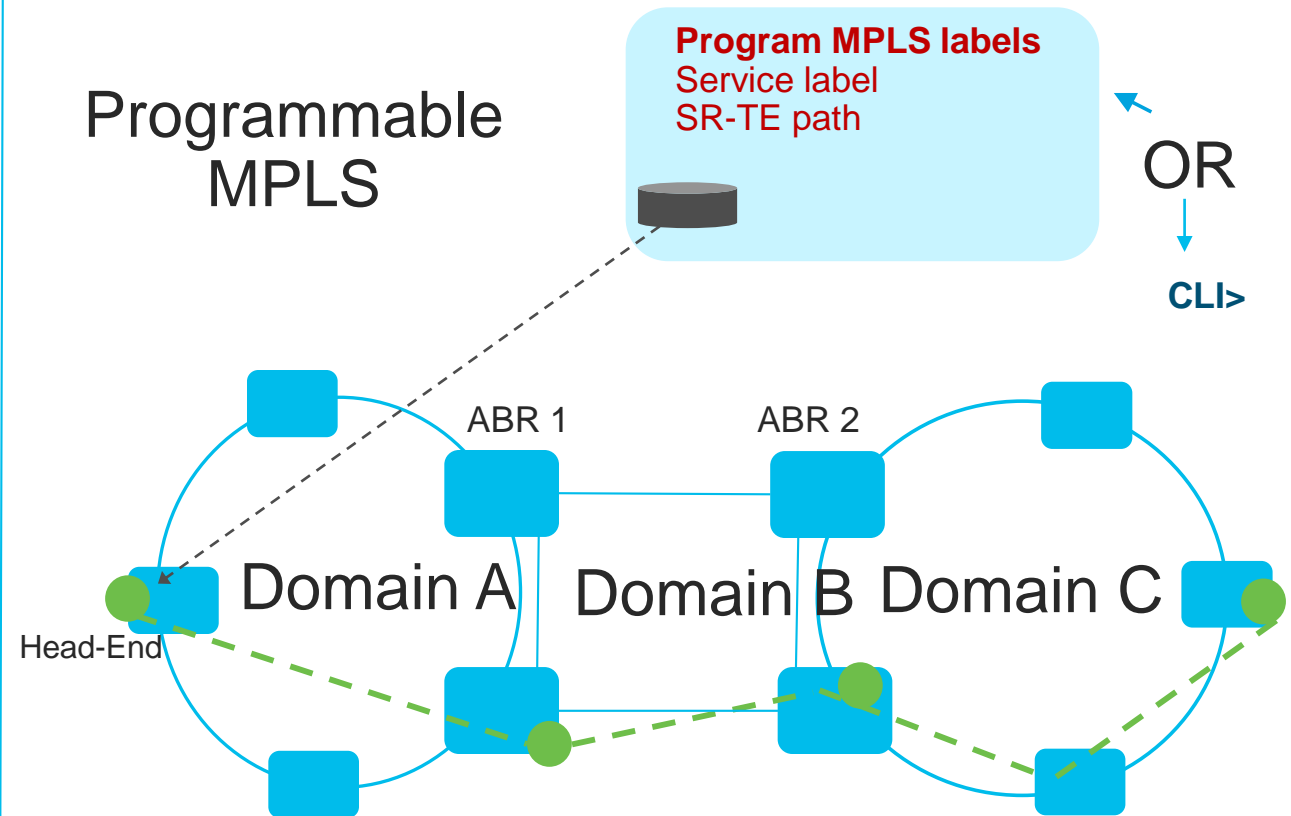
- Bring the network closer to the applications

- IPv6 data plane a must, and should share parity with MPLS



Why Segment Routing?

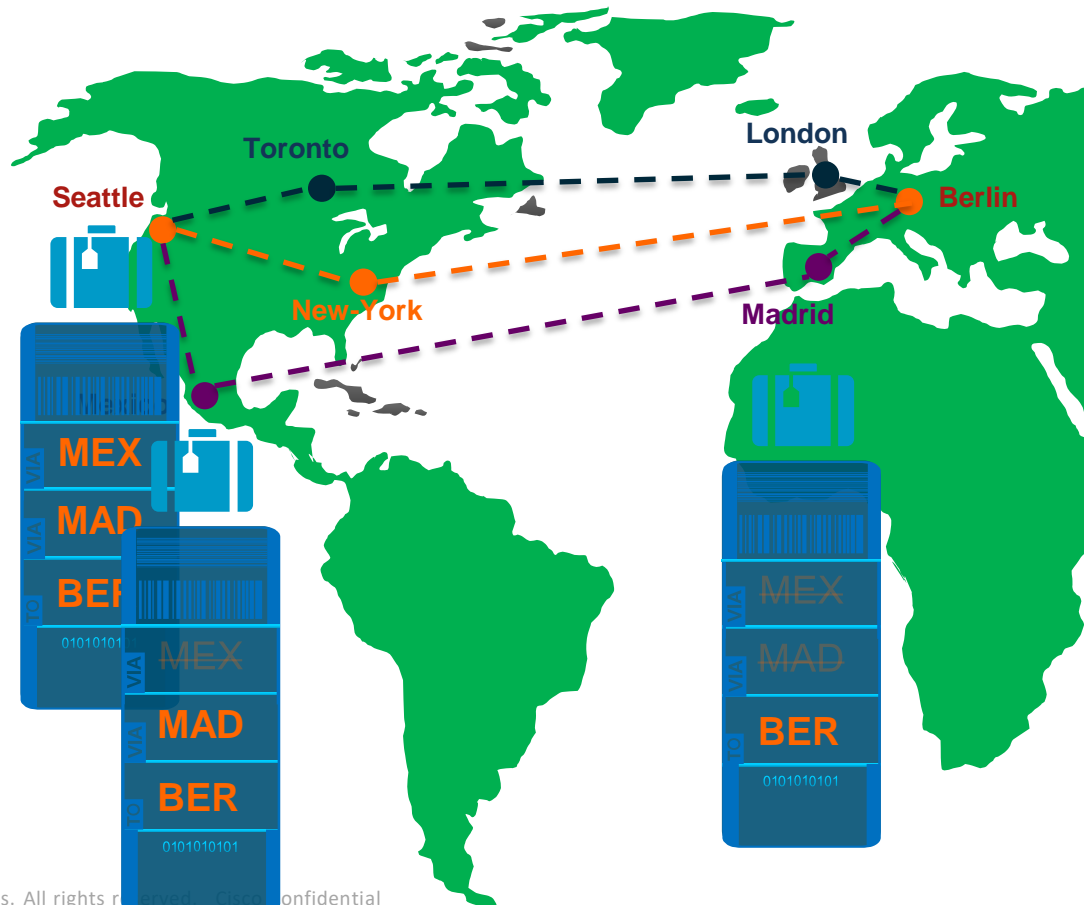
- More Control and Programmable
 - Segment Routing Labels are assigned manually or programmed
- Simplifies the Control plane stack.
 - Extension to IGP's (ISIS , OSPF)
- Seamless migration
 - SR mapping server
- Traffic Engineering: SR-TE
 - Single touch point at the headend
 - Flexibility to optimize traffic load
 - Control the path at very granular level



Segment Routing

Evolve MPLS with Segment Routing

Segment Routing



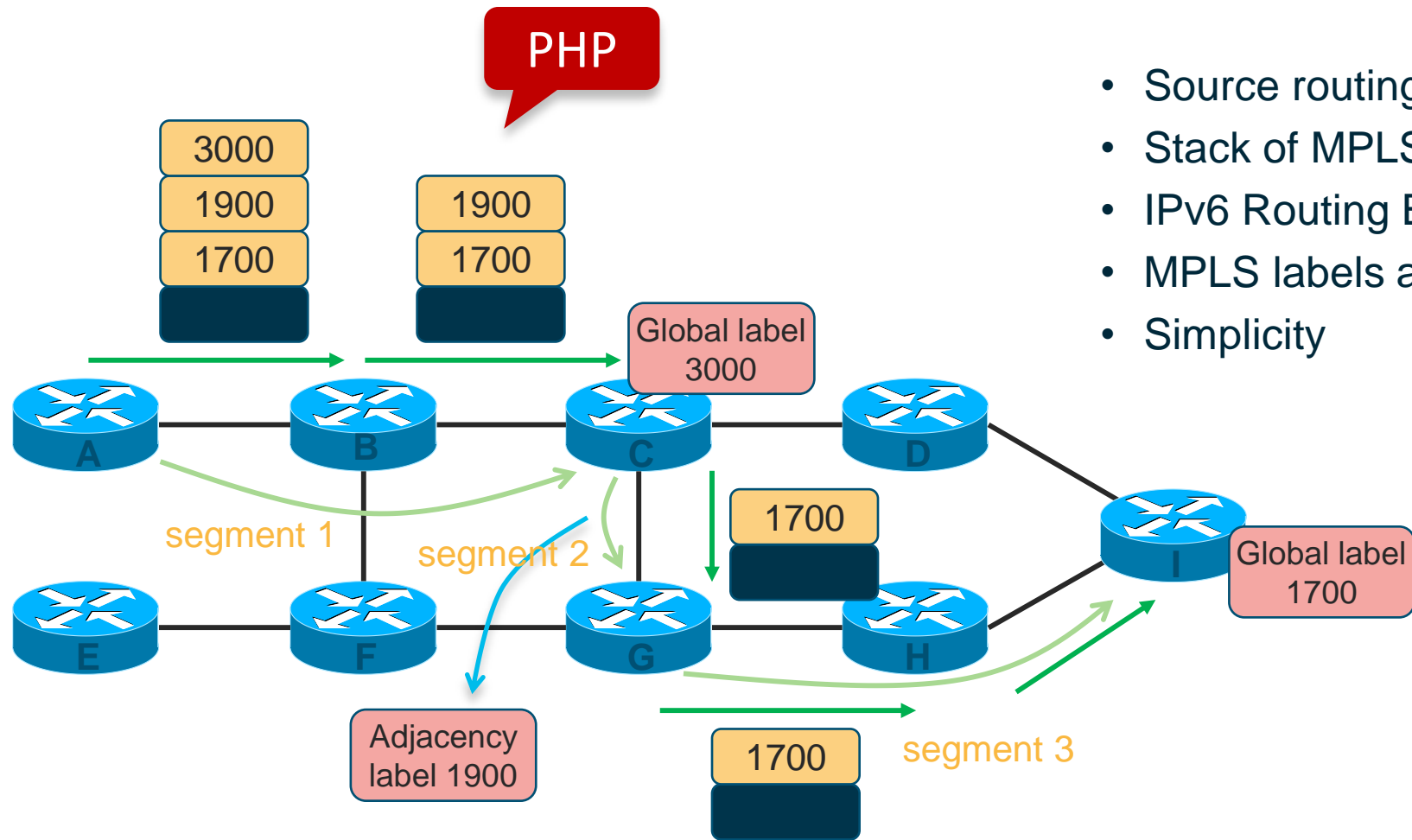
Mission – Route the luggage to Berlin via Mexico and Madrid



1. A unique and global luggage tag is attached to the luggage with the list of stops to the final destination
2. At each stop, the luggage is simply routed to the next hop listed on the luggage tag

RESULT: Path can be controlled
Simple and scalable

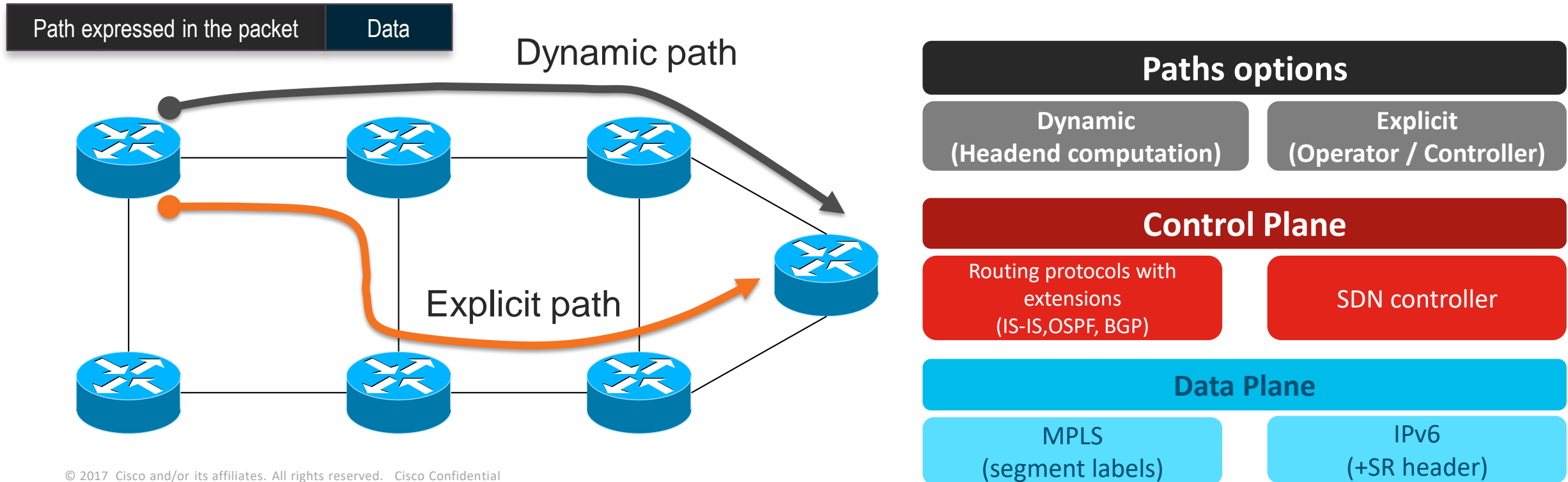
Segment Routing – 3 Segments Example



- Source routing – ordered list of segments
- Stack of MPLS labels
- IPv6 Routing Extension
- MPLS labels are advertised by the IGP
- Simplicity

Segment Routing

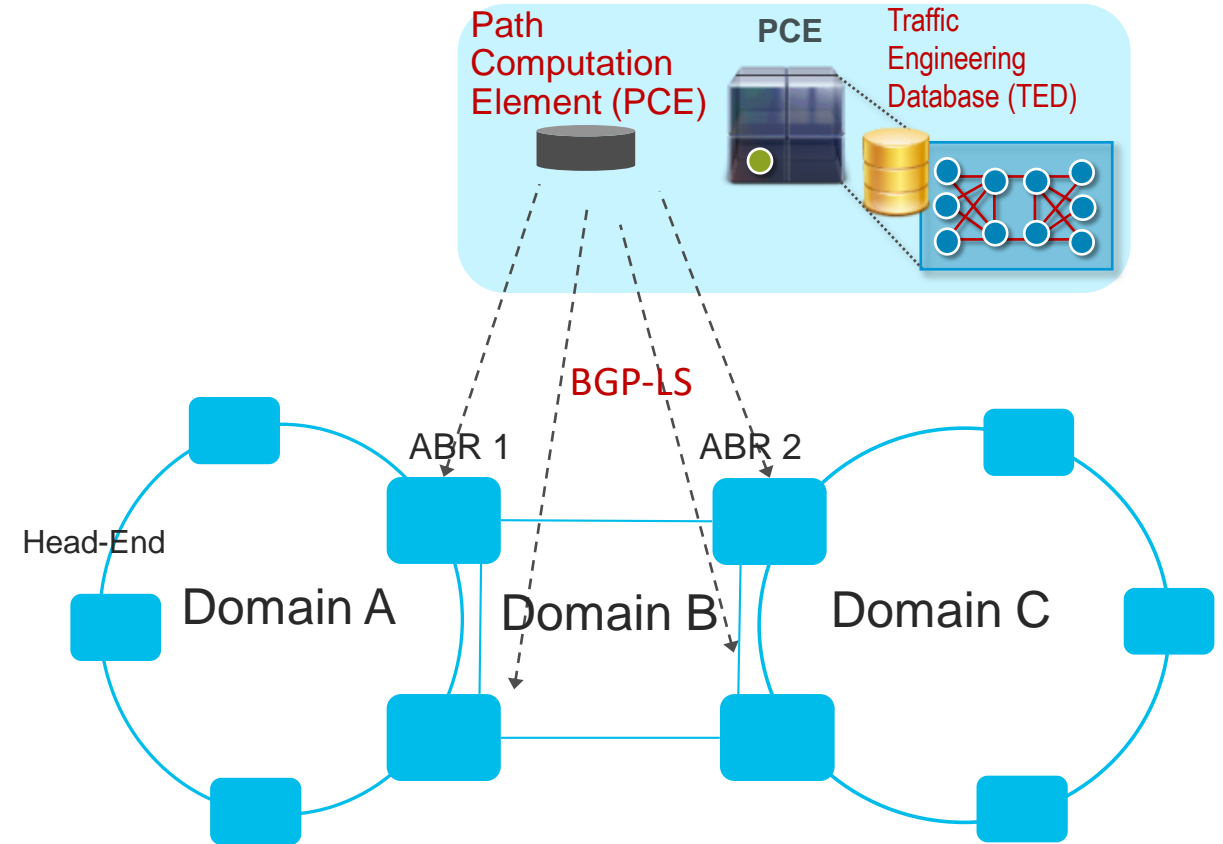
An IP and MPLS source-routing architecture that seeks the **right balance** between **distributed intelligence** and **centralized optimization**



SR-PCE

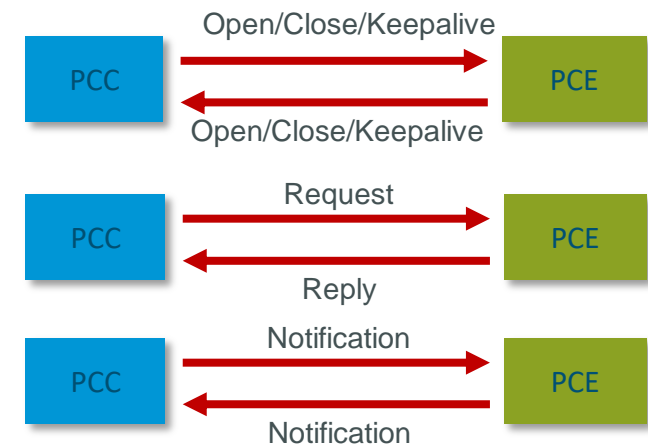
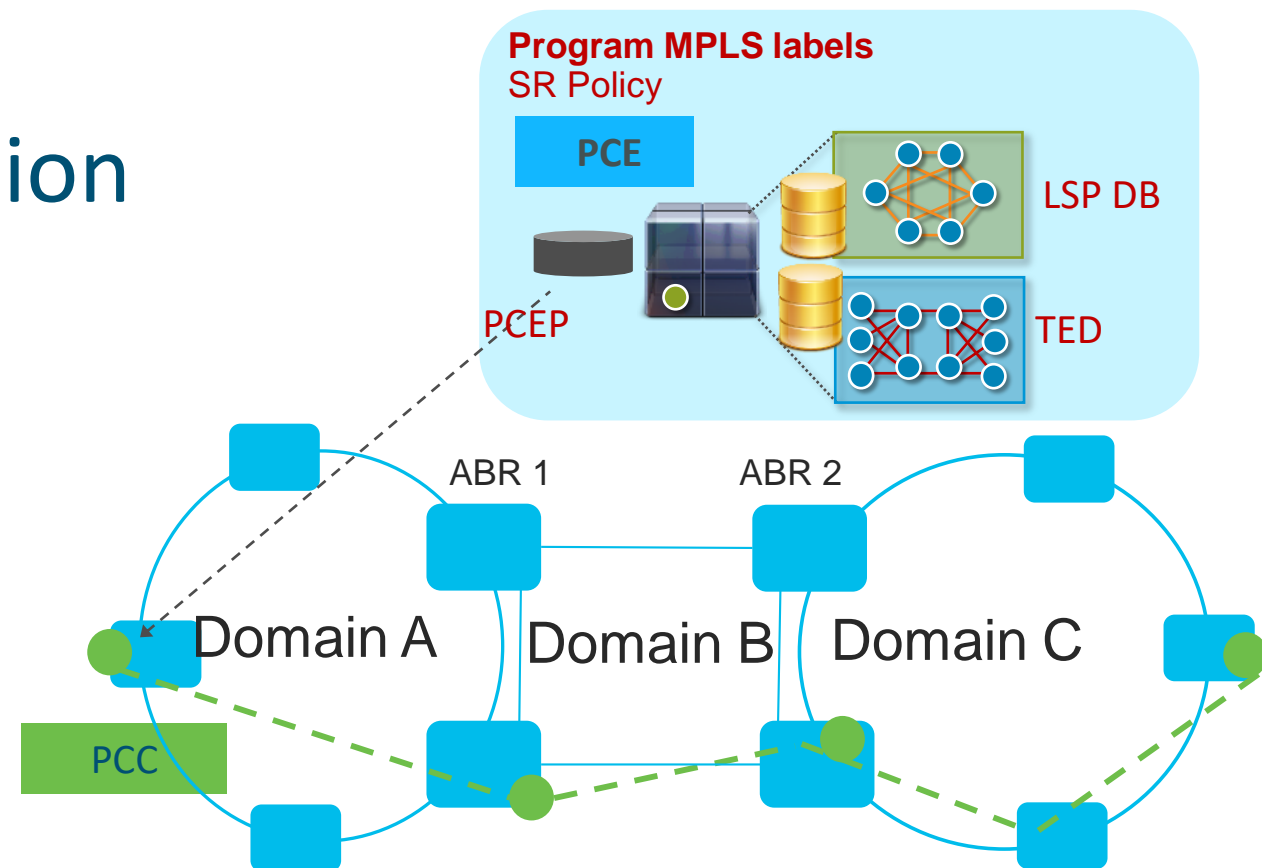
BGP-LS Overview

- Build TED for Multi-Domain Optimal Path Computation
- Scalable Solution is BGP, not IGP.
- BGP-LS is an address-family
 - afi=16388, safi=71
- Defined to carry IGP link-state database via BGP
 - Supports both IS-IS and OSPF
 - Delivers topology information to outside agents
- Only one BGP-LS speaker required per domain



PCEP Architectural Introduction

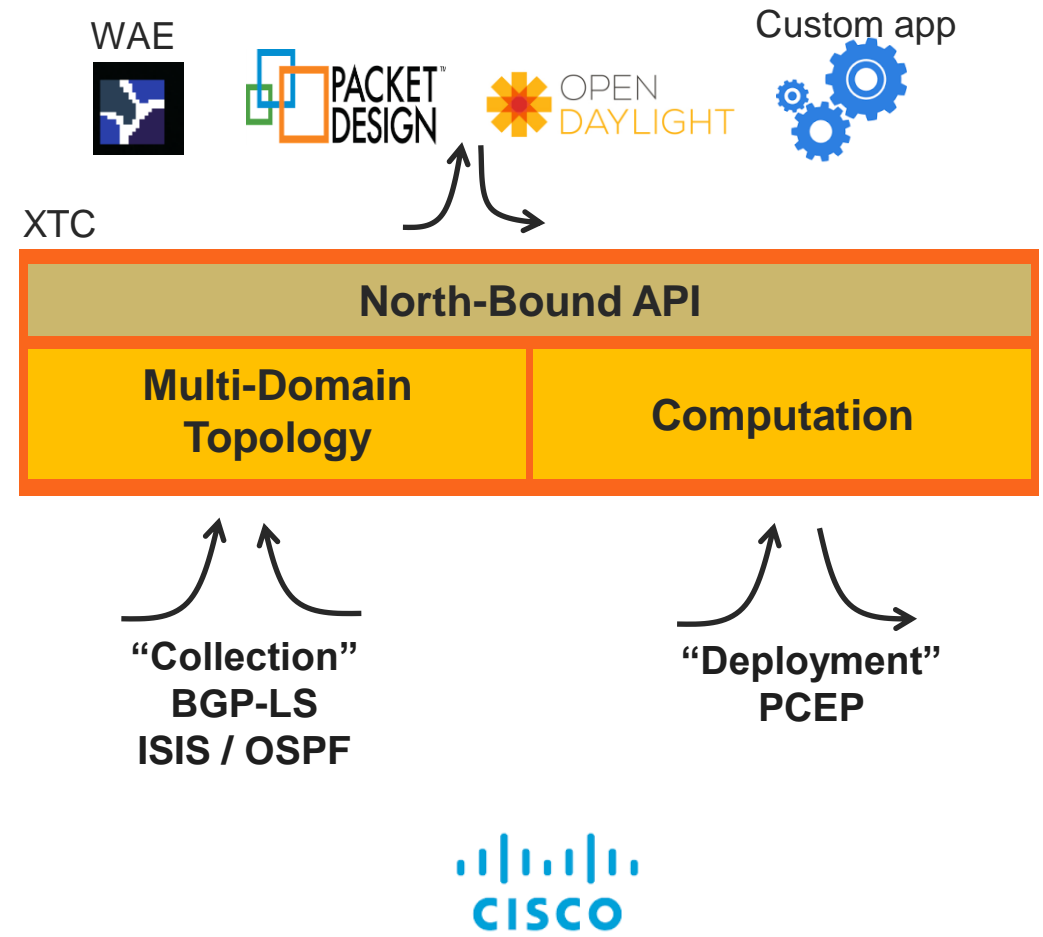
- Path computation
- Large, multi-domain and multi-layer networks
- Path computation element (**PCE**)
 - Computes network paths (topology, paths, etc.)
 - Stores TE topology database (synchronized with network)
 - May initiate path creation
 - Stateful - stores path database included resources used (synchronized with network)
- Path computation client (**PCC**)
 - May send path computation requests to PCE
 - May send path state updates to PCE
- Used between head-end router (PCC) and PCE to:
 - Request/receive path from PCE subject to constraints
 - State synchronization between PCE and router
 - Hybrid CSPF



XR Transport Controller (XTC)

An IOS XR-powered Stateful Path Computation Element (PCE)

- Multi-Domain Topology Collection
 - Real-time reactive feed
- Computation
 - Native SR Policy algorithms
- Applicable to Centralized (Controller) and Distributed (Router) deployments

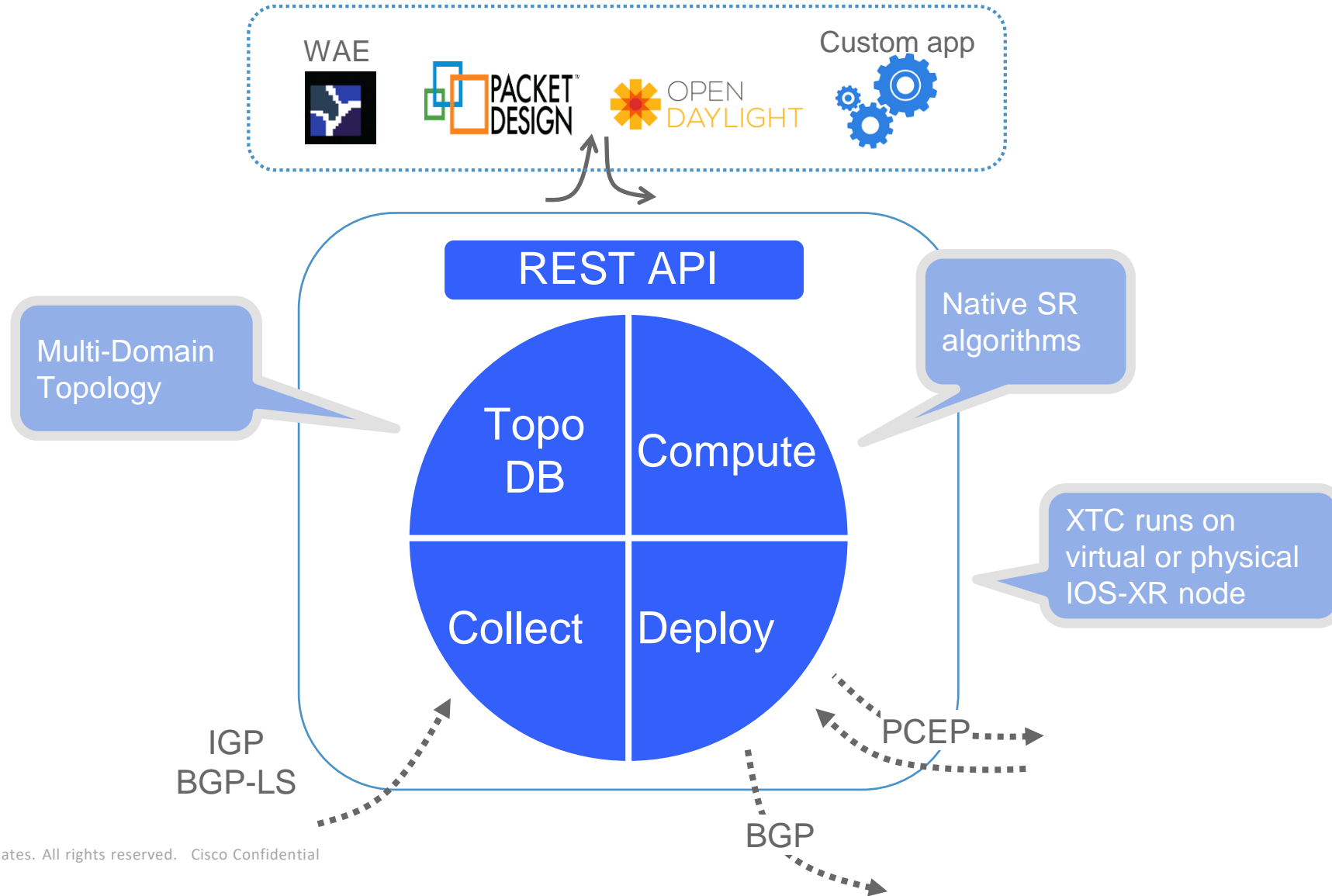


Path Computation

Distributed or Centralized ?

Policy	Single-Domain	Multi-Domain
Reachability	IGP's	Centralized
Low Latency	Distributed or Centralized	Centralized
Disjoint from same node	Distributed or Centralized	Centralized
Disjoint from different node	Centralized	Centralized
Avoiding resources	Distributed or Centralized	Centralized
Capacity optimization	Centralized	Centralized
Multi Layer	Centralized	Centralized

SR PCE Building Blocks



WAN Automation Engine

WAE Design

Visualization

- Graphical view of link traffic utilization
- Customized topology views
- Traffic paths, LSP paths and shortest path

Capacity Planning

- Full Traffic Matrix and Topology
- Traffic Trending/Forecasting
- Model Network adds/moves/changes

Optimization and Traffic Engineering

- IGP and LSP metrics with detailed reports and recommendations

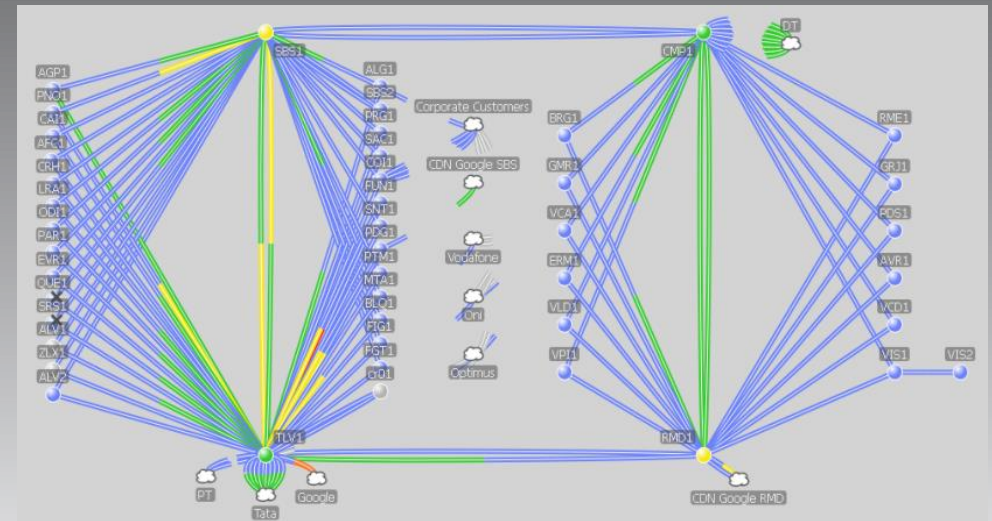
Network-Wide Simulation Analysis

- Extensive network wide failure analysis
- 'Worst Case' analysis of Network

Maintenance Planning

- Risk Analysis of planned outages
- Model Node, Circuit and SRLG failovers

Software installed in a laptop for offline modelling and analysis



Snapshot from WAE Design

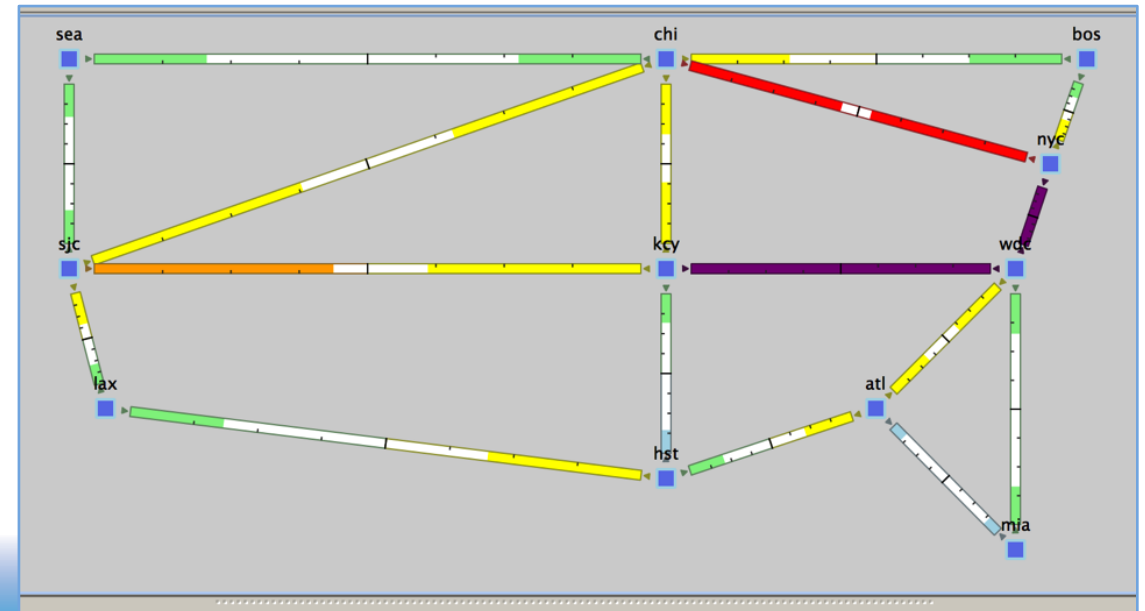
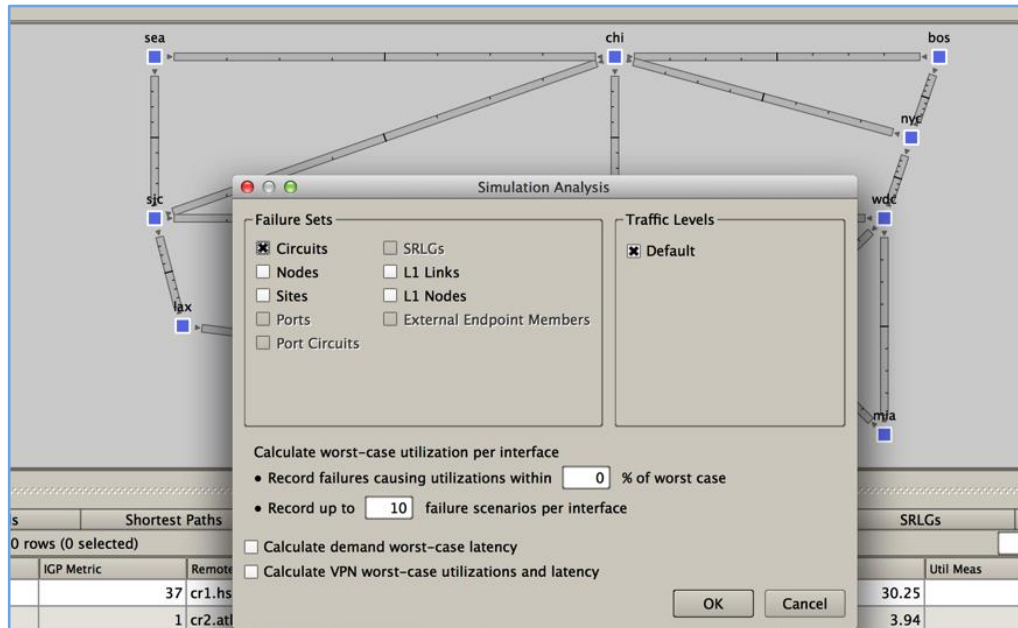
Use Case: Failover and What-If Analysis

Scenario

- › Model failover scenarios and optimization techniques (IGP/TE) Is a new Circuit required?

Value

- › Optimize your network. Avoid costly upgrades



Use Case: Design Verification

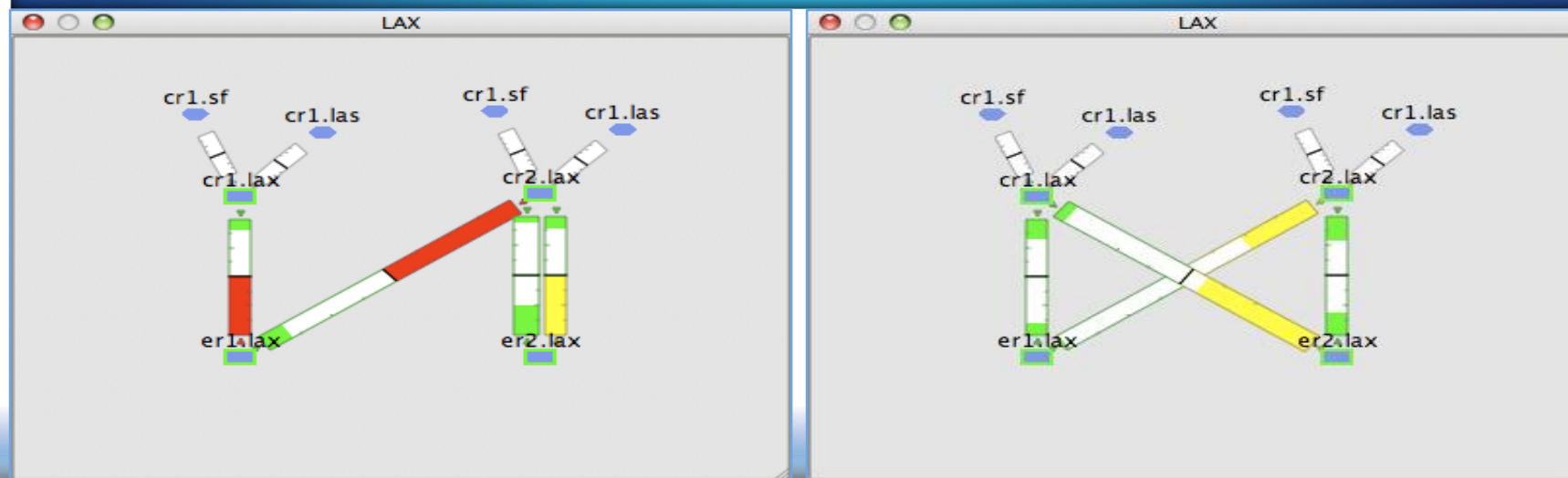
Scenario

- › New edge router in LAX is not dual homed correctly per planning request

Value

- › Isolate misconfigurations or physical connectivity errors

Engineer picks up recent plan file and notices discrepancy with the intended design



Use Case: Evaluate New Customer

Scenario

- › Can a new service using 4Gbps at the San Francisco PoP be supported

Value

- › Model and predict impact of the new service within minutes.

Identify flows for new customer

Name contains

Source contains SF

Destination contains

Service Class contains

Match All

Current filter: 37/296 rows Replace

Clear OK Cancel

Add 4Gbps to those flows

Modify traffic for selected demands.

Traffic Level: 2004 stats
Number of Selected Demands: 26 / 296
Total Traffic (Mbps): 7157.35

Change traffic by %

Add 4000 Mbps in total, proportionally

Add Mbps in total, uniformly

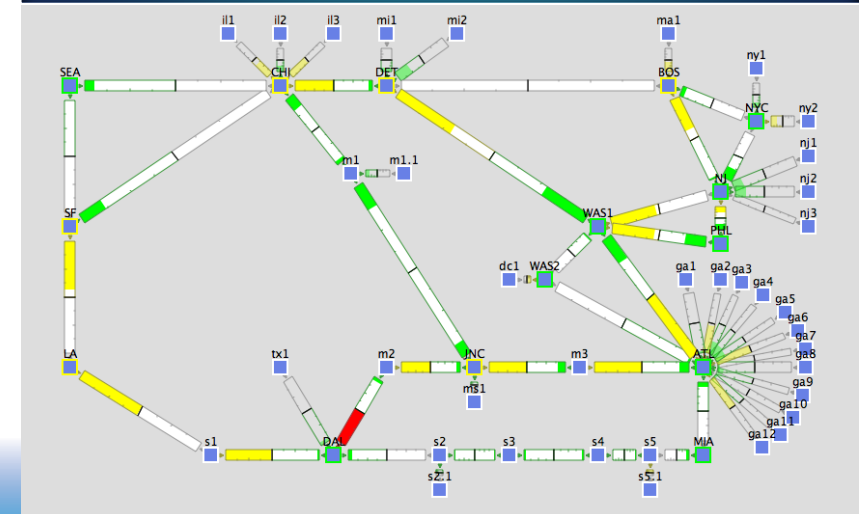
Set traffic to Mbps each

Set traffic to Mbps in total, proportionally

Set traffic to Mbps in total, uniformly

OK Cancel

Simulate results



Congested link in **RED**

Use Case: Topology What-If Analysis

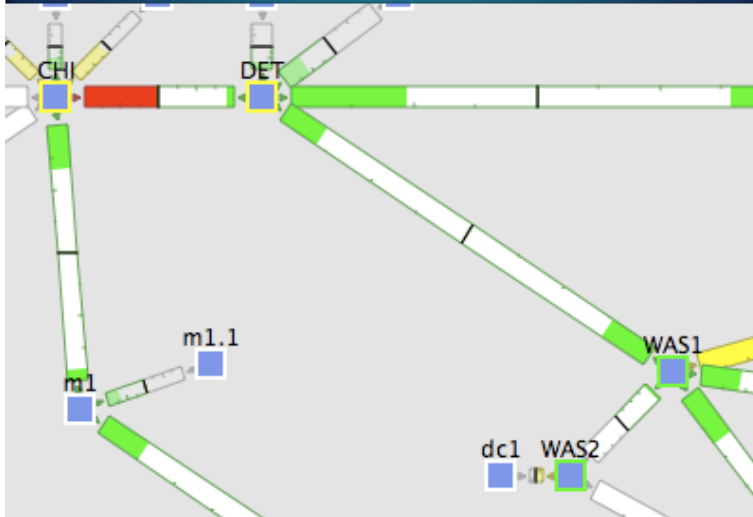
Scenario

- › Impact of adding a new circuit between two nodes

Value

- › Network change analyzed and impact across global network can be modeled

Congestion between CHI and DET



Add new circuit

Insert Initializers Tools

Site...
Node...
Circuit...

Demand...
Demand Mesh...

LSP...
LSP Mesh...
LSP Paths...

Demands for LSPs...
LSPs for Demands...

SRLG...
SRLGs from Layer1 Plan...
AS...

Specify parameters

New circuit

Circuit Name: CHI-WAS1

Capacity: 2488

Delay: 8.73 Estimate...

OSPF Area: 0.0.0.0 Edit...

SRLGs: 0 Edit...

Protected
 Active

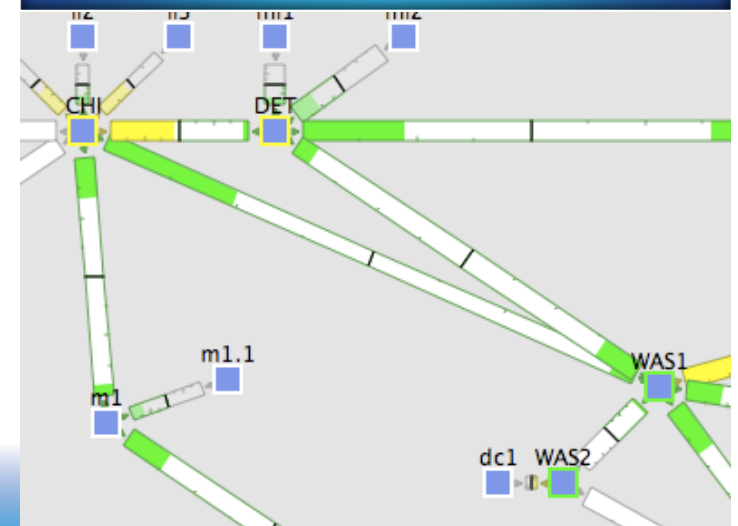
Node A: Site: CHI Node: cr1.chi

Node B: Site: WAS1 Node: cr1.was1

Interface A: Name: IP Address: IGP Metric: Shortest Distance Description:

Interface B: Name: IP Address: IGP Metric: Shortest Distance Description:

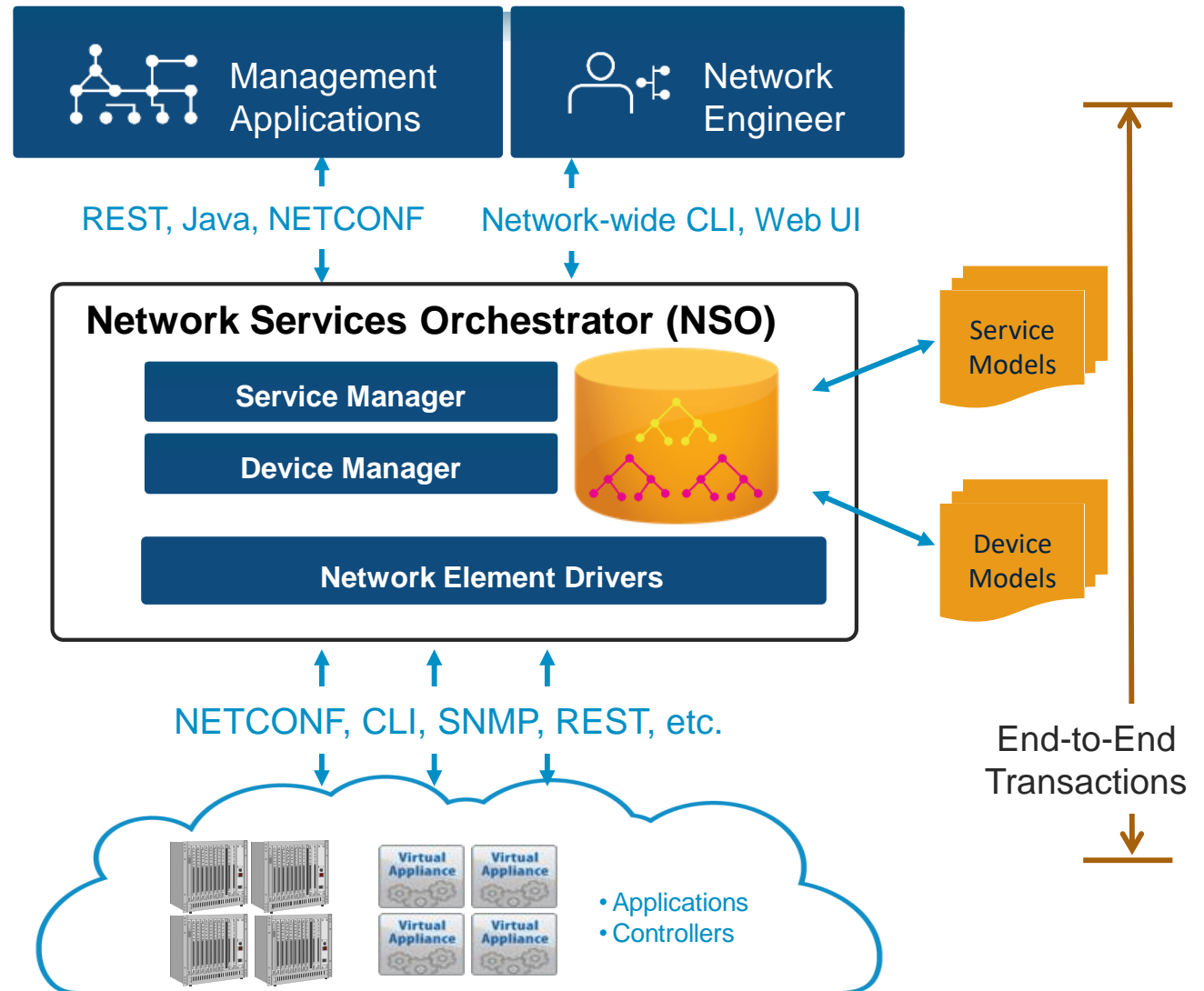
Congestion relieved



Network Services Orchestrator

Network Services Orchestrator (NSO)

- Multi-vendor service orchestrator
 - Distributed service configuration management
 - Transaction integrity
 - Validation and rollback
- Single pane of glass for:
 - L2-L7 networking
 - Hardware Devices
 - Virtual Appliances
- YANG Model Driven Orchestration
 - Service Data models
 - Device Data Model
 - Network Element Driver
- Highly Scalable for large infrastructure
 - One of the existing deployment is managing 60K devices on the network





Automating Service Delivery

Complexity

Before:

- Time-consuming, manual provisioning processes
- Days and weeks to implement new services
- Poor visibility across network during service activations

Multi-vendor Network Orchestration

Comprehensive lifecycle service automation for hybrid networks

Simplicity

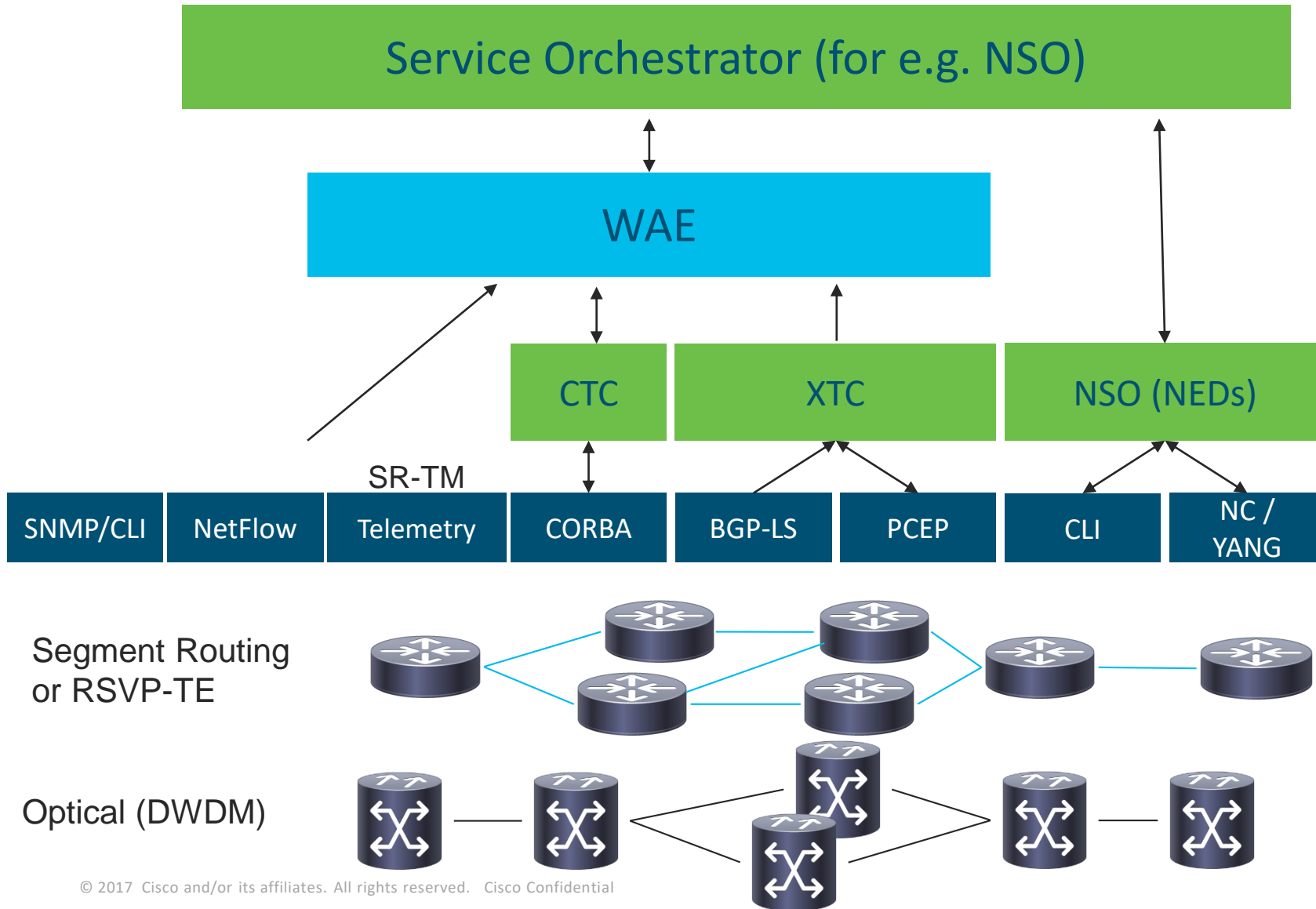
After:

- **70% operational efficiency** increase*
- **60% reduced time** to revenue*
- Optimized service and network quality through better visibility

Cisco Network Services Orchestrator (NSO) enabled by Tail-f

Summary

High-Level Solution Building Blocks



“Service Abstraction”
Service Models and Orchestration

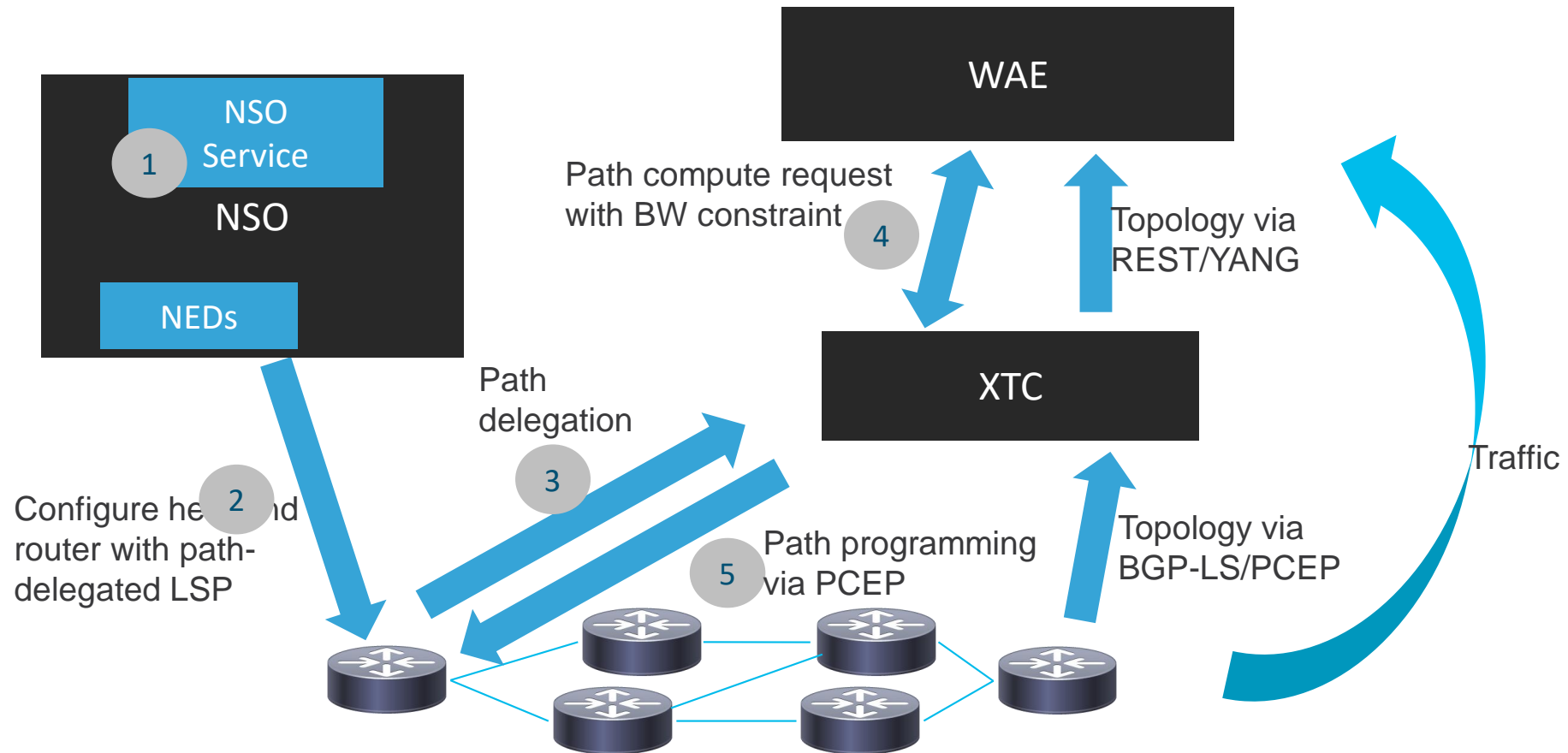
“Network Abstraction”
Network Model, Path Computation

“Device Abstraction”
Controllers, Protocols, NEDs

“Protocols”
South-bound Network Protocols

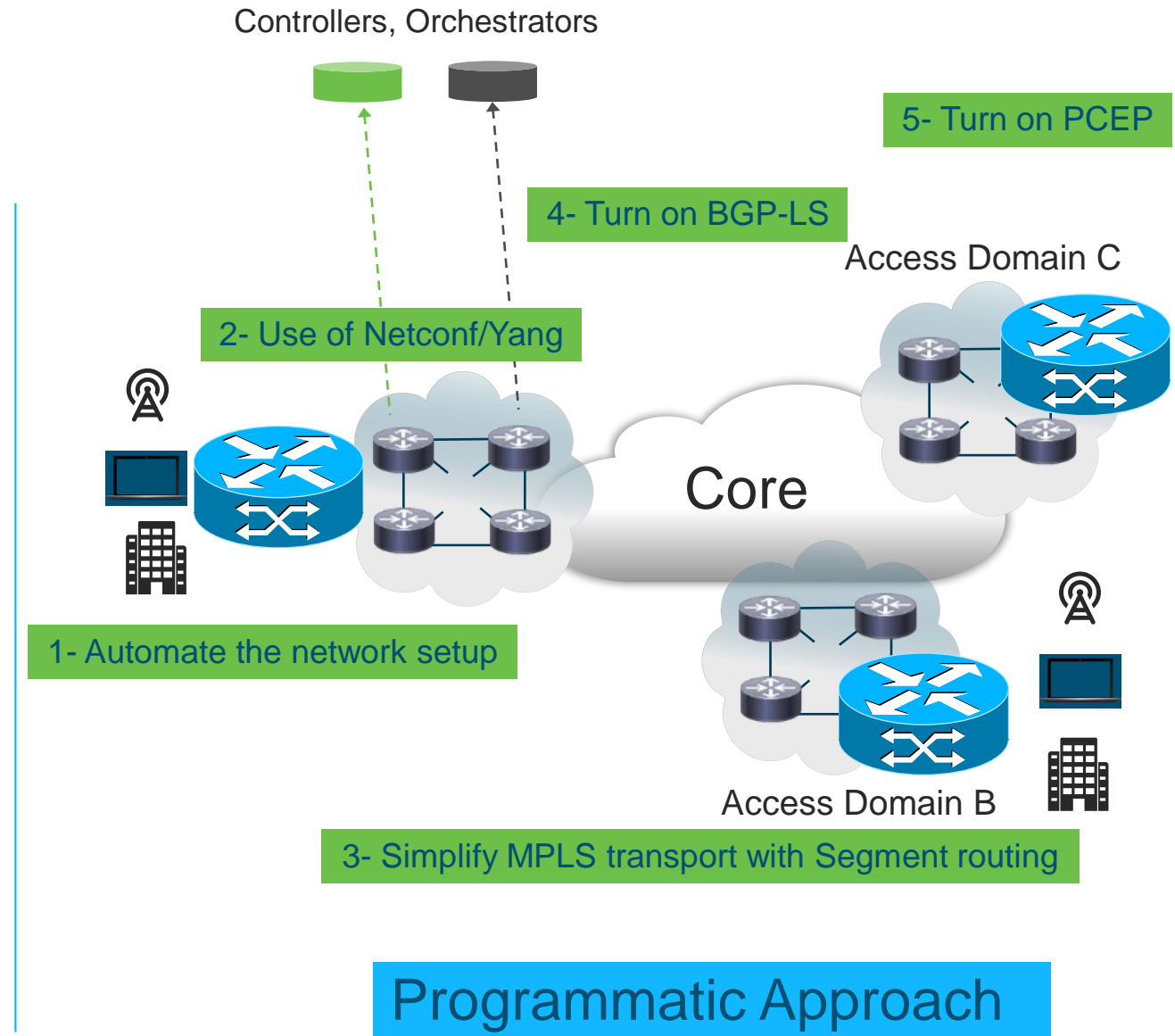
“Network”
Equipment and Devices

Use case: Service Driven Bandwidth on Demand



Automation Journey

- Automation
- Configuration through Netconf/Yang Models
- Network Simplification with Segment Routing
- Enable Topology Discovery
- Enable inter Domains Traffic Engineering



References

- Network Automation and Programmability for Service Providers - BRKSPG-2210 - <https://ciscolive.cisco.com/on-demand-library/?search=BRKSPG-2210#/session/BRKSPG-2210>
- LTRMPL-2104 - Cisco WAN Automation Engine (WAE) Network Programmability with Segment Routing
- Agile Carrier Ethernet Demonstration on Youtube - <https://www.youtube.com/watch?v=biYqyAn9rl0>
- Segment Routing .net - <http://www.segment-routing.net/>
- Segment Routing Demo Friday - <https://www.sdxcentral.com/resources/sdn-demofriday/segment-routing-cisco-demofriday/>
- Cisco Programmability Yang blog - <http://blogs.cisco.com/tag/yang>
- Tail-f netconf yang tutorials - <http://www.tail-f.com/education/>
- BGP-LS linkedin blog: <https://www.linkedin.com/pulse/introduction-open-api-bgp-link-state-bgp-ls-source-controller-abeer?trk=prof-post>
- Netconf linkedin blog: <https://www.linkedin.com/pulse/netconf-rfc-6242-protocol-tutorial-ahmed-n-abeer?trk=prof-post>



Cisco Partner Help

Technical Pre-Sales Support

<https://www.cisco.com/c/en/us/partners/support-help/presales-helpline.html>

Partner Help Services Catalog

Partner Help Standard Services for Approved Partners



Cisco BOM

Sub-Service types offered

- Create CCW Estimate
- Cisco Service Estimate



Cisco Product or Service Information

Sub-Service types offered

- Cisco Presentation Material
- Cisco Technical Services
- Licensing
- List Pricing / RFQ
- Product Information



Partner Tools Support

Sub-Service types offered

- Certification/ Specialization
- Cisco Commerce Workspace
- Cisco Proposal Generator
- Cisco RFP Tool
- SalesConnect



Cisco RFP Tool (login required)

Sub-Service types offered

- Sales Proposal Generation
- RFP Cloud Collaboration Tool
- Centralized Knowledge base

Partner Help Plus Advanced Services for Partner Plus Partners and Distributors



Cisco Design

Sub-Service types offered

- Design
- Requirements Collection



Customer / Opportunity Engagement

Sub-Service types offered

- Demo
- Discovery Engagement
- Presentations

