The bridge to possible

Automate Transport Service Provisioning, Optimization, and Assurance with SDN Controller

Cisco Crosswork Network Automation

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BRKSPG-2870

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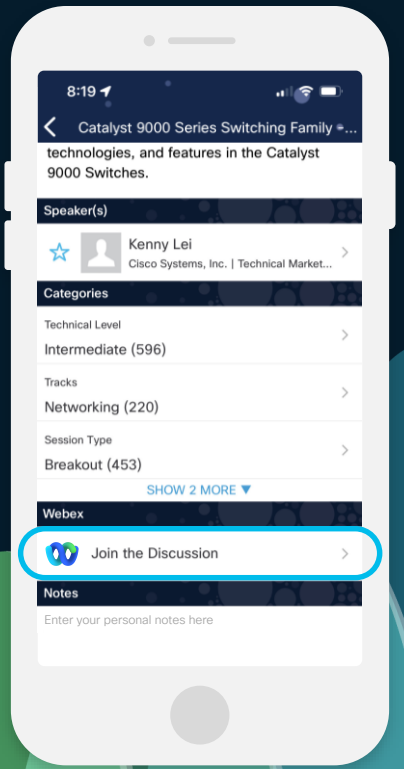

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Operational Dilemma

Challenges

- Increasing Infrastructure Complexity and Scale
- Proliferation of services and traffic types
- Multiple tools, fragmented observability
- Lack of Cohesive Automation framework and tools
- Limited in-house software expertise

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Automation is Key to drive Operational Agility

Agility is Essential in Operationalizing Mass-infrastructure Networks

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Agenda

- Why Automation is Critical?
- Demands of Next-Generation Automation Solution
- Introduction to Crosswork Automation Portfolio
- Utilizing SDN Controller for Automation
  - Visualization, Provisioning, Optimization, Assurance
- Conclusion

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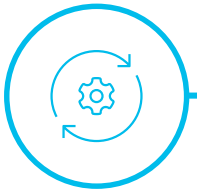
Why Automation is Critical?



Deliver services at machine speed with repeatable quality

81% Reduction in time to launch new services

Make quicker, smarter planning and operations decisions

55% Reduction in operating expenses

Bridge and synchronize business and IT processes

47% Increase in new services revenue

Source: Economic Benefits of Network Automation, ACG Research

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Demands of Next-Generation Automation Solution

Challenges

- Increasing Infrastructure Complexity and Scale
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- Multiple tools, fragmented observability
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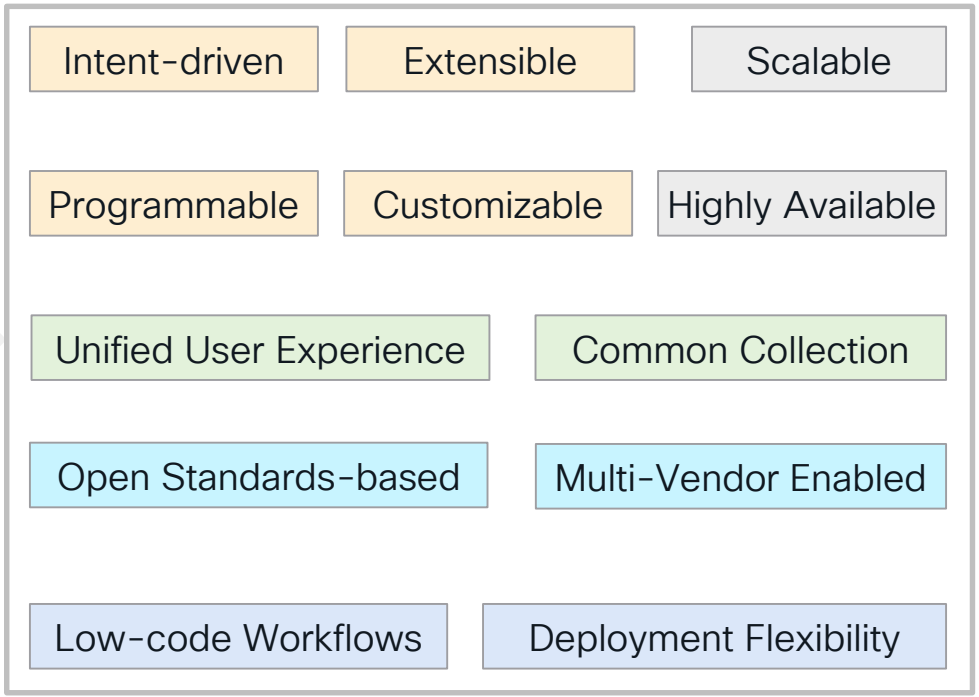
- Limited in-house software expertise



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Focus on Outcome-driven Automation

Crosswork Network Automation Pillars

Automate processes by bringing together visibility, insights and actions in a closed loop

Visibility
Verify and monitor customer experience

Insights
Correlate data, identify trends and patterns

Action
Automate processes to create a nimble organization

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Operationalizing Mass-Infrastructure Networks

Foundation for closed-loop automation and zero-touch networks

Workflow

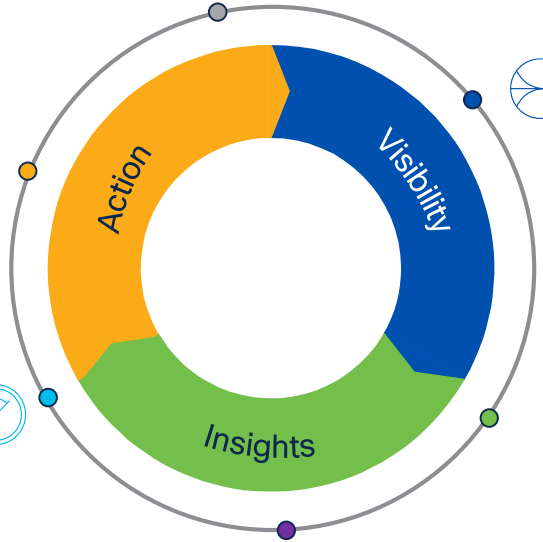
Low-code automation workflow

Visualization

Multi-vendor, multi-layer single pane of glass with Crosswork Hierarchical Controller (HCO), and leading IP SDN visibility with Crosswork Network Controller (CNC).

Service provisioning

300+ customers, 170+ multi-vendor devices supported. All of the Top 10 SP's use Network Service Orchestration (NSO) in production.



Optimization

SR and SRv6 path optimization leadership
Top-rated IP SDN Controller per leading operators

Automated Assurance

Assurance IP services in CNC and IP/Optical in HCO.
Accedian Acquisition Intent for SLA guarantee

Planning

Crosswork® Planning.
Built on the Crosswork SDN Platform.

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General Availability: 3QCY24

Introducing Crosswork Planning

Key Features

- Predictive AI

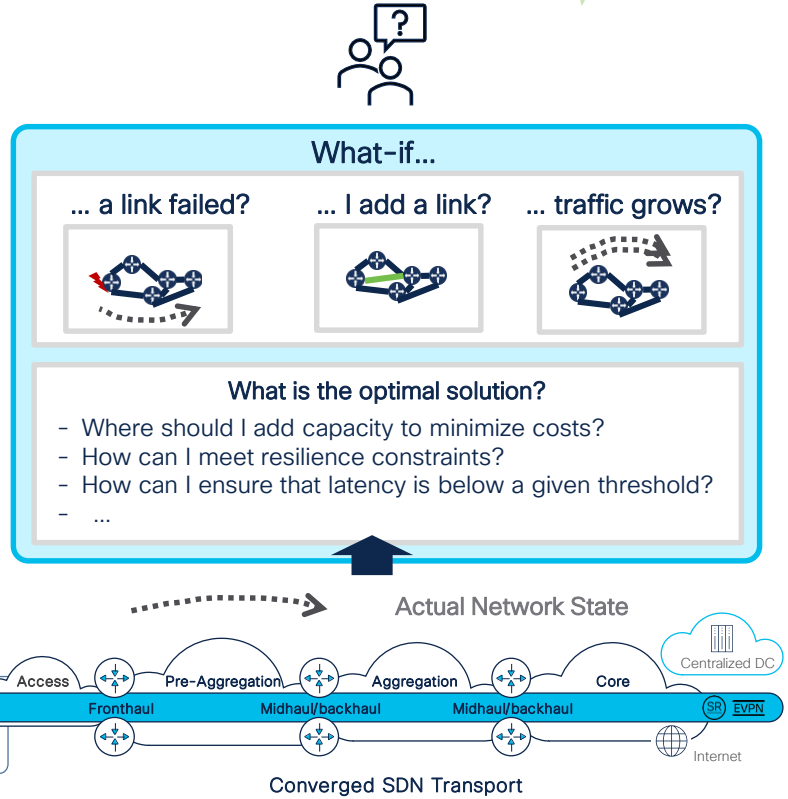
  Predict the impact of network changes, traffic growth, new services, and potential failures

- Simulation Analysis

  Leverage measured or simulated traffic data for accurate predictions

- Optimization

  Optimize network design for efficiency and reliability



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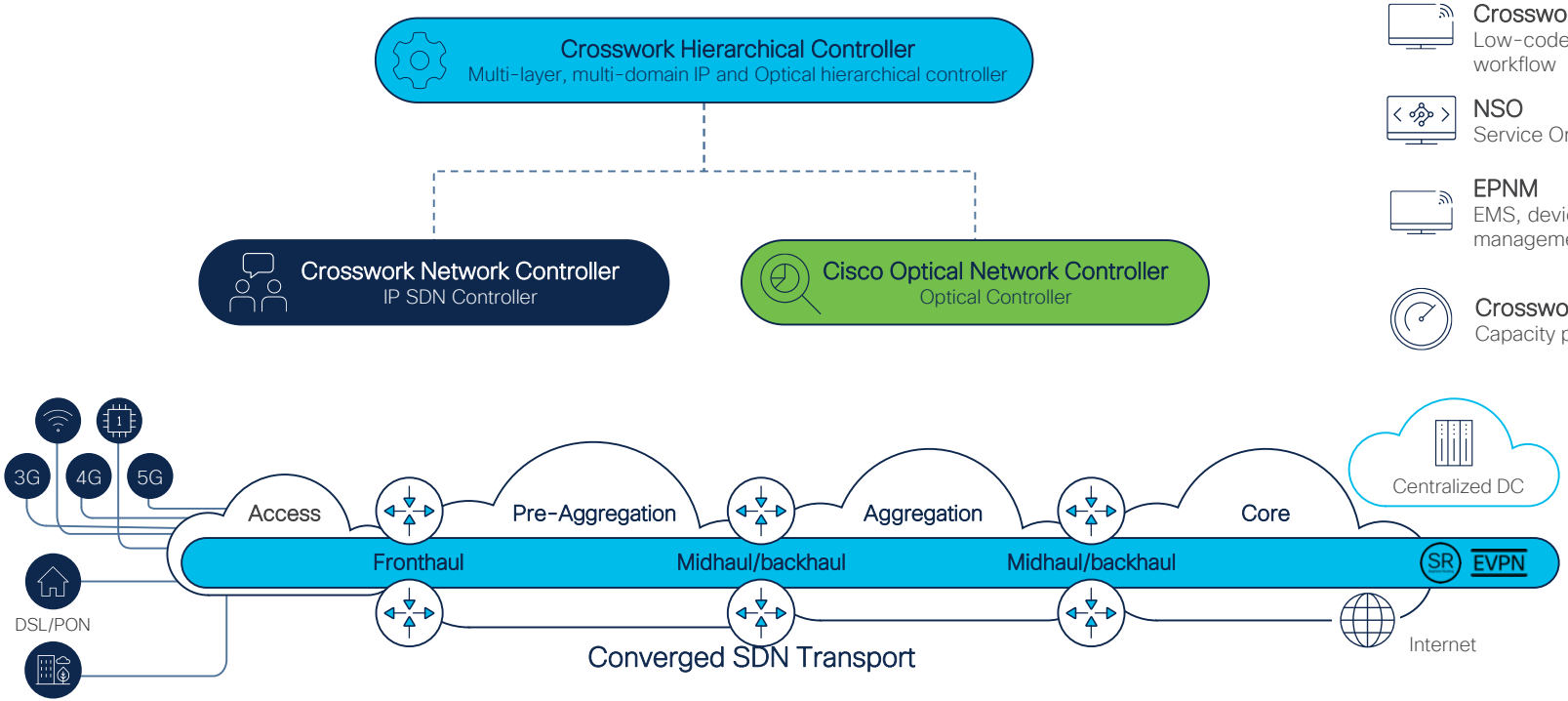
Cisco Crosswork Automation Portfolio

Operationalizing Mass-infrastructure Networks



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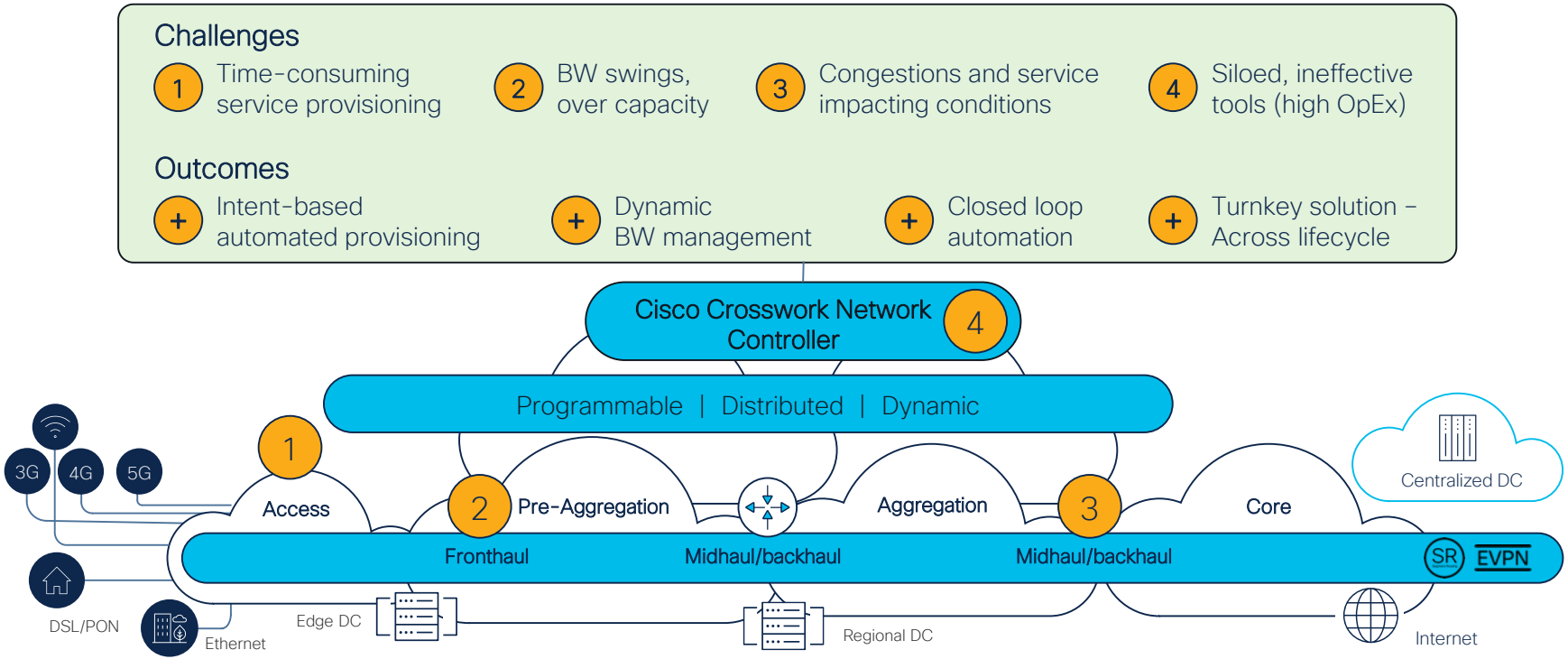
Simplify Operational Lifecycle with IP SDN Controller

Cisco Crosswork Network Controller (CNC)



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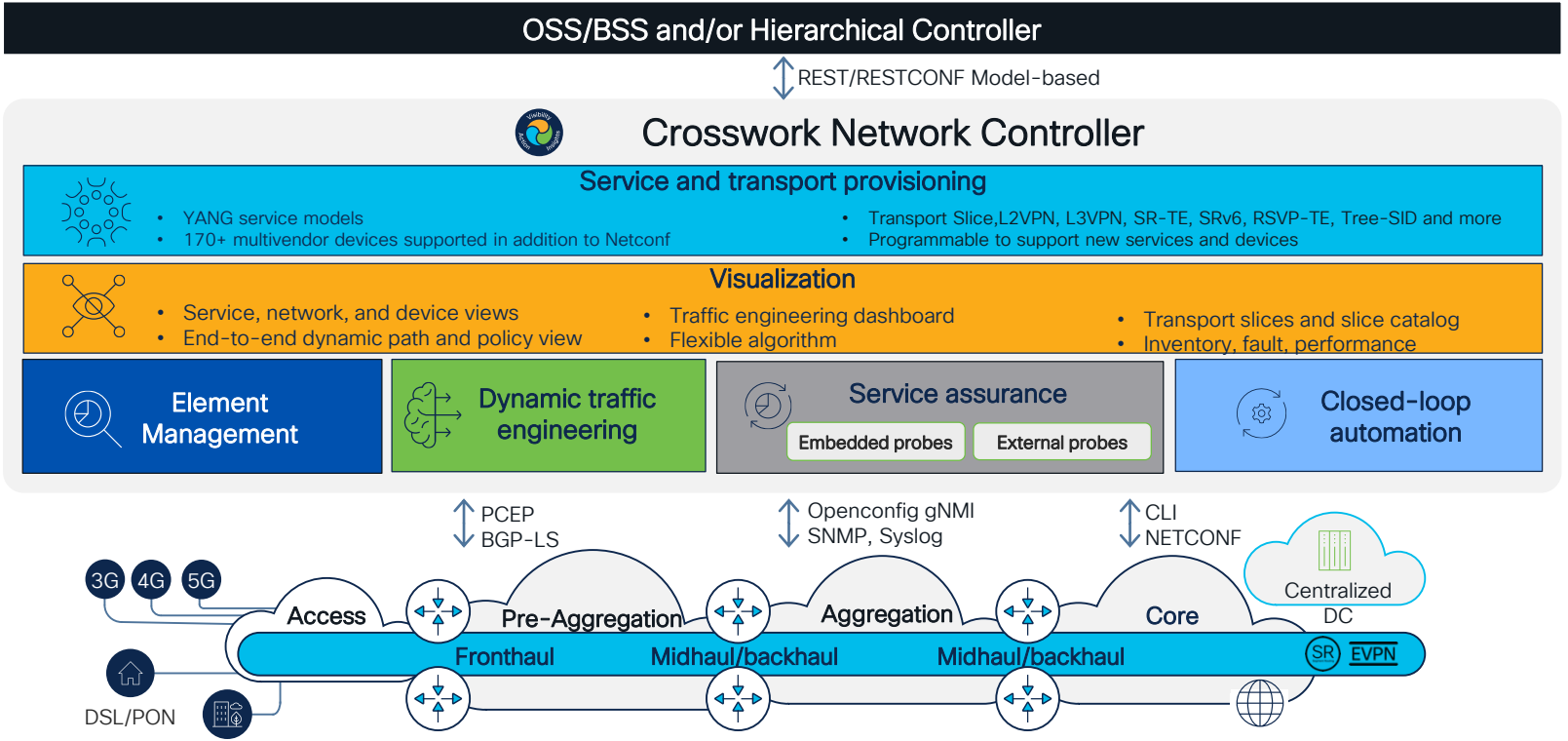
Cisco Crosswork Network Controller (CNC)

Integrated Service and Device Management



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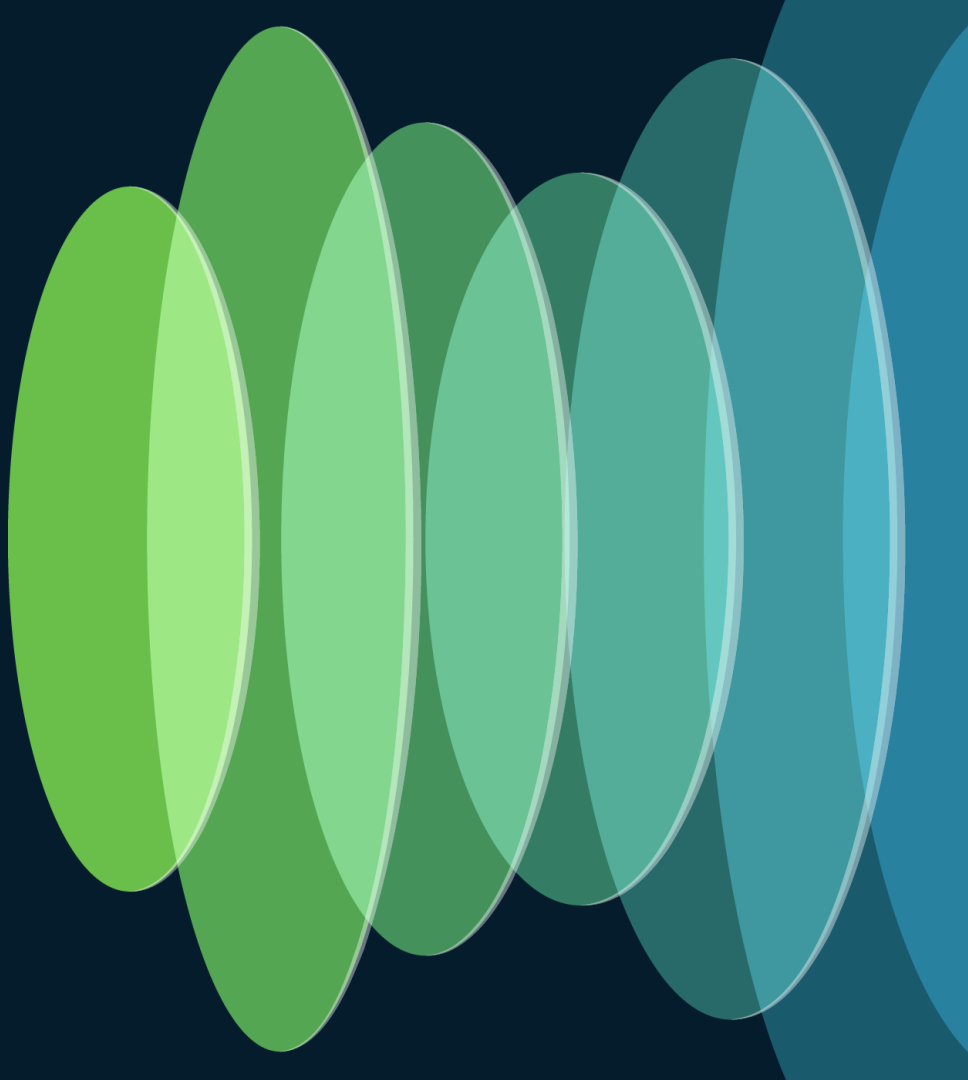
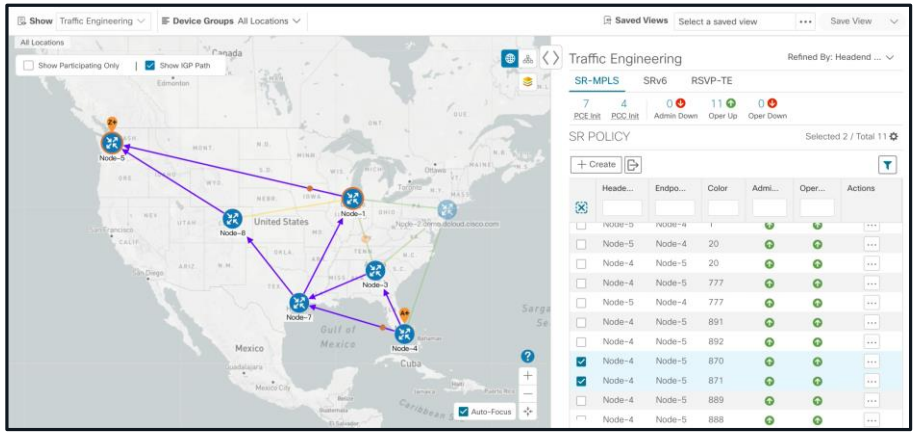
Opportunities for Automation



Real-Time Network Visualization

Visibility, Insights and Action



Visibility is Paramount

Challenges:

- Real-time visibility – End-to-end view of transport network

Solution:

- Discovery of network via BGP-LS
- Real time visualization of topology, services, policies and history of changes, link congestion, latency, etc.
- Real time automatic detection of topology changes.

Outcome:

- Automatic topology discovery with real time information
- Accurate real time view into the network with details of intent, traffic engineering constraints
- Rapid detection of anomalies improving operational efficiency

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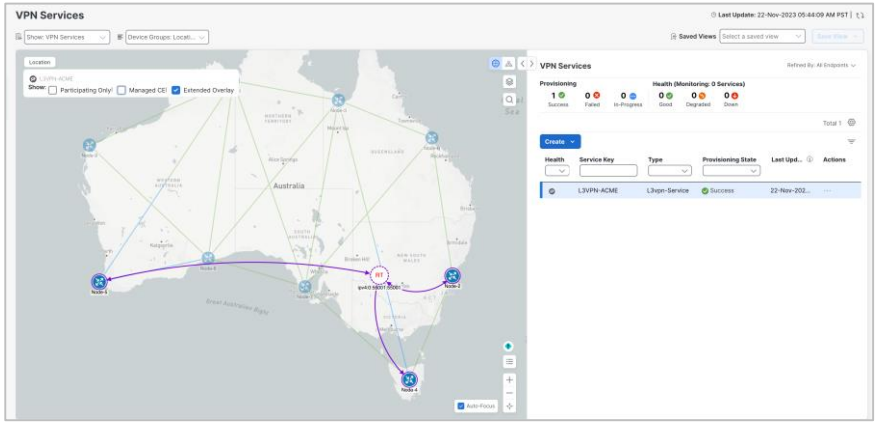
Service & Transport Provisioning

Intent-based Automation



SR Policy SLA Objectives and Constraints	
Objective	Latency/IGP/TE Metric Minimization
Constraints	Affinities, Disjoint Paths, Bandwidth

✔ Rapid Time-To-Value

Challenges:

- Cumbersome and time-consuming service provisioning
- Missing transport and service context linkage and visibility, satisfy service specific performance objectives, such as low latency

Solution:

- Intent-based automated provisioning
- Customizable service intent with explicit SLA definitions
- Service Topology Visualization with actionable operational context (Health, Path changes, etc)

Outcome:

- Rapid Time to Value with provisioning reduced from weeks to minutes

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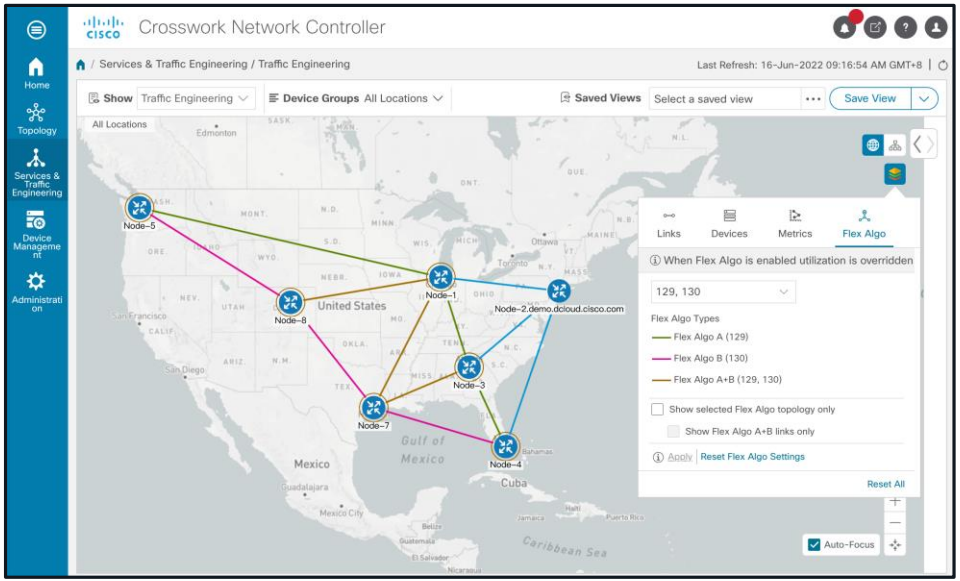
Enhanced Traffic Engineering with FlexAlgo

End-to-end fine grained policy control



Flexible Path Control

Challenges:

- Inability to scale with end-to-end, fine-grained control over the myriad 5G services with distinct policy requirements

Solution:

- Customized IGP shortest path computation
- Flexibility to define and assign new SR segments (prefix SIDs)
- Establish traffic engineered path from anywhere to anywhere automatically computed by the IGP

Outcome:

- Enhanced TE control with SID list customization
- Operational Flexibility and control to meet SLA intent
- Custom fit 5G network slices to specific applications

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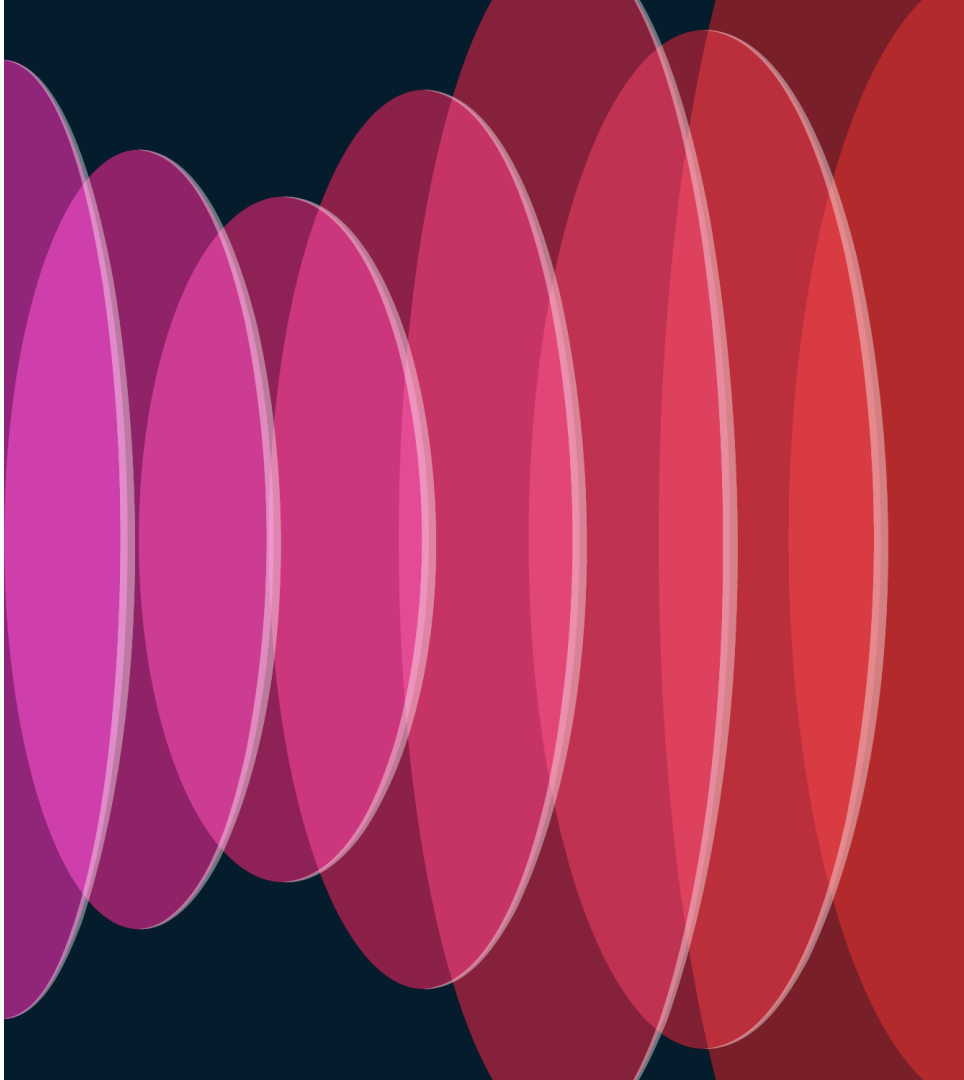
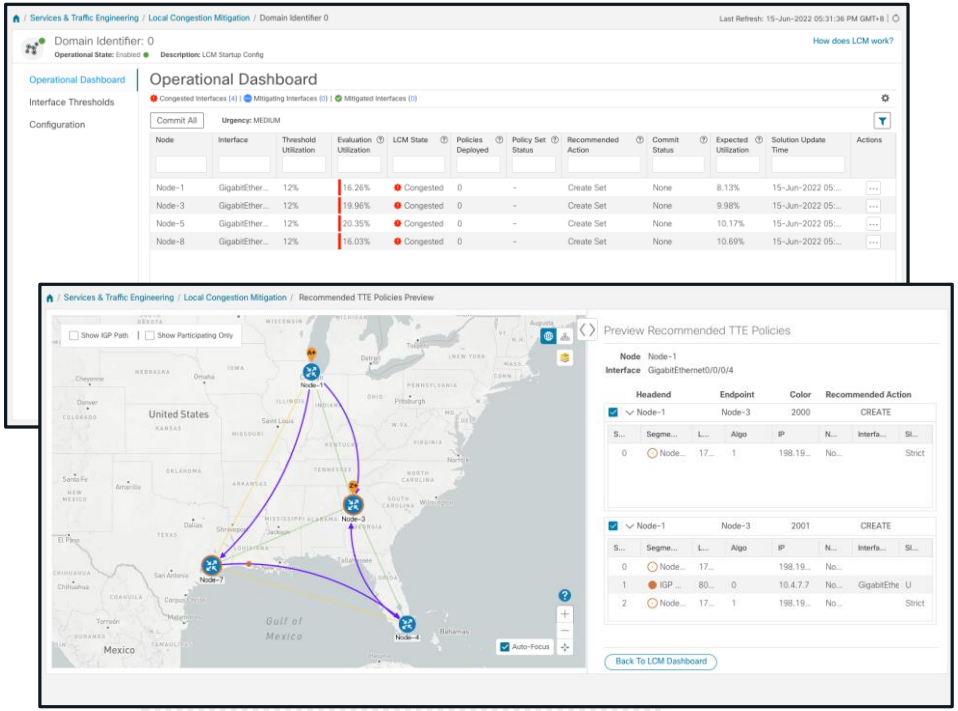
Demo: Automated Service Provisioning



Local Congestion Mitigation (LCM)

Quickly mitigate network congestion



Challenges:

- Dynamic network state with risk of congestion leading to degraded service levels and user-experience

Solution:

- Congestion handling in a localized manner using tactical TE policies
- Automated path recommendation to divert best effort traffic
- User approval for path acceptance and automated provisioning
- Traffic steered on shortest path around congestion points

Outcome:

- Rapid handling of congestion with user control
- Minimized impact to service levels
- Optimal utilization of network capacity

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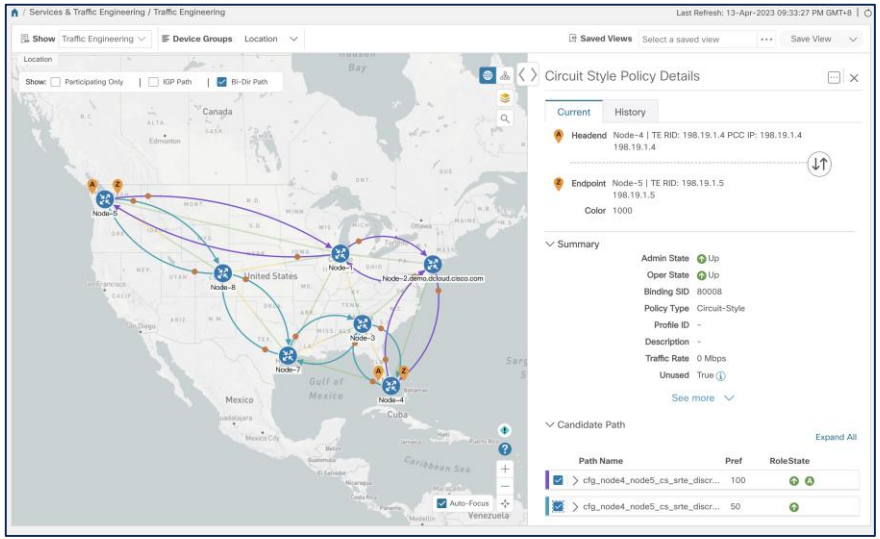
SR Circuit Style Provisioning and Visualization

Maximize the benefits of unified Segment Routing infrastructure



Challenges:

- Deliver services with bandwidth reservation and path protection over Segment Routing
- Leverage the Segment Routing infrastructure to carry any kind of services including OTN, TDM, PLE

Solution:

- Pre-book some bandwidth in the network to be used by these Circuit-Style policies
- Use the SDN Controller for bandwidth bookkeeping and path computation
- Use the SDN Controller to compute bi-directional, co-routed paths with path protection (under 50ms)

Outcome:

- One unified Segment Routing infrastructure can be used to carry any kind of services, including the most demanding one

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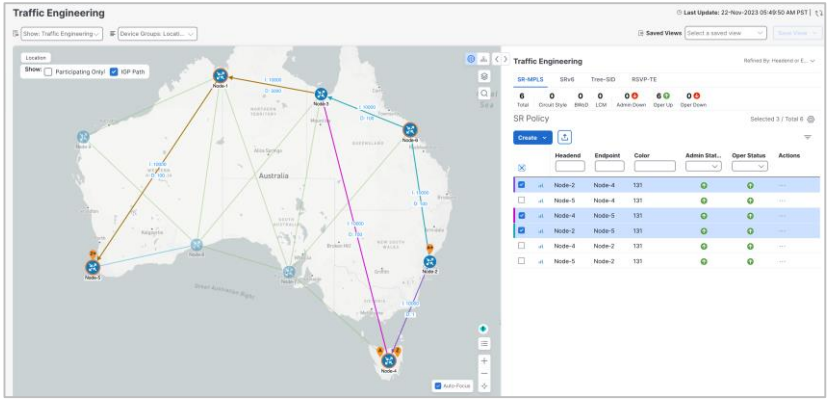
Real-time Network Optimization

Closed loop Automation



SR Policy SLA Objectives and Constraints	
Objective	Latency/IGP/TE Metric Minimization
Constraints	Affinities, Disjoint Paths, Bandwidth

Preserved Service Intent

Challenges:

- Manual re-optimization based on network changes is not scalable and poses risk to target SLAs

Solution:

- Define policy intent once
- Automatically detect topology changes
- Real-time re-computation of paths in violation of ‘optimization metric’ aka intent
- Optimized path is automatically provisioned

Outcome:

- Preserved service policy Intent and associated SLAs
- Enhanced operational agility with real time action
- Optimal utilization of network capacity

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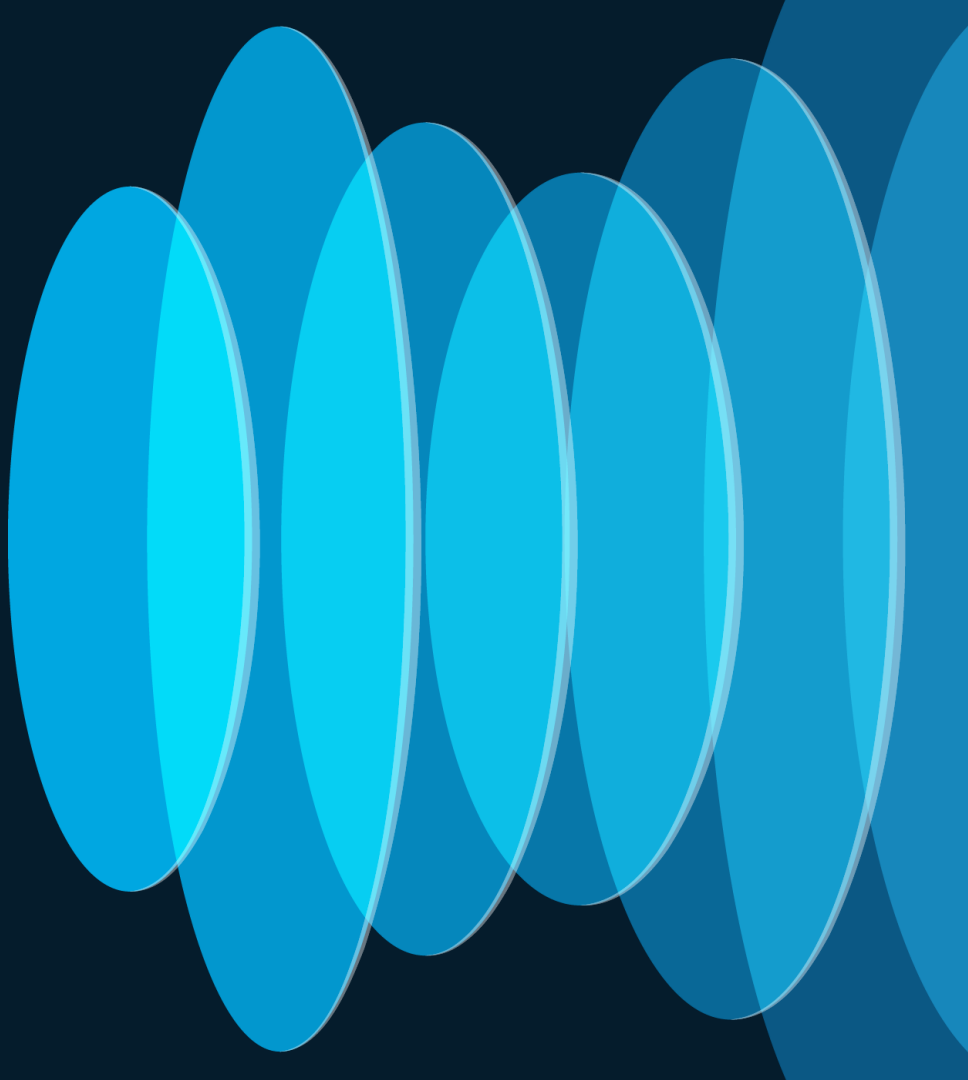
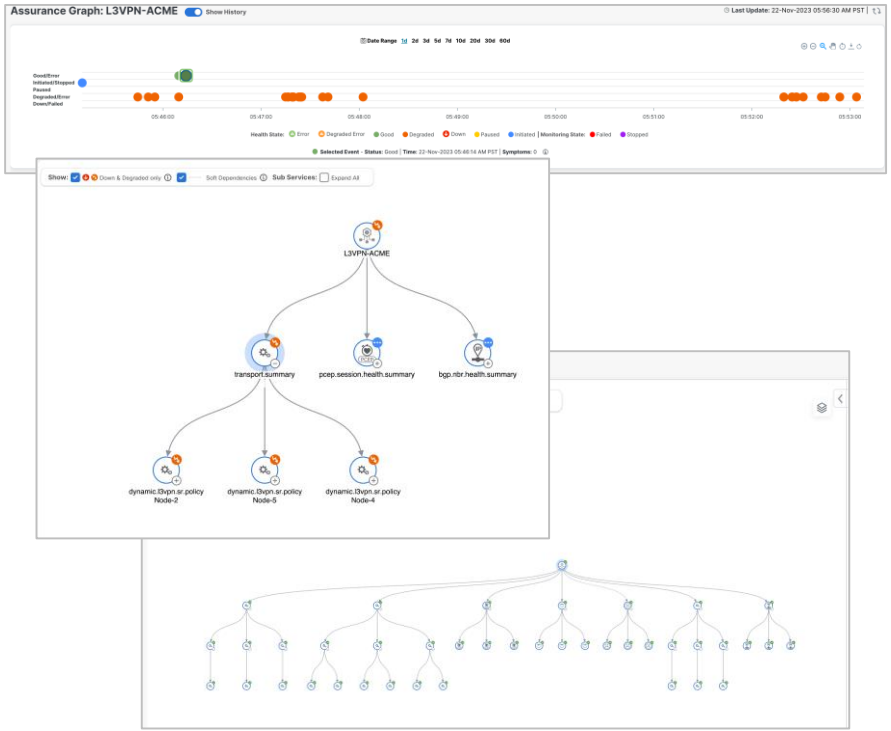
Demo: Real-time Optimization



Service Assurance

Enhanced end-user experience with expedited troubleshooting



Challenges:

- Decoupled Service Provisioning and monitoring
- Disconnect between customer service experience and network health

Solution:

- End-to-end service health monitoring
- Proactive causality models
- Linkage between service and underlying components

Outcome:

- Reduction in Time to Detect service issues and remediation
- Improved user experience and operator productivity

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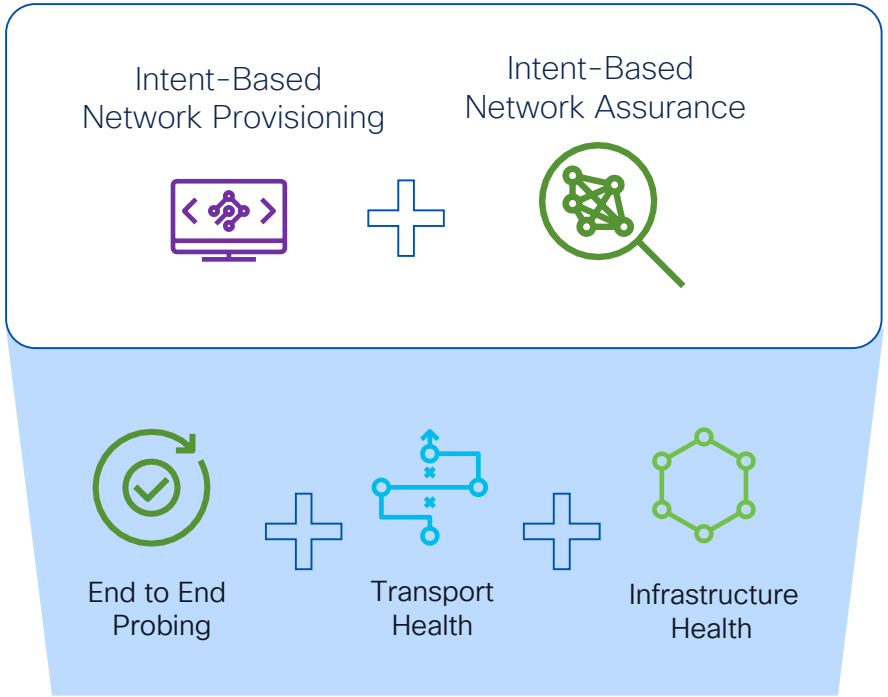
Service Health Monitoring

IETF RFC9417: Service Assurance for Intent based Networking Architecture



Service Centric Approach

Start from the definition of the services and Tie Health across the layers

Dynamically Tie Intent to Telemetry

Monitor only network component that can influence the service health state

Automate Troubleshooting

Codify networking troubleshooting "Know-How" to automate

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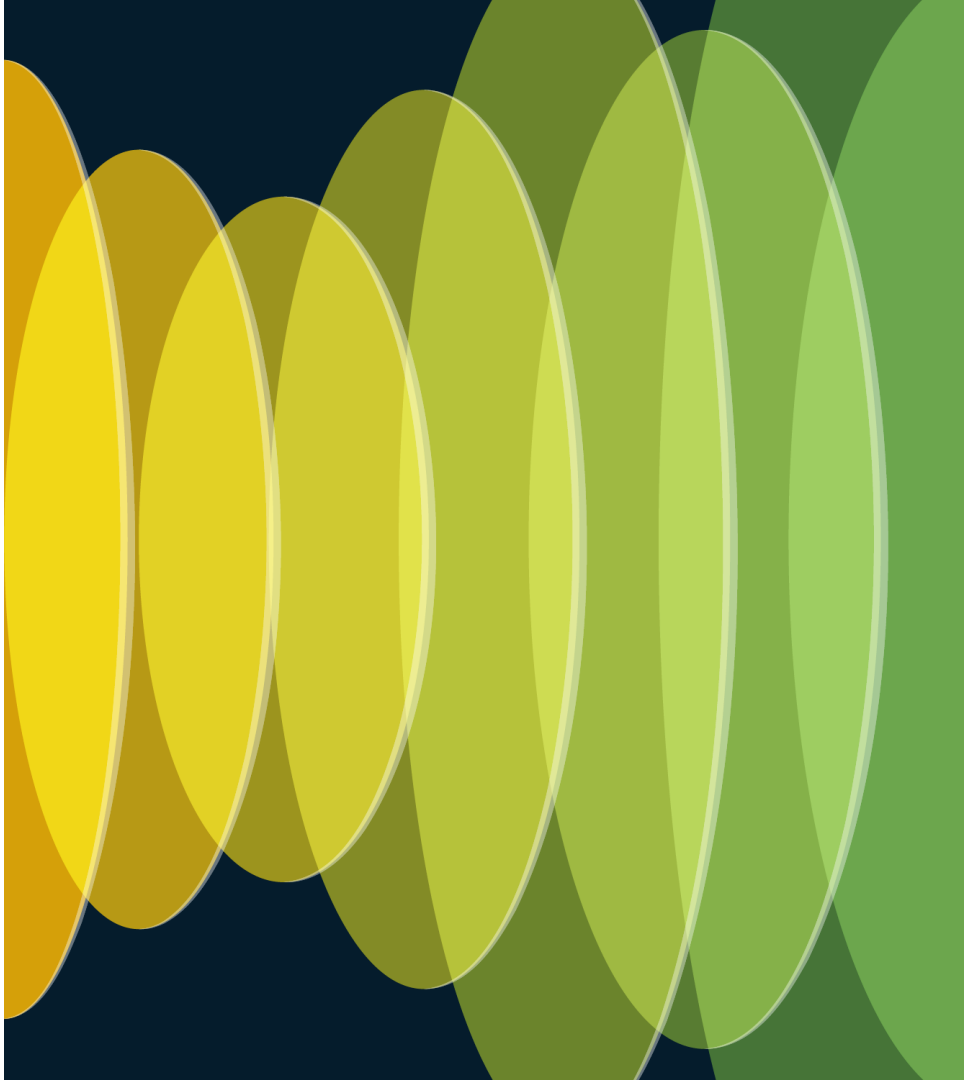
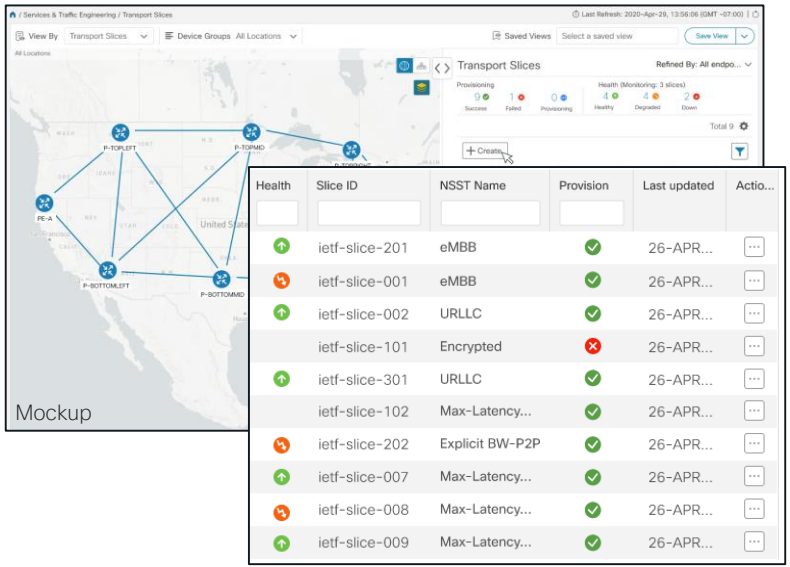
Demo: Service Health Monitoring and Troubleshooting



Transport Slicing Automation

Simplify Slice Lifecycle Management



Challenges

- Automation of slice lifecycle functions
- Ensure delivery of distinct SLA/SLO requirements

Solution

- Service catalog with templates for common slice types
- Utilize existing CNC capabilities: Provisioning, Monitoring, Traffic engineering and closed loop optimization

  L2VPN/L3VPN, SR TE, SRv6, FlexAlgo
- Leverage Circuit-Style Capabilities for bandwidth reservations
- SLA monitoring with QoS* and End-to-End network measurements (Latency/Loss/Jitter)
- Open, standards-based NBI (IETF slide YANG model)

Outcome

- Simplified deployment of 5G services with designated SLA
- New revenue stream can be enabled via Differentiated service offering

*In Planning

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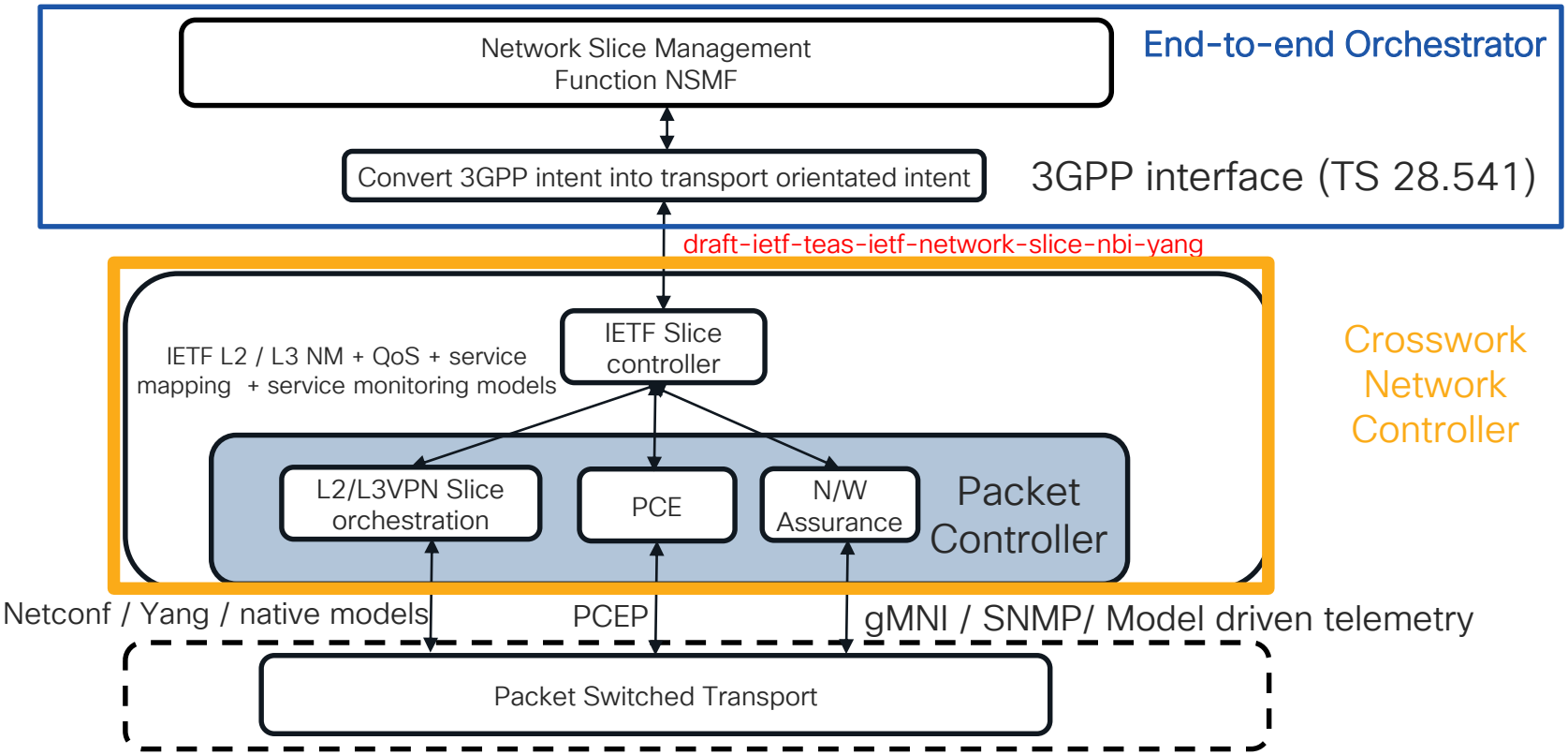
Reference only

Transport NSSMF and Crosswork Network Controller



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Automation Outcomes and Benefits

Agility is Essential in Operationalizing Mass-infrastructure Networks

Automation is Key to drive Operational Agility

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Automation Outcomes and Benefits

Agility is Essential in Operationalizing Mass-infrastructure Networks

Accelerate Time To Market 	• Rapid Service, transport and slice provisioning • Reinforced differentiation with granular TE control and SLAs • Faster introduction of new services with model-based approach
Improve Service Delivery 	• Preserved service policy intent and SLAs • Effective mitigation of network congestion • Optimal utilization of network resource with real-time optimization
Boost Operational Agility 	• Automated changes minimizing configuration errors • Abstraction of complexity in a heterogenous environment • Enhanced productivity with unified UI and workflows

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- BRKSPG-2474: Reduce resolution ti,e with a service-centric approach to troubleshooting

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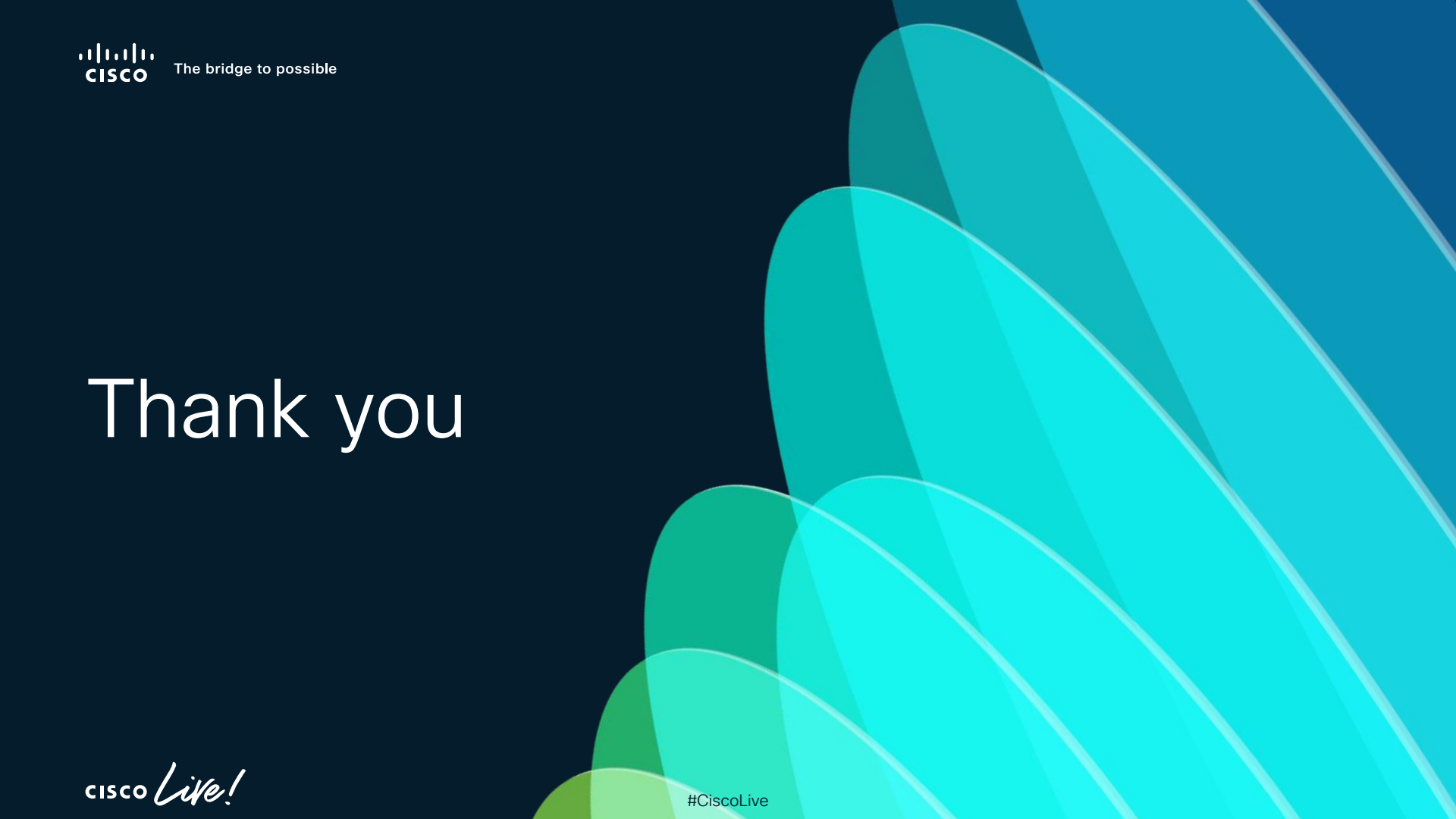
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