The Role and Importance of Automation in Converged SDN Transport Networks

Cisco Knowledge Network Webinar

September 21, 2021

Today's Presenters

Larry Goldman
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Agenda list

1. Key market developments are reshaping service provider priorities
2. Evolving architecture options, industry standards direction
3. Need for automation and orchestration in converged SDN transport networks
4. Cisco's network automation solution for Converged SDN Transport and RON
5. Questions

Webinar

The role and importance of automation in converged SDN transport networks

Larry Goldman

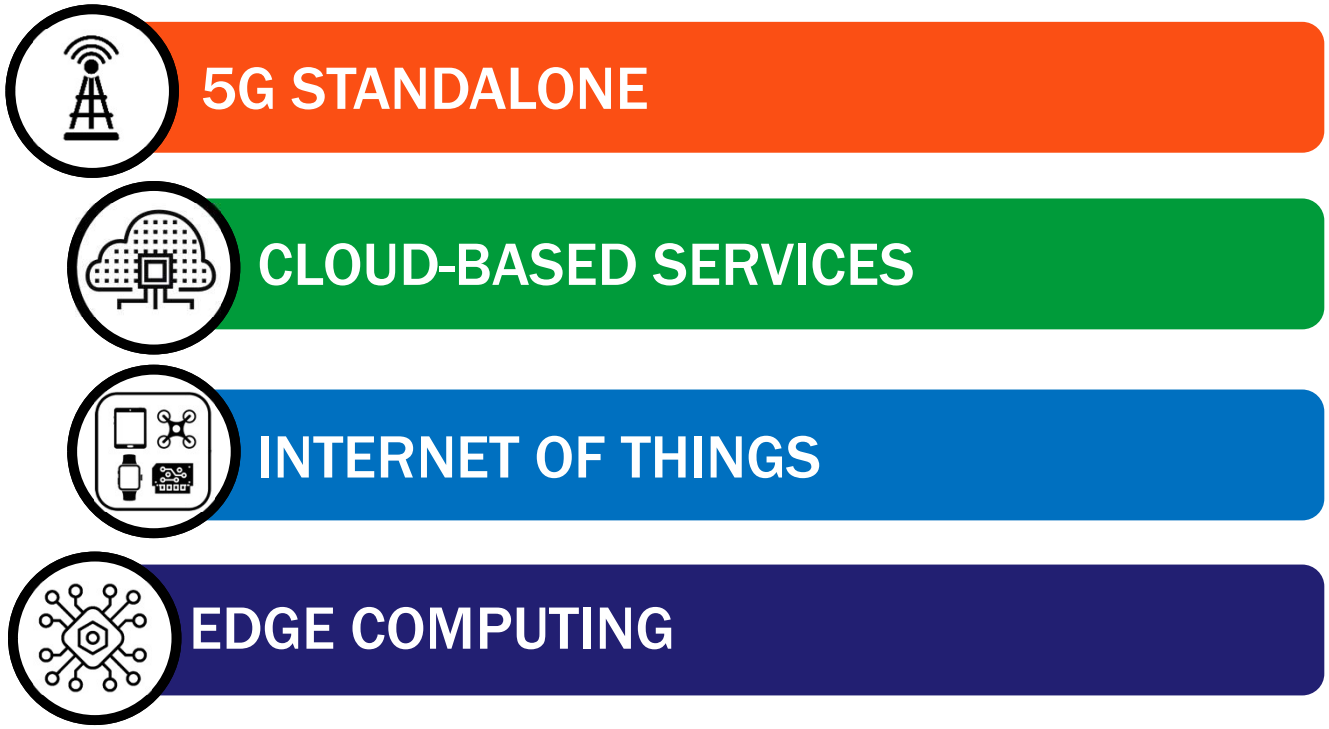
Chief Analyst, Analysys Mason

RESEARCH

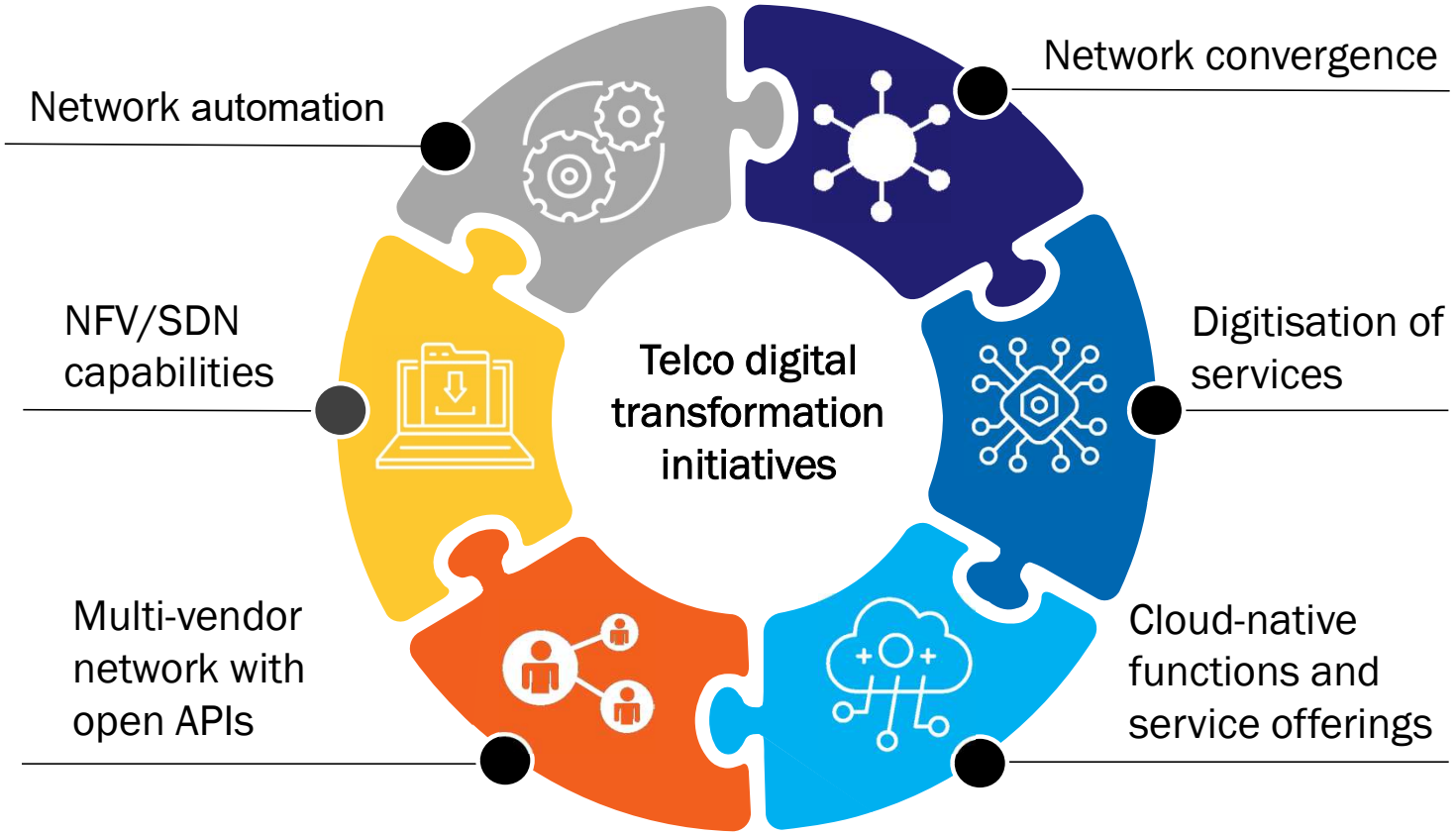
Introduction

1. 5G, cloud, IoT and edge computing are the key drivers for telcos' digital transformation.
2. Service providers can reduce network complexity and increase OpEx and capex efficiency by deploying converged IP/optical networks.
3. Hierarchical SDN controllers provide enhanced support for network automation, control and management functions for IP/optical networks.

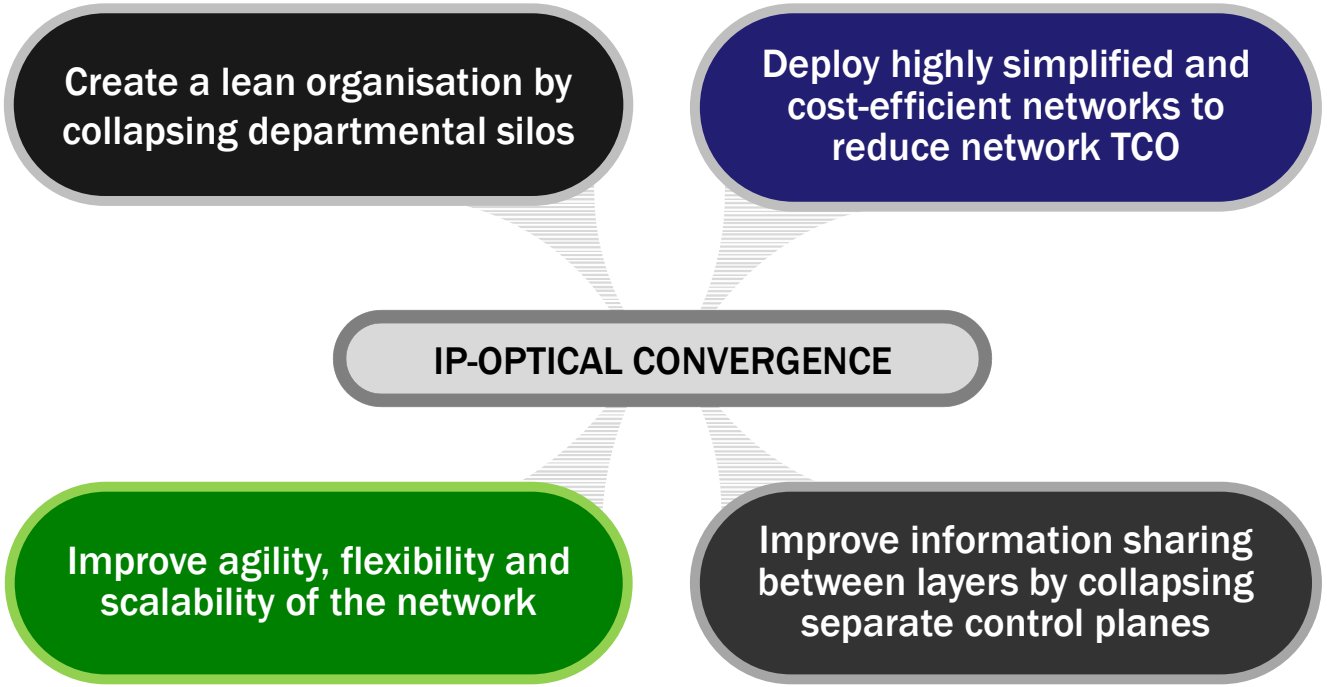
Key drivers for digital transformation



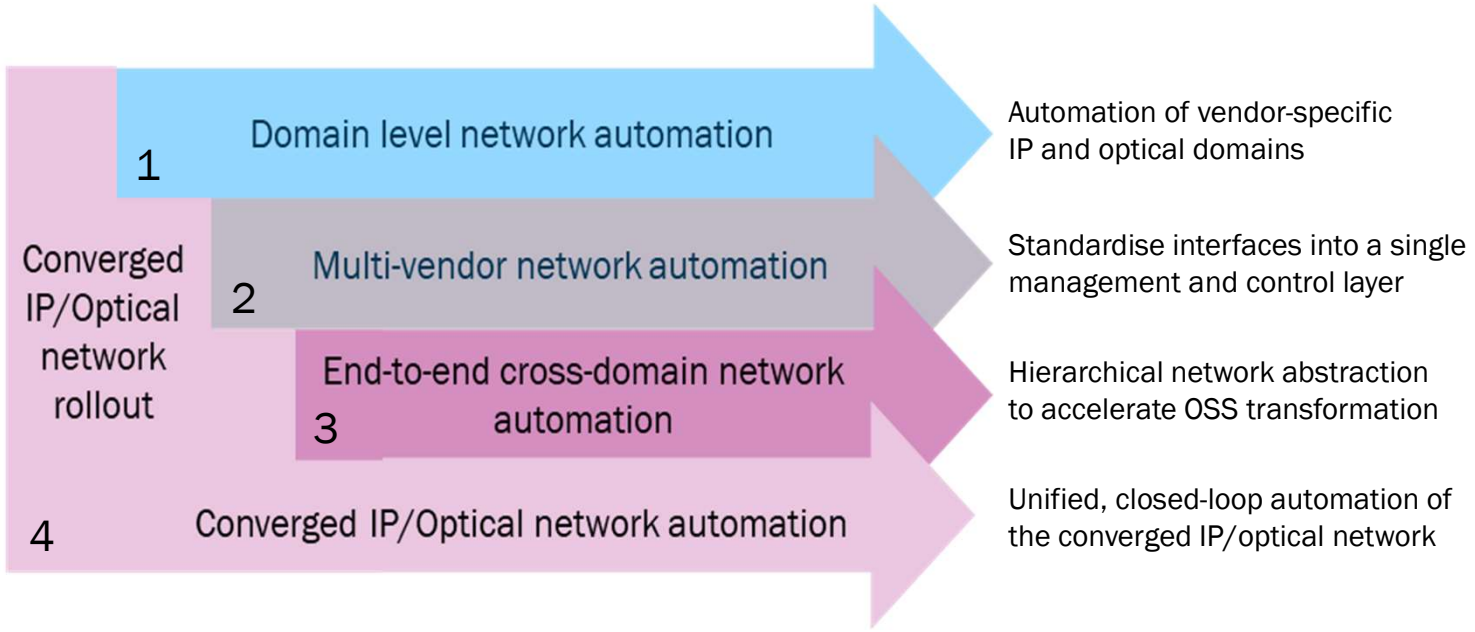
Telco journeys in digital transformation



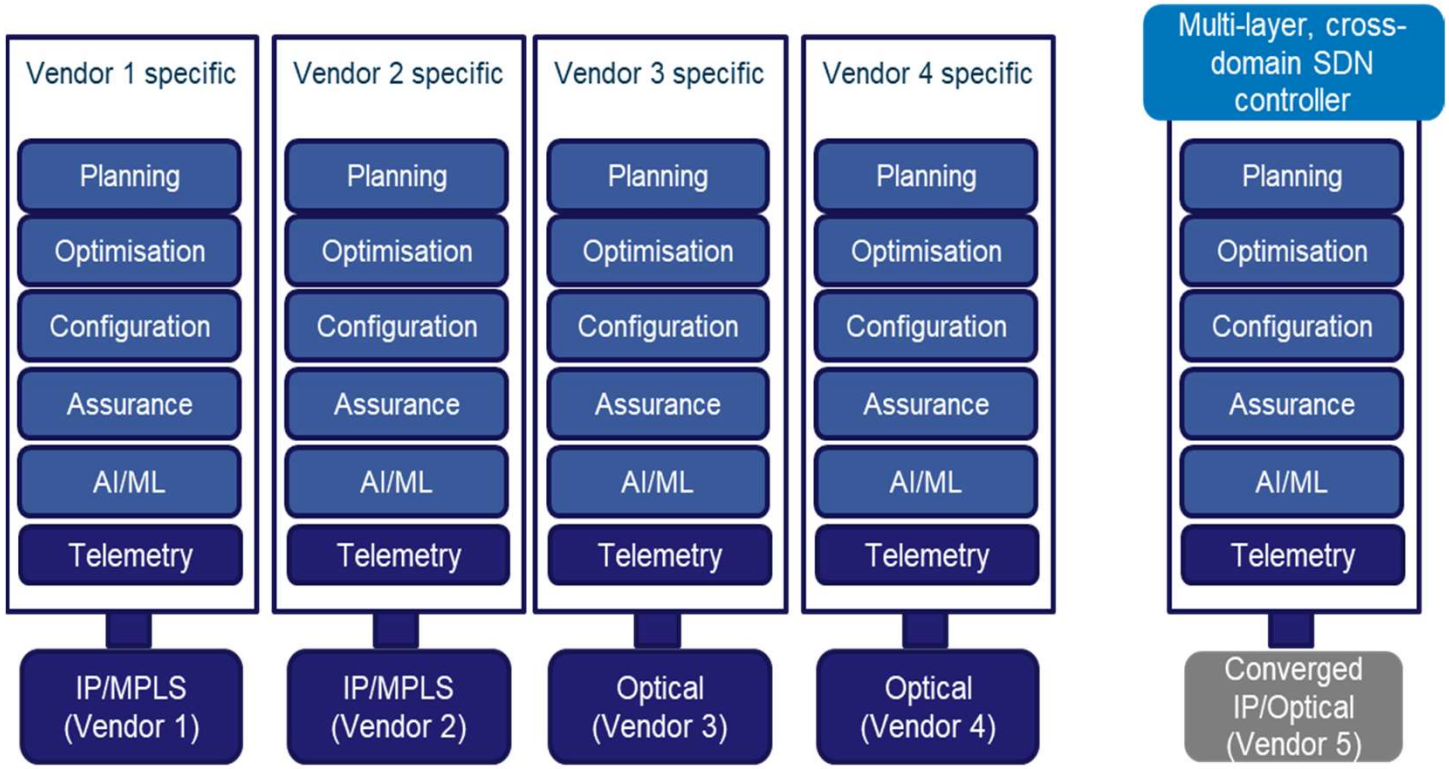
Benefits of converged IP-optical networks



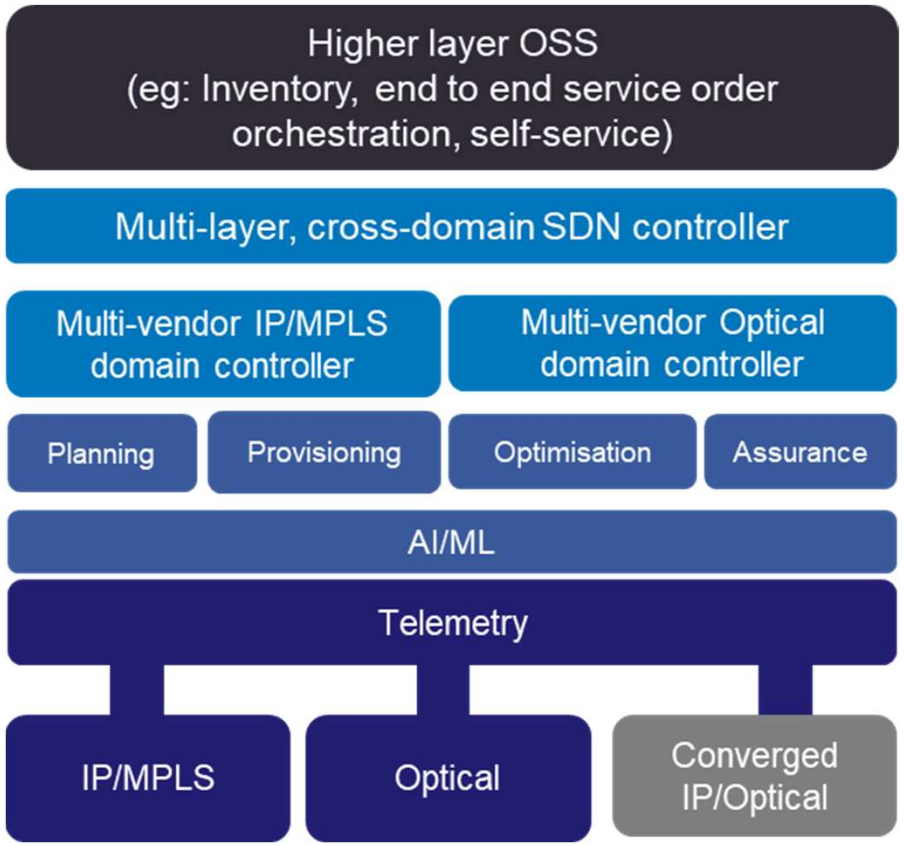
Network automation roadmap



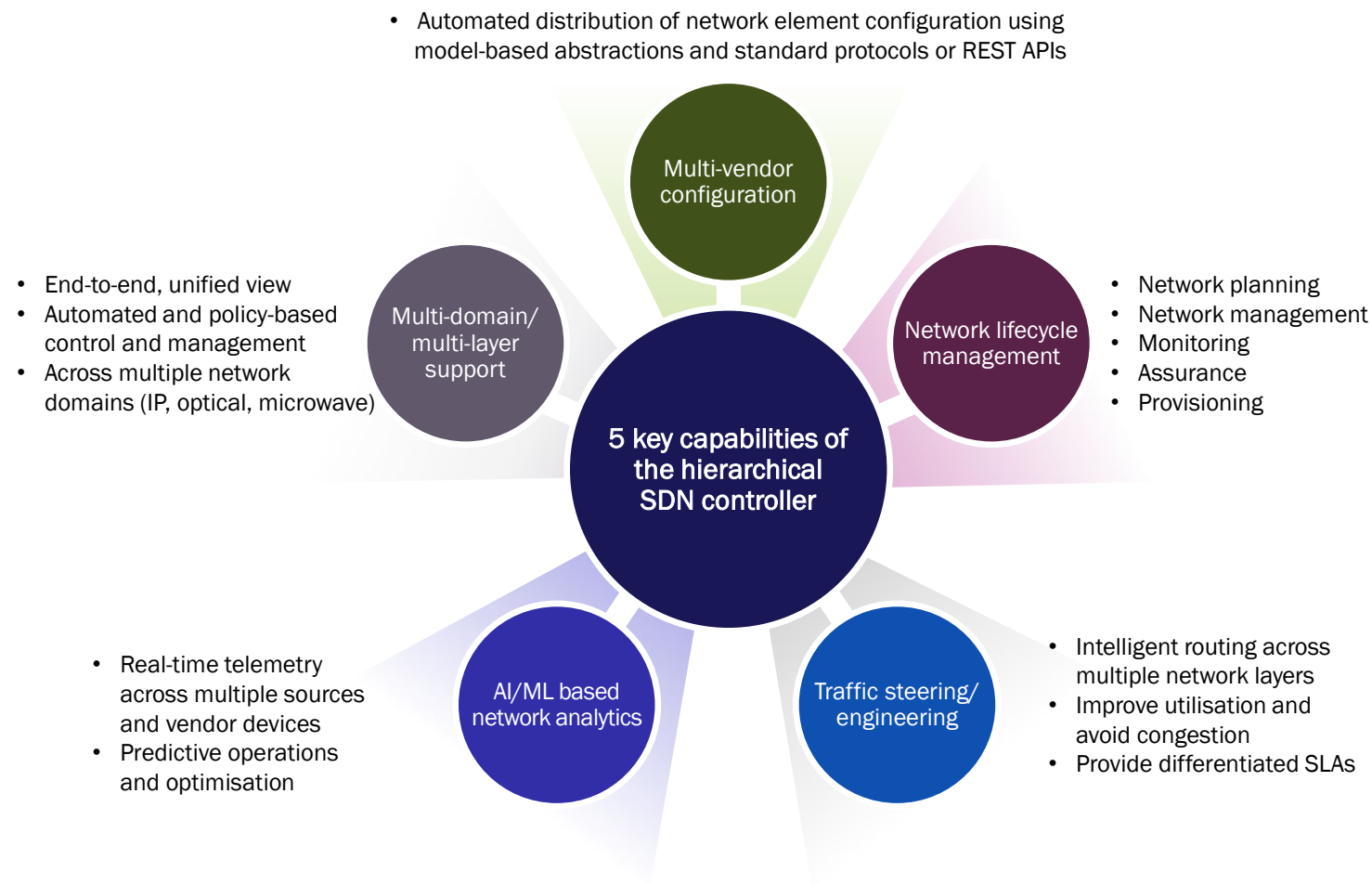
Domain level network automation



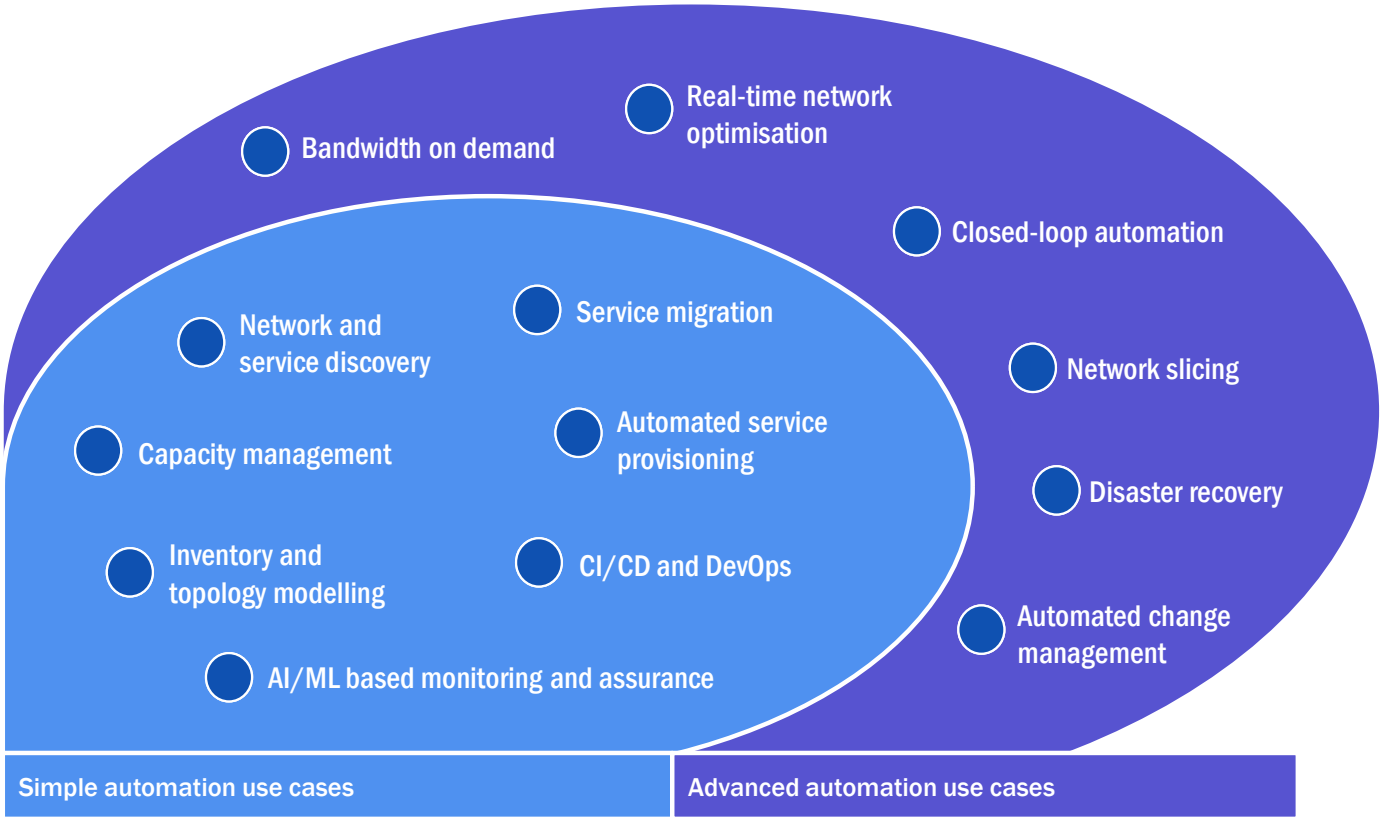
Hierarchical SDN controller architecture



Key capabilities of the hierarchical SDN controller



Use cases for hierarchical SDN controller



Recommendations

1. CSPs should migrate to converged IP/optical networks to achieve a simpler, more efficient network architecture.

2. CSPs should identify specific operational and digital transformation benefits that they want to achieve from deploying the converged IP/optical network.

3. The hierarchical SDN controller will help CSPs achieve network automation and gain operational and transformational benefits.

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analysys mason

Cisco’s network automation solution for Converged SDN Transport

Ori Gerstel, Senior Director, Mass-scale Infrastructure Automation

Rana Desouky, Director, Product Management Mass-scale Infrastructure Automation

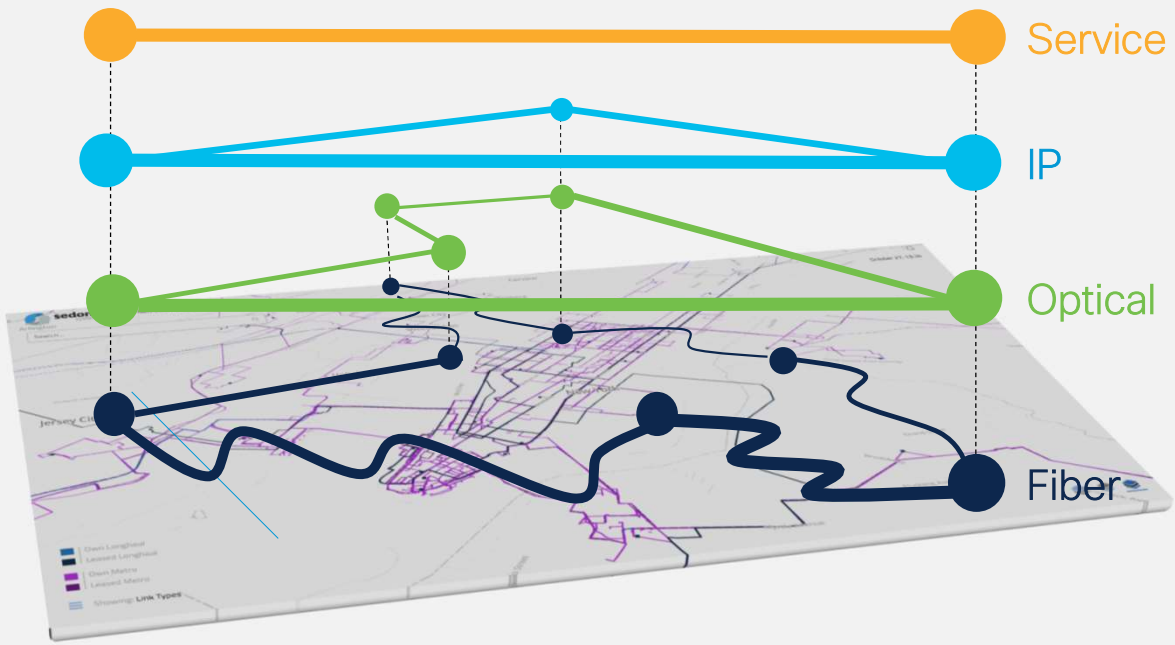
September 21, 2021

Cisco strategy

1. Cisco leads Internet for the Future with silicon, routing, optical and automation
2. Cisco Routed Optical Networking (RON) converges IP and optical networks with pluggable coherent optics and automation
3. Simplified RON networks operate at mass-scale with 46% less cost
4. Crosswork Hierarchical Controller complements Cisco Crosswork Network Controller to help customers operate the Cisco Routed Optical Networking solution

Crosswork Hierarchical Controller

Creating the ultimate network data source: Fiber-to-service visibility



Complete

Multilayer, multivendor, and multidomain topology, traffic, and services (SDN and legacy)

Current

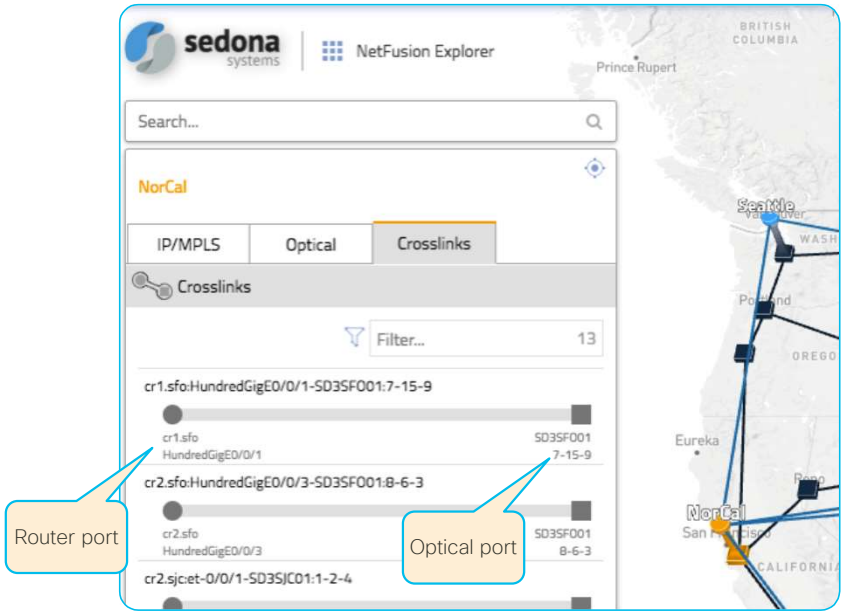
automatically and ongoingly discovered – directly from the network

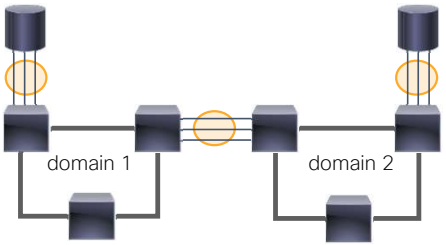
Correlated

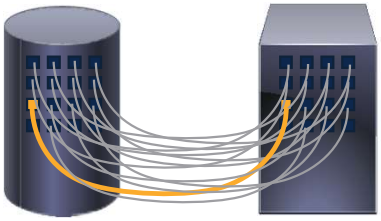
dynamically deducing cross-domain connectivity

Cross-layer/ domain mapping

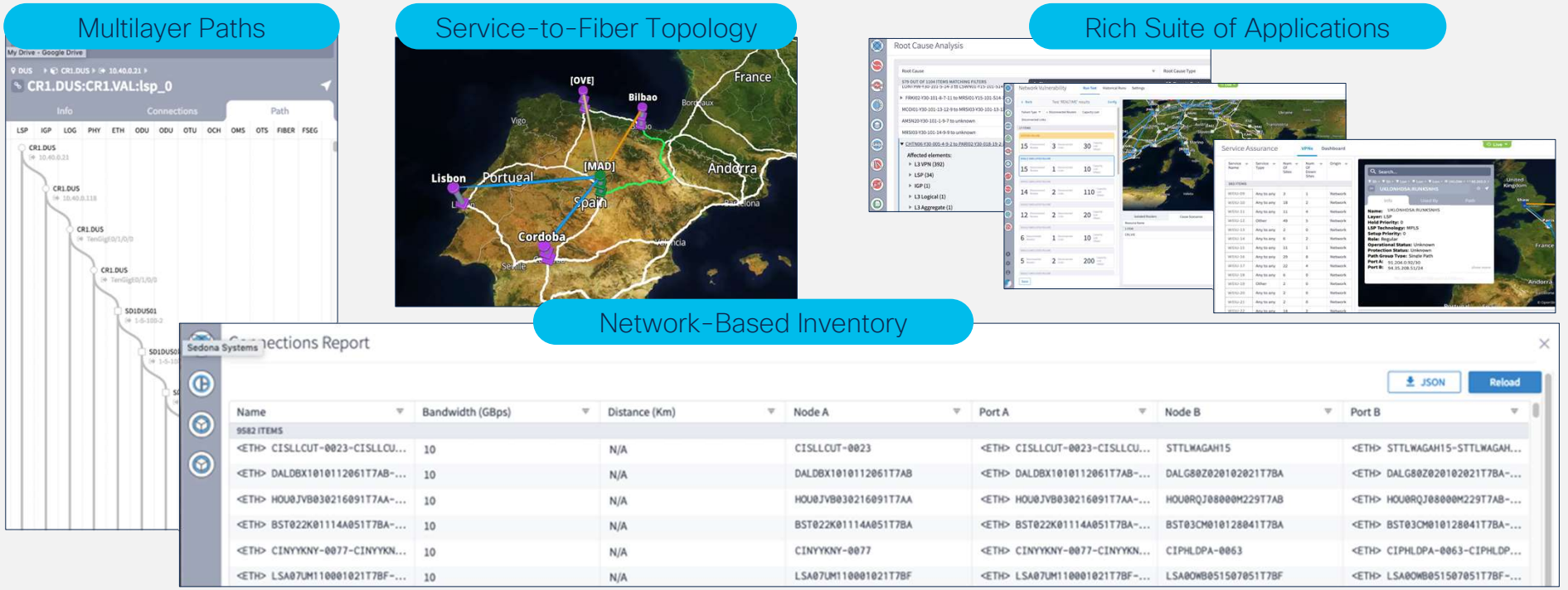
- Patented process based on complex analysis of topology, performance data, and transient behaviours
- Mandatory before any autonomous action
- Full mapping impossible using current standards
  - Partial solution for Ethernet via LLDP
  - Partial solution for OTN via TTI
  - Not working on most legacy gear



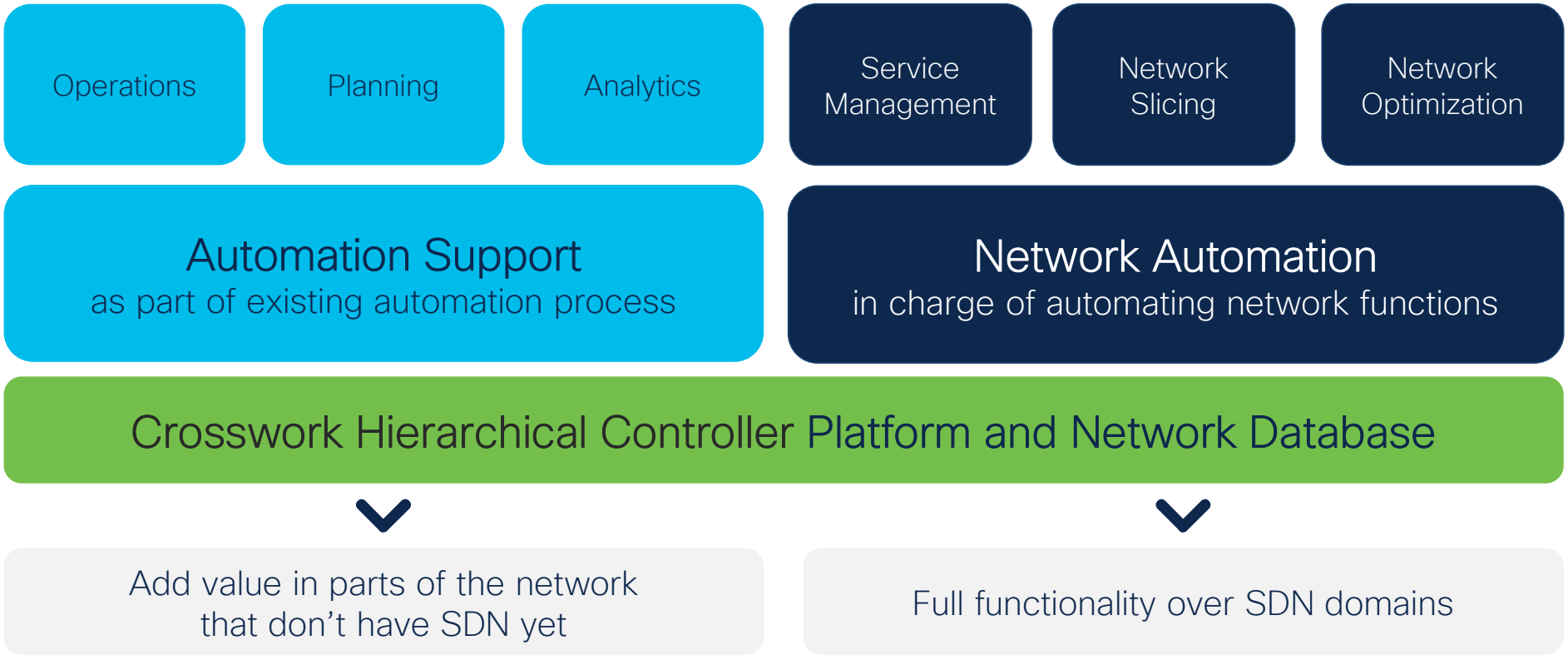




Crosswork Hierarchical Controller core functions



Crosswork Hierarchical Controller solution



The operational challenge solved by Crosswork Hierarchical Controller

The Challenge: Network Silos

Transport networks are a patchwork of technologies, domains, layers, and vendor turfs.

Most still rely on a siloed, highly manual, and error-prone operational apparatus.

Each domain is modeled completely differently.

This limits the ability to automate the network and optimize it.

IP Aggregation NW

IP Core Network

Metro Optical Vendor A

LH Optical Vendor B

The Solution

Automatically acquire domain-specific network **data**

Normalize vastly different models into a common structure

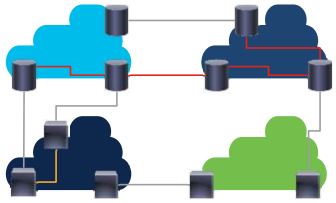
Understand how **domains** in one layer are connected

Understand how **layers** are connected to each other

Analyze the **network** to identify issues and **visualize** it

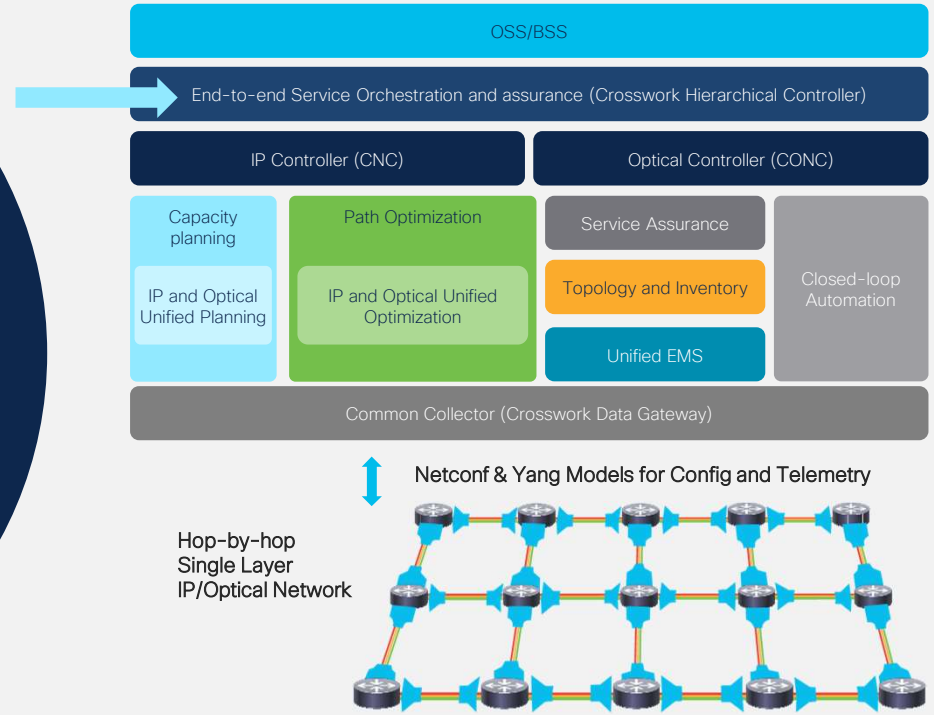
Automate transport slice fulfilment and assurance across any layer

One Network, One Model



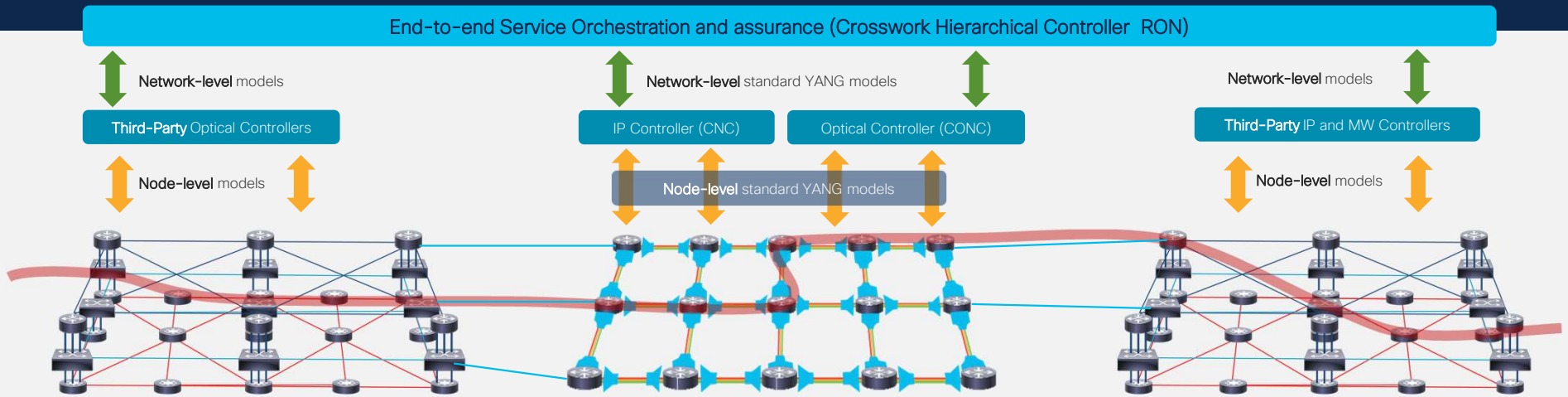
Role of Crosswork Hierarchical Controller in the routed optical network control architecture

- A RON control solution contains at least:
  - Cisco® optical controller (CONC)
  - Cisco router controller (CNC)
  - Solution controller (Crosswork Hierarchical Controller RON)
- CONC and CNC are responsible for:
  - Discovering all their layer details
  - Path optimization within the layer
  - Configuring services within the layer
  - Updating Crosswork Hierarchical Controller with changes
- Crosswork Hierarchical Controller RON is responsible for:
  - Single pane of glass/API
  - NBI to OSS
  - Understanding how the layers are connected
  - Breaking a multilayer request in the IP part and optical part
  - Bridging between the RON and non-RON networks across multi-vendor, multi-layer IP and Optical networks.

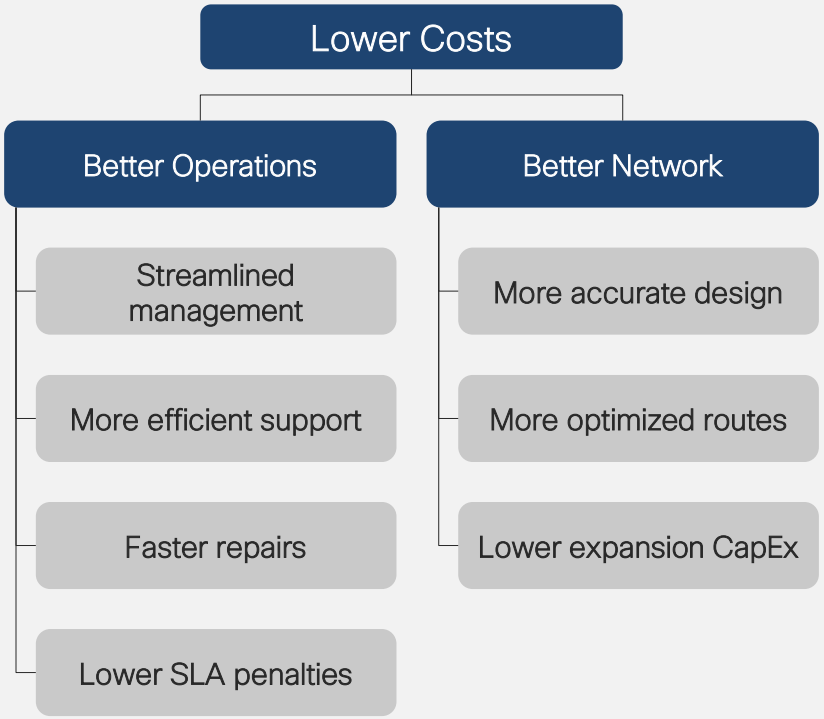


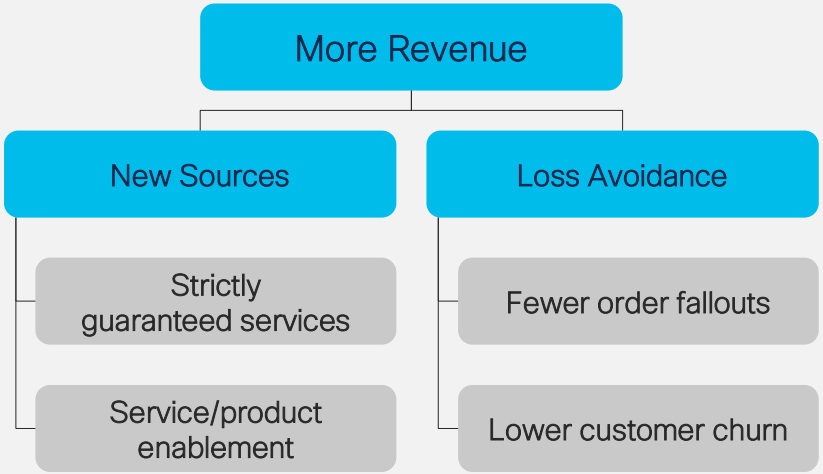
Role of Crosswork Hierarchical Controller in a hybrid RON + legacy network

- Deployment scenarios:
  - RON is deployed side by side with other domains
  - RON routers are deployed over legacy WDM systems
- Role of Crosswork Hierarchical Controller RON: control and assure the entire network in a unified and easy manner
- Provide smooth introduction for RON into a non-RON network – single look and feel to operations

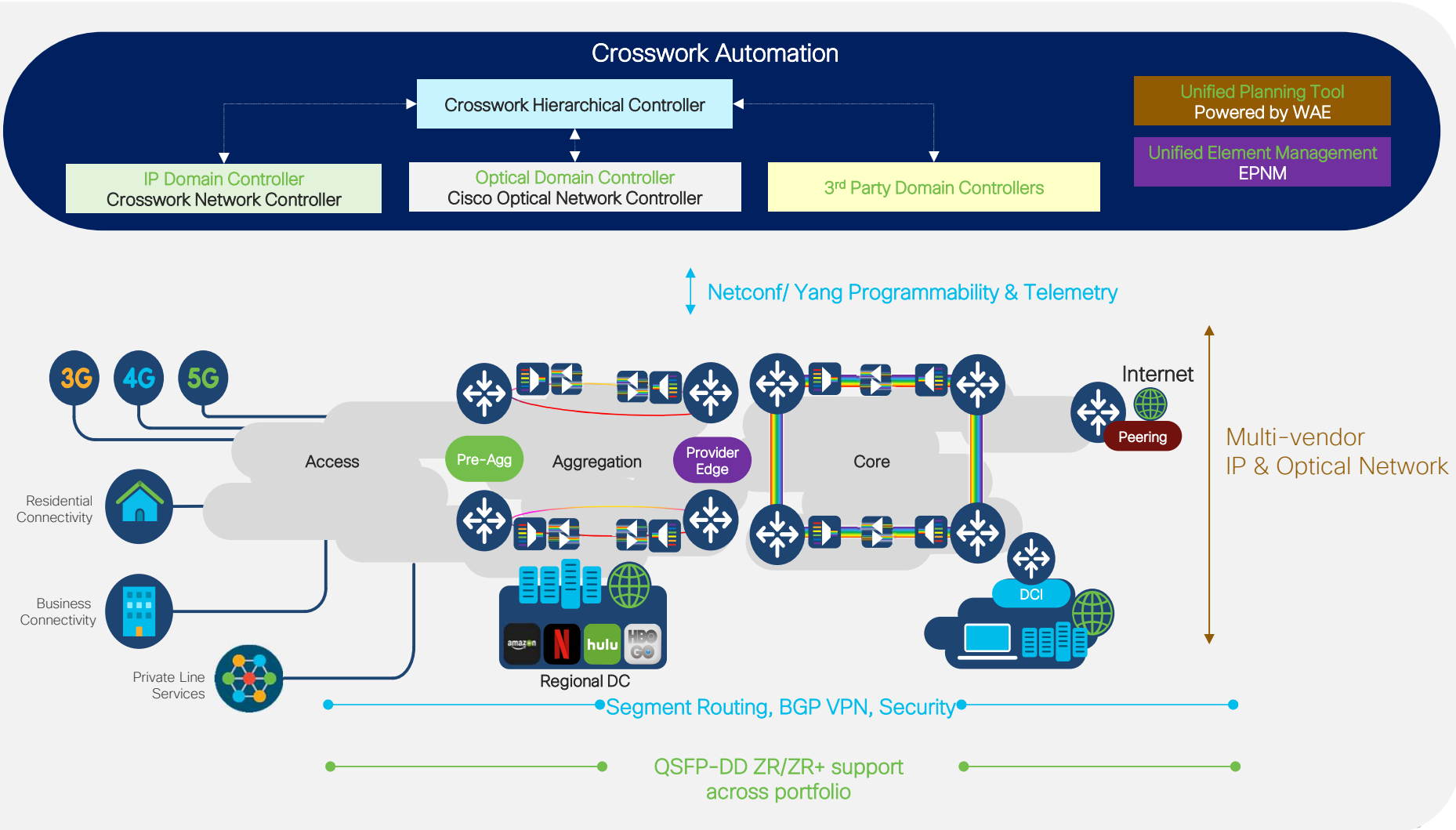


Economic benefit drivers



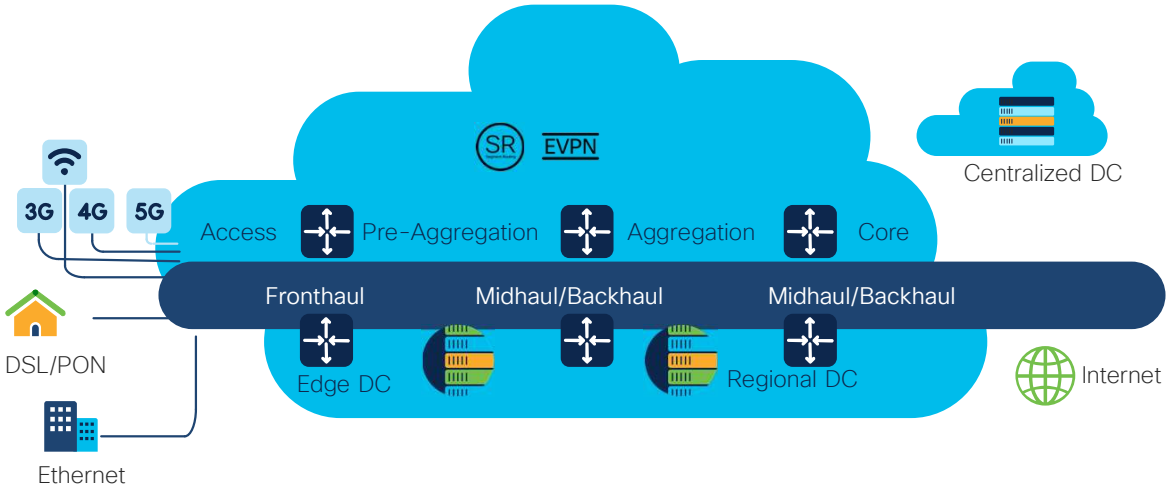


Crosswork Network Controller
for IP Converged SDN Transport


Crosswork Automation
Crosswork Hierarchical Controller
IP Domain Controller
Crosswork Network Controller
Optical Domain Controller
Cisco Optical Network Controller
3rd Party Domain Controllers
Unified Planning Tool
Powered by WAE
Unified Element Management
EPNM
Netconf/ Yang Programmability & Telemetry
3G
4G
5G
Residential Connectivity
Business Connectivity
Private Line Services
Access
Pre-Agg
Aggregation
Provider Edge
Core
Internet
Peering
Regional DC
DCI
Multi-vendor
IP & Optical Network
Segment Routing, BGP VPN, Security
QSFP-DD ZR/ZR+ support
across portfolio

Crosswork Network Controller (CNC)

CNC simplifies service provisioning, optimization and visualization for multi-vendor, cross-domain IP transport networks



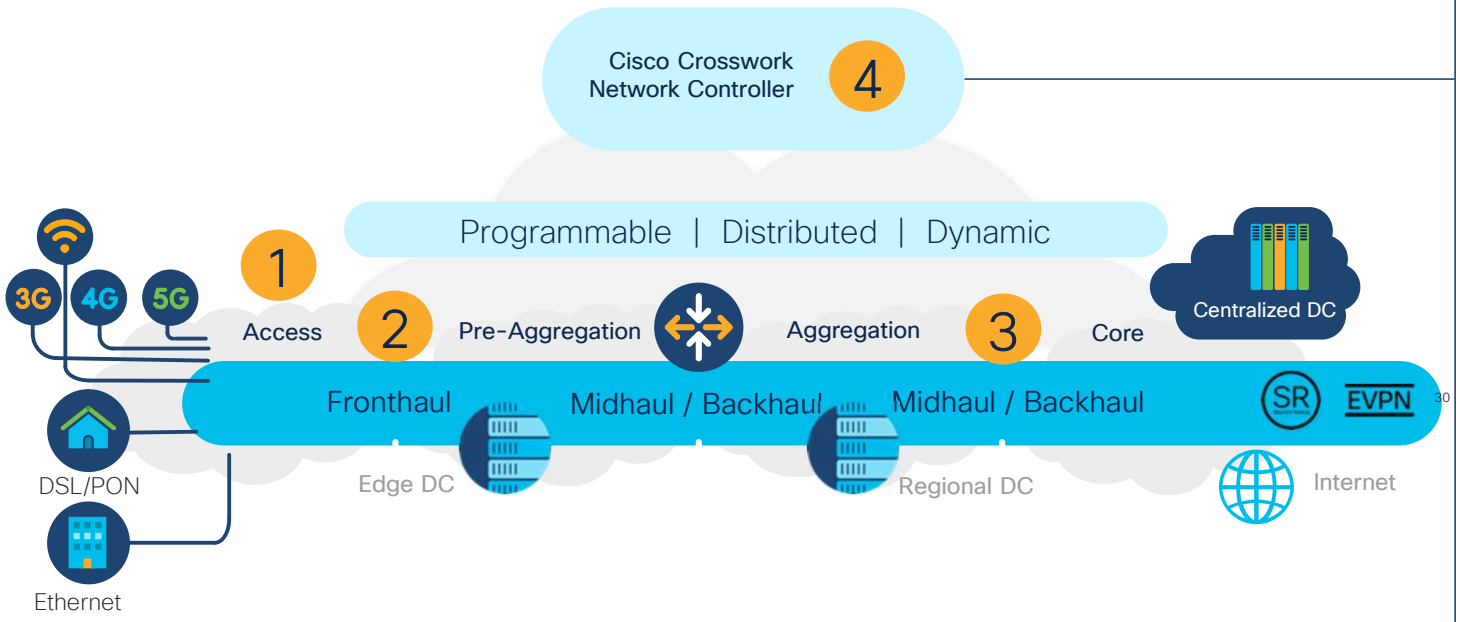
Visibility
Topology Visualization
Network Collection

Insights
KPI Monitoring
Path Optimization
Traffic Engineering

Action
Service Orchestration

Crosswork Network Controller (CNC)

Simplify Operational Lifecycle - Converged SDN Transport Automation



Challenges

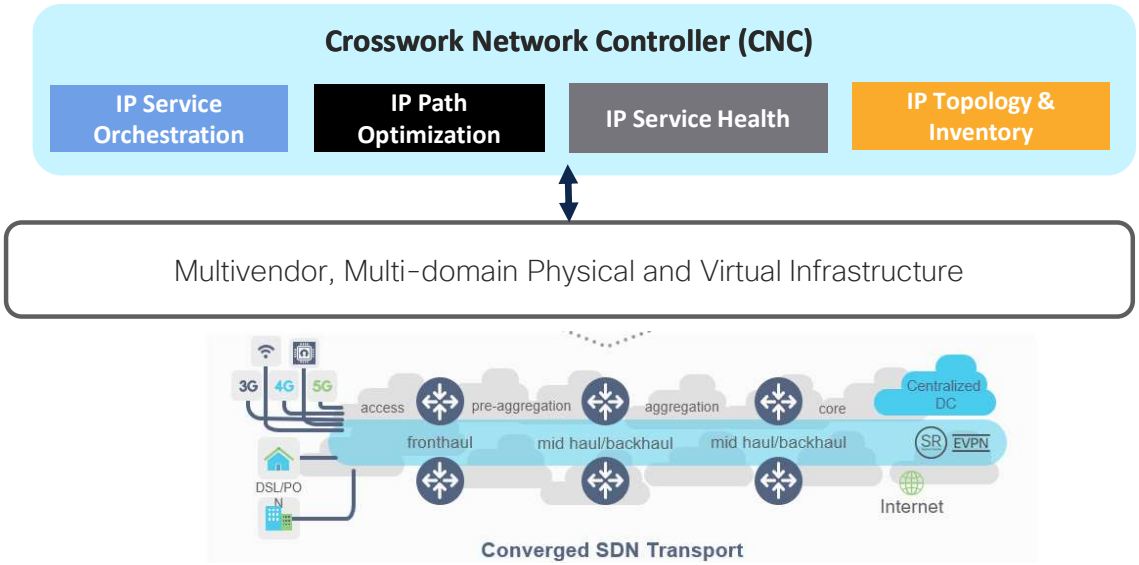
1. Time-consuming Service Provisioning
2. BW swings, over capacity
3. Congestions and service impacting conditions
4. Siloed, ineffective tools (high OpEx)

Outcomes

- **Intent-based Automated Provisioning**
- **Dynamic BW management**
- **Closed loop Automation**
- **Turnkey solution – across lifecycle**

Crosswork Network Controller (CNC)

Integrated solution for deploying and operating IP transport networks



Use Case	Description
Service Provisioning	Provision L2VPN & L3VPN services with transport intent
Intent-Oriented Transport Provisioning	Provision segment routing traffic-engineering policies for services with SLAs.
Bandwidth Optimization	Tactically optimize the network during times of congestion
Real time network optimization	Collect real-time performance information and optimize the network as needed to maintain the SLA
Topology & Inventory	Collect and expose information about network and services

Evolved Programmable Network Manager for Element Management

EPNM for Routing & Optical Infrastructure Operations

Fault Management

- Service status monitoring
- Circuit-based alarm correlation
- Troubleshooting in context
- Circuit troubleshooting tools
- Multi-layer traces

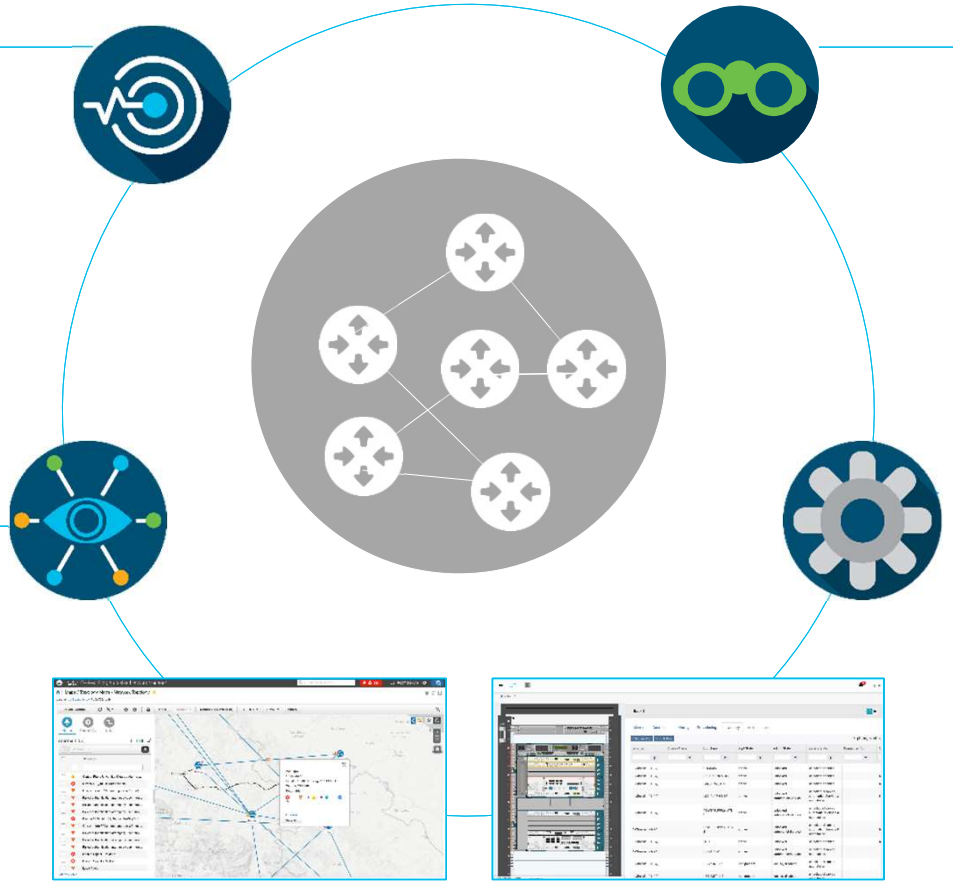
OUTCOME: Reduce time to know, time to restore service

Inventory and Topology Management

- Detailed discovery of devices, topology (physical, circuit, virtual connectivity)
- ChassisView
- GUI and template configuration
- Image and config file management

OUTCOME: Know your network,

.



Performance Management

- KPI Monitoring (device, interface, and circuit/virtual connection)
- Real-time and Historical PM
- Leverage network features and probes, e.g. IP SLA, Y.1731

OUTCOME: Reduce time to know, time to action

Configuration/Provisioning

- Discover circuits and virtual connections
- Edit or delete discovered circuits/virtual connections
- Device-level configuration
- UI and NBI driven Provisioning
- Centralized control plane for optical circuit provisioning and restoration

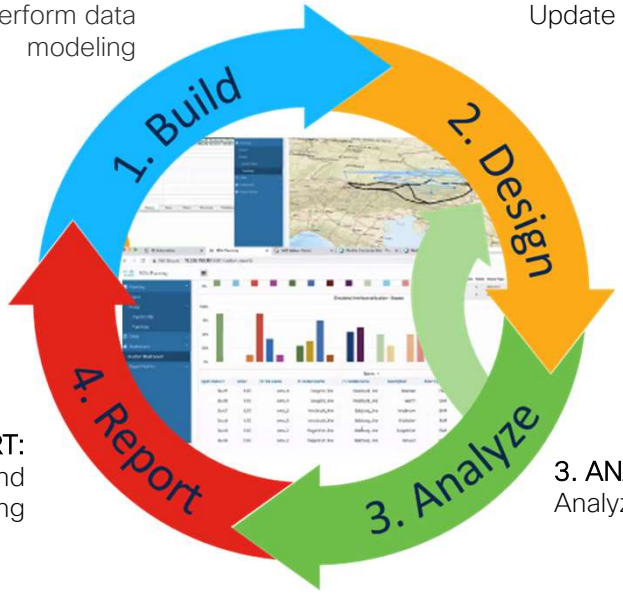
OUTCOME: Reduce time to value, Increase provisioning accuracy

Crosswork Unified Planning
powered by WAN Automation Engine

Unified Planning
powered by WAE

1. BUILD: Collecting input data to feed into the planning exercises and perform data modeling

2. DESIGN: Visualization and Update



4. REPORT: Dashboarding and Reporting

3. ANALYZE: Route & Analyze the Traffic

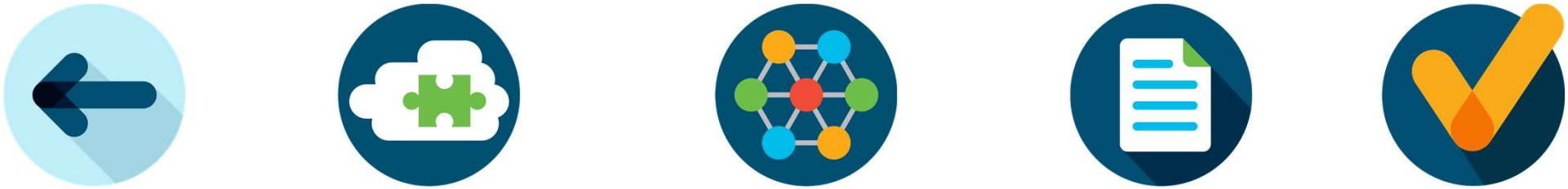
use cases

- Import and visualize actual network (existing static network)
- Create and visualize hypothetical network plan (new network deployment)
- Capacity optimization
- What-if analysis simulation

Summary

Unified IP and Optical Automation

for Routed Optical Networking & Brownfield Siloed IP and Optical Networks



Unified Visualization
Single Pane of Glass

Unified Planning &
Orchestration

Service Health &
Assurance

Dynamic Path
Optimization

Unified Element
Management

Operational Simplification with Multi-Domain Automation
Leveraging standards-based Open APIs

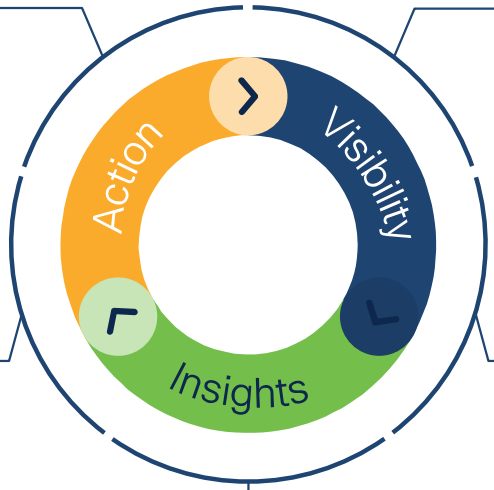
Tenets of Cisco Crosswork Automation

Software defined

API-centric, unlocking of operational data and simpler tool chain integration

Standards-based

Architecture based on standard APIs and protocols giving customers the needed flexibility.



Autonomous

Real-time visibility, assurance, and analytics to support zero-touch operations

Multivendor + multidomain

Robust support for vendors across technologies for the entire service

Scalable + adaptive

Effortlessly adjust to changes in size, volume, and frequency of workflows

Please download the white paper

Available on

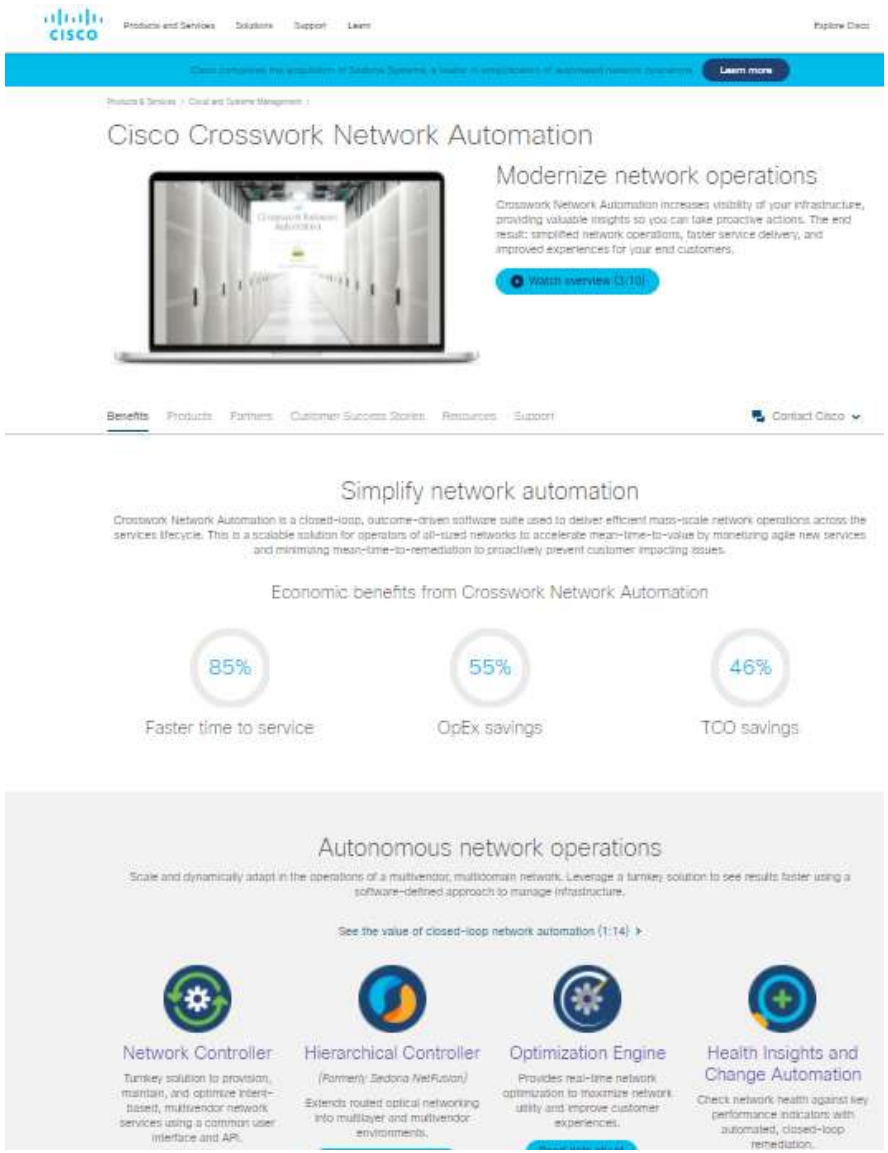
www.analysysmason.com/

and

www.cisco.com/go/crosswork

For more information on Cisco's Crosswork Automation portfolio, please visit

cisco.com/go/crosswork



Questions?

The bridge to possible

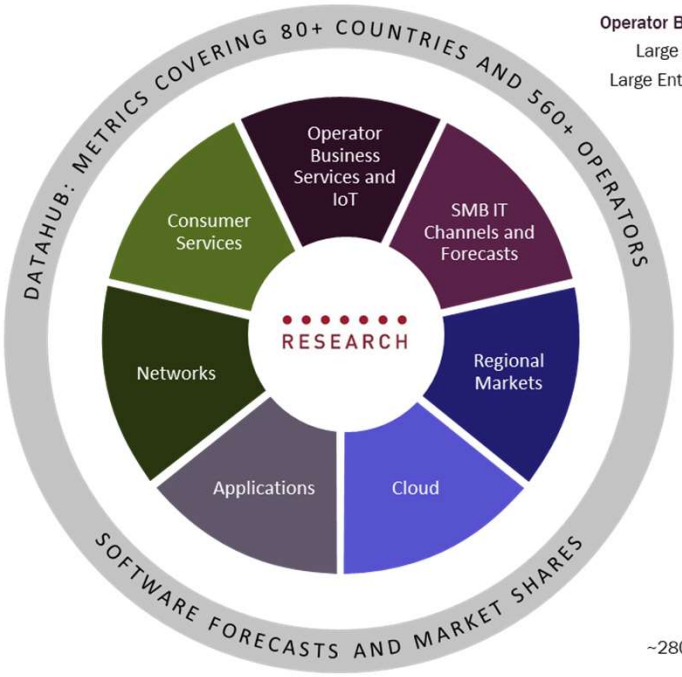
Research from Analysys Mason

Consumer Services programmes
Fixed Broadband Services
Mobile Services
Fixed–Mobile Convergence
Smart Devices
Future Comms
Video, Gaming and Entertainment
Digital Services

Networks programmes
Next-Generation Wireless Networks
Wireless Infrastructure
Fibre Infrastructure
Operator Investment Strategies

Applications programmes
Network Automation and Orchestration
Customer Engagement
Monetisation Platforms
Digital Experience
Automated Assurance
Service Design and Orchestration

Cloud programmes
Cloud Infrastructure Strategies
Data, AI and Development Platforms
Media Platforms



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Operator Business Services and IoT programmes
Large Enterprise Voice and Data Connectivity
Large Enterprise Emerging Service Opportunities
SME Strategies
IoT and M2M Services
IoT Platforms and Technology

SMB IT Channels and Forecasts programmes
Cyber Security

Regional Markets programmes
Global Telecoms Data
Americas
Asia–Pacific
Middle East and Africa
European Core Forecasts
European Telecoms Market Matrix
European Country Reports

DataHub
~2800 forecast and 280+ historical metrics
Regional results and worldwide totals
Operator historical data

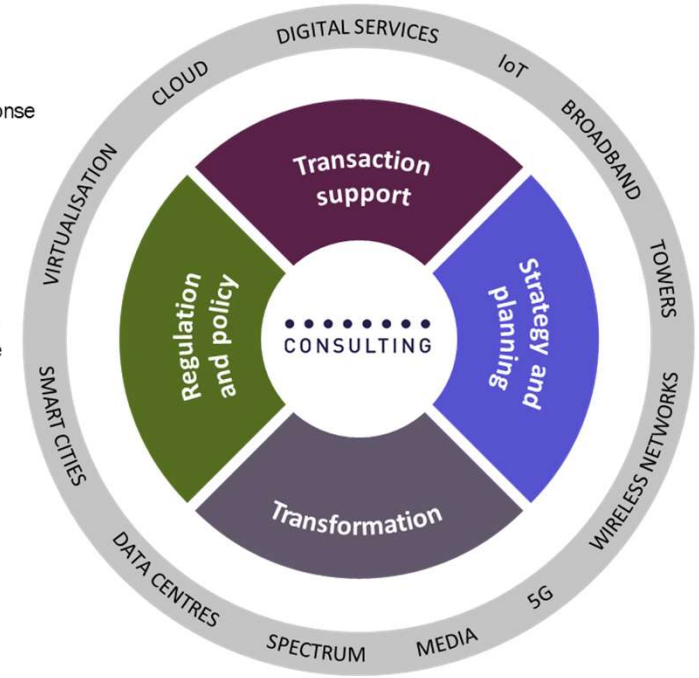
Consulting from Analysys Mason

Regulation and policy

Policy development and response
Ex-ante market reviews, remedies, costing...
Universal Service Obligation (USO)
Scarce resources: radio spectrum management, auction support, numbering...
Ex-post / abuse of dominance
Postal sector

Transformation

Transformation programmes
Assurance
Implementation
Delivery



Transaction support

Commercial and technical due diligence, buy-side and sell-side
Initial public offerings (IPOs)
Financial valuation
Debt financing
Lending technical advisory
Opportunity scouting
Business plan review

Strategy and planning

Commercial expertise
Technology optimisation
New digital frontiers

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