The bridge to possible

Chrosswork Hierarchical Controller

Cross layer-vendor-domain Automation

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cisco Live!

BRKSP-2080

Agenda

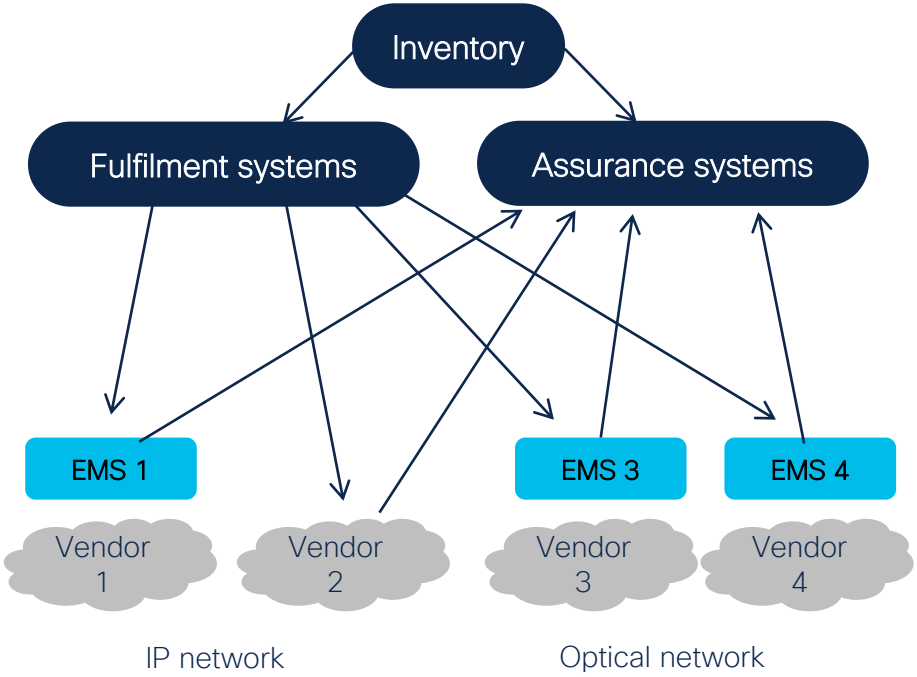
- Introduction
- Defining a Hierarchical Controller
- Compliant with Industry Standards
- Introducing HCO
- Differentiation
- Conclusion
- Short Demo

Why the need for hierarchical control?

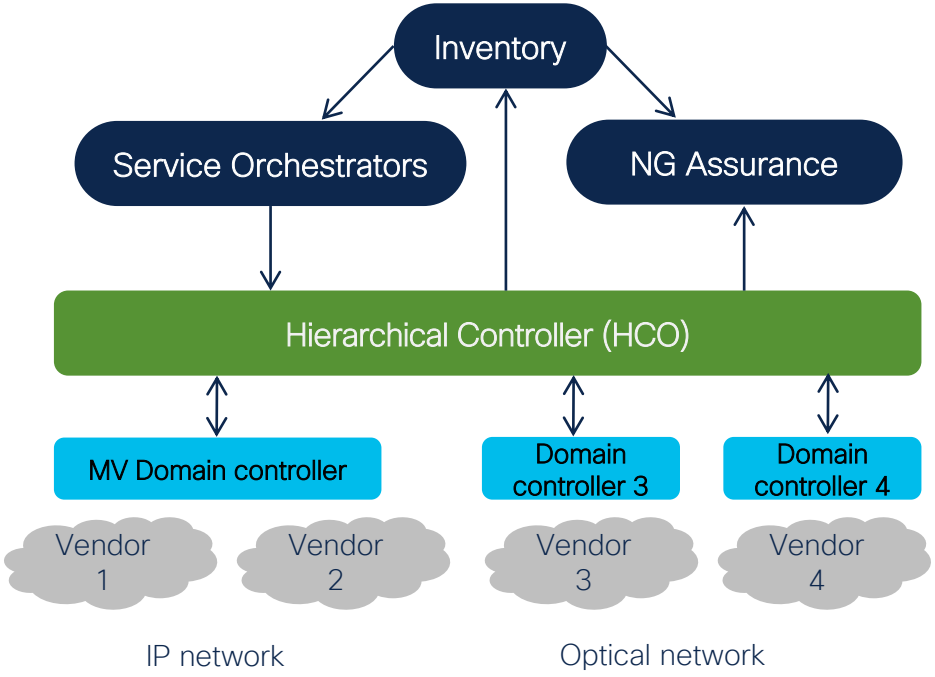
- All service providers networks are complex
  - Multi Layer
  - Multi Domain
  - Multi Vendor
- Demands on the network are ever increasing
  - 5G services
  - On-demand expectations
  - Rapid data growth
  - Architecture shifts

Legacy Network Management vs. SDN Hierarchy

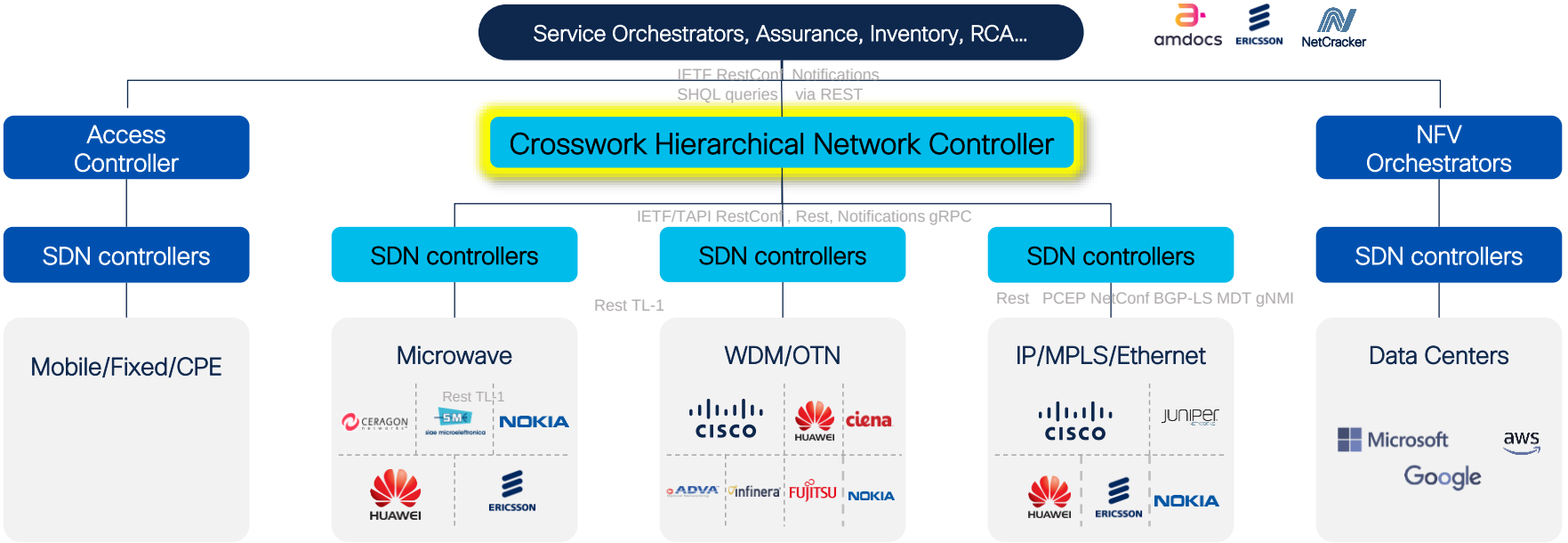
Legacy mgmt stack



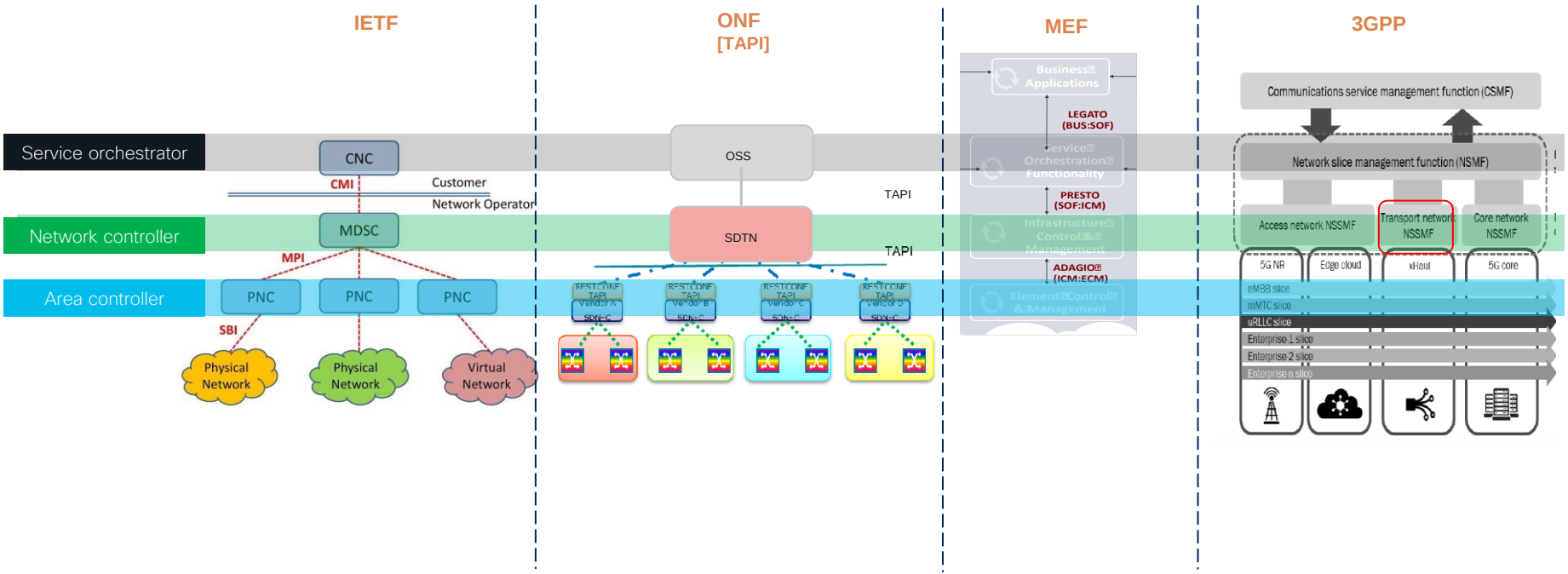
New SDN stack



SDN Network architecture
Industry and operators



Aligned to standards



...As Well as by Major Telco Groups

- HCO is the interface between the OSS world and the network
- HCO has complete network visibility
- HCO closes the loop for network functions (remediation, optimization)
- HCO abstracts the network towards the OSS

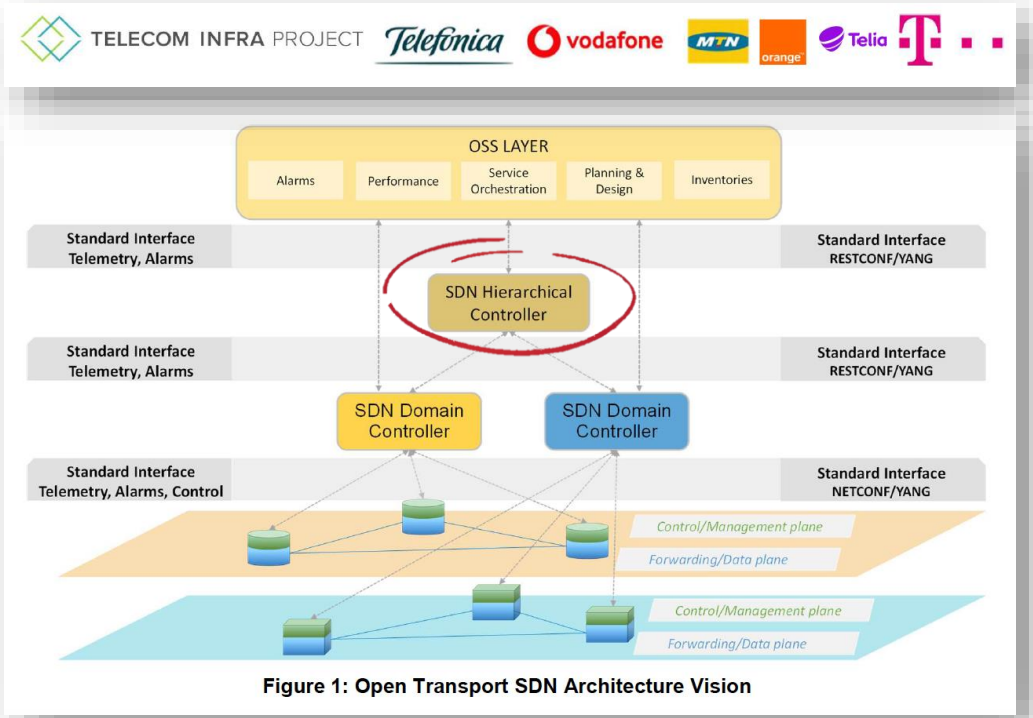
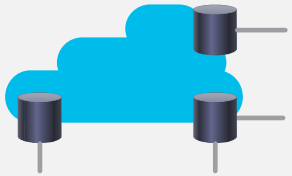


Figure 1: Open Transport SDN Architecture Vision

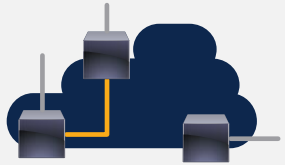
https://cdn.brandfolder.io/D8DI15S7/at/jh6nnbb6bjvn7w7t5jbgm5n/OpenTransportArchitecture-Whitepaper_TIP_Final.pdf

The challenge:
Rigid and fragmented networks

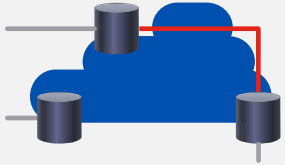
- Transport networks are a patchwork of technologies, domains, layers, and vendor turfs
- Most still rely on a siloed, highly manual, and error-prone operational apparatus
- Current network data is fiendishly difficult to collect, correlate, and utilize



IP Aggregation NW



Metro Optical Vendor A

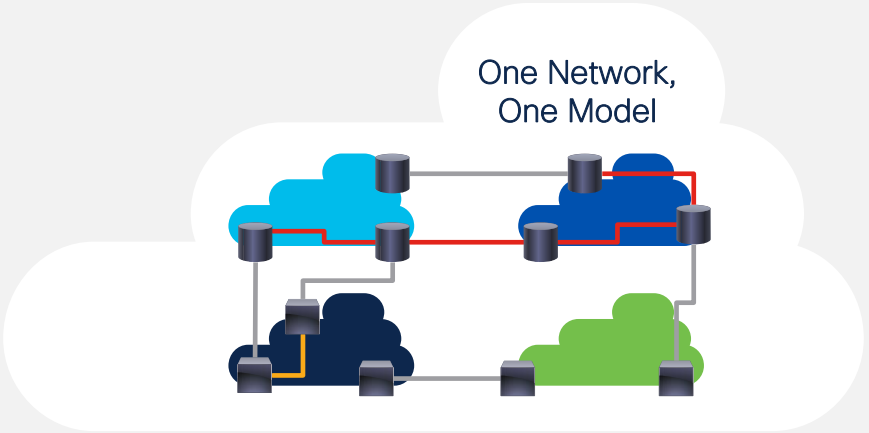


IP Core Network

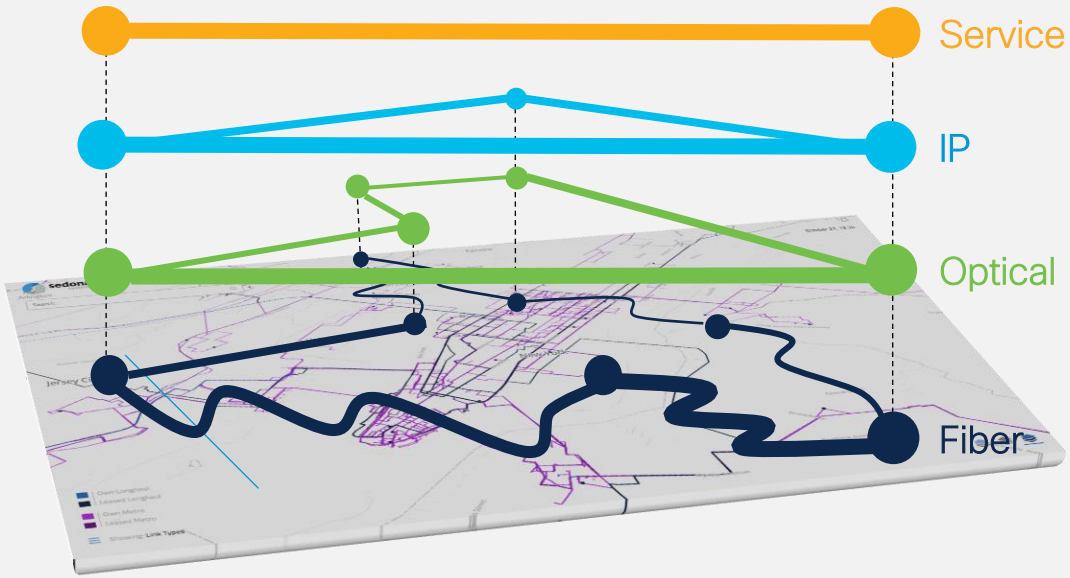
LH Optical Vendor B

Crosswork Hierarchical Controller puts this puzzle together

- Automatically acquire domain-specific network data
- Normalize into network structure
- Understand how domains in one layer are connected
- Understand how layers are connected to each other
- Analyze the network to identify issues
- Visualize it
- Automate it



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



Complete

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

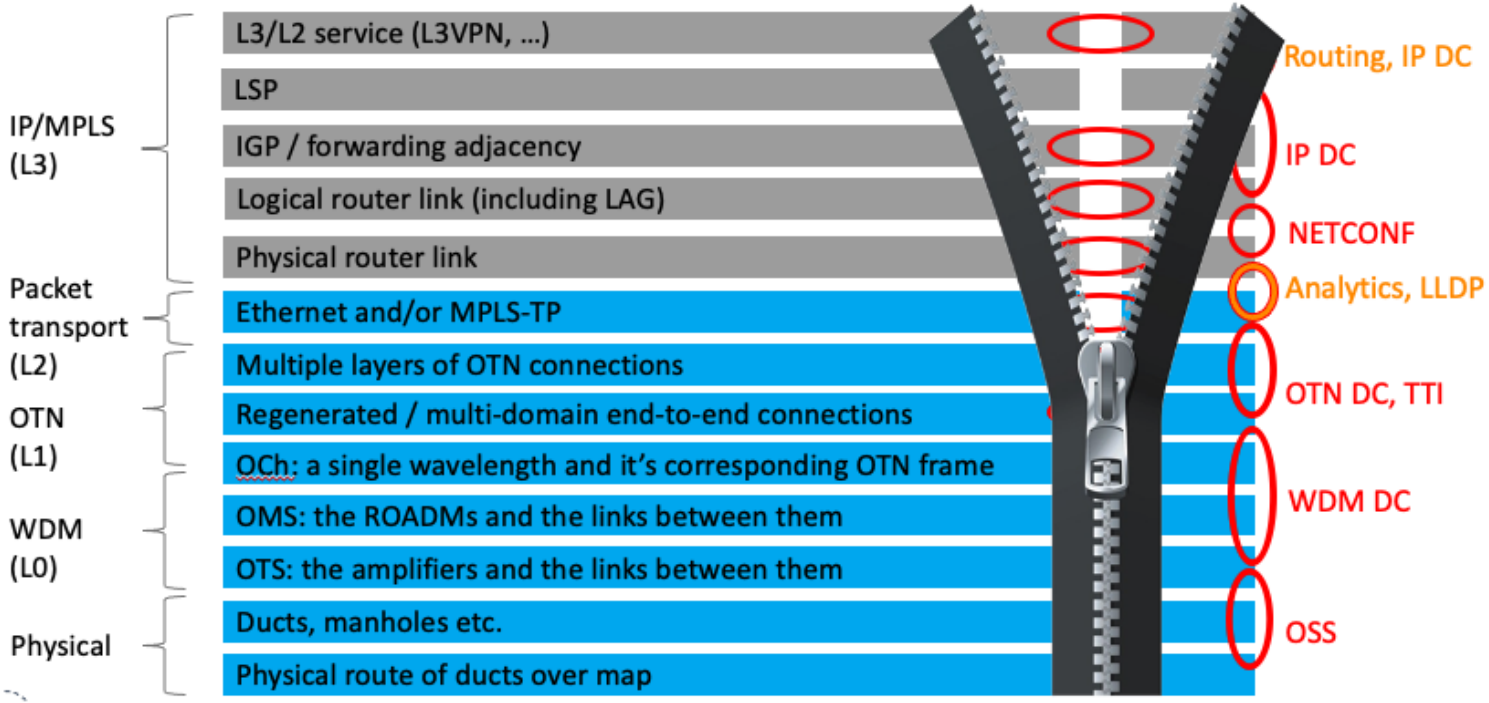
Current

automatically and ongoingly discovered – directly from the network

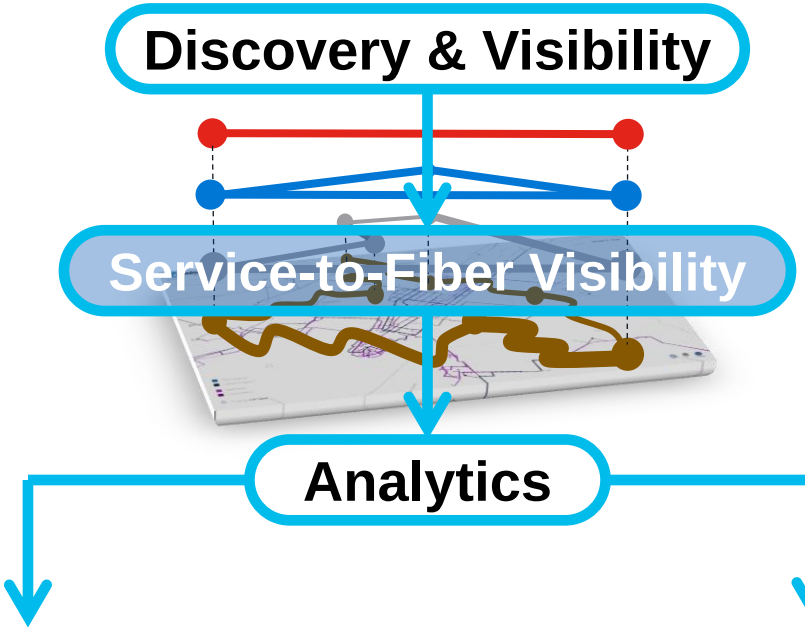
Correlated

dynamically deducing cross-domain connectivity

Inter-domain / inter-layer stitching



We Apply the Data to Transform Network Operation



Insights

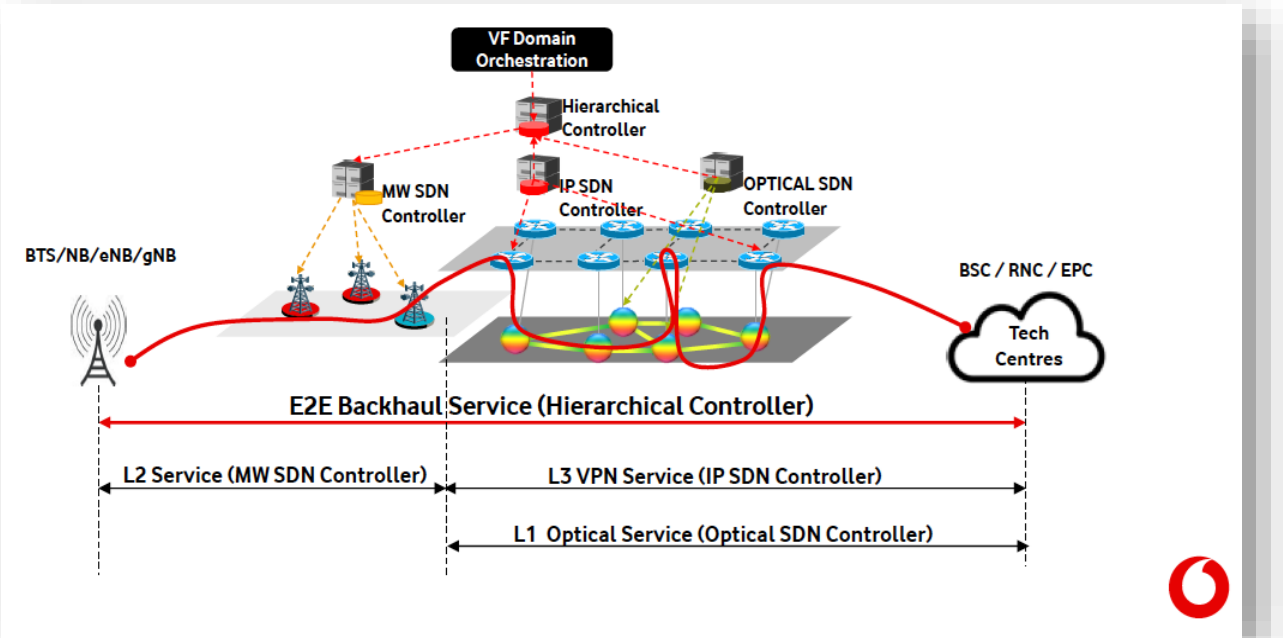
Inventory validation
Diversity assurance
Live auditing
Network anomalies
Policy compliance

Action

Multi-layer provisioning
Bandwidth on demand
SRLG sharing
Multi-layer restoration
Disaster recovery

Manage all Services from a Single Platform

- L0-L3 services:
  - WDM
  - OTN
  - ELINE
  - ELAN/ETREE
  - L2VPN(Opt & Packet)
  - L3VPN
- Over any underlay:
  - WDM
  - OTN
  - MPLS-TP
  - Microwave
  - MPLS
  - SR
- Multivendor
- Hybrid services



Network query language

Problem

- Raw network data model too complex for BI tools
- Costly OSS development due to need to ingest complex network models

Solution

Sedona Hierarchical Query Language (SHQL)

Extract complex network data, in a simple, flat structure

- Navigation up and down the layers
- Transform from one object type to another
- Integrated time machine

Usage patterns

- By Crosswork Hierarchical Controller **apps**
- By users, via **reporting** app
- Creation of customized, rule-based **tags**
- Through Hierarchical Controller REST **API**

"All core routers":

```
inventory_item[.type = "ROUTER" and .name contains "CR"]
```

"All ports of Cisco edge routers":

```
inventory_item[.type = "ROUTER" and .name contains "ER" and .vendor = "Cisco"] | port
```

"All logical links going to/from site FRA":

```
site[.name contains "FRA"] | inventory_item | port | link [.layer = "R_LOGICAL"]
```

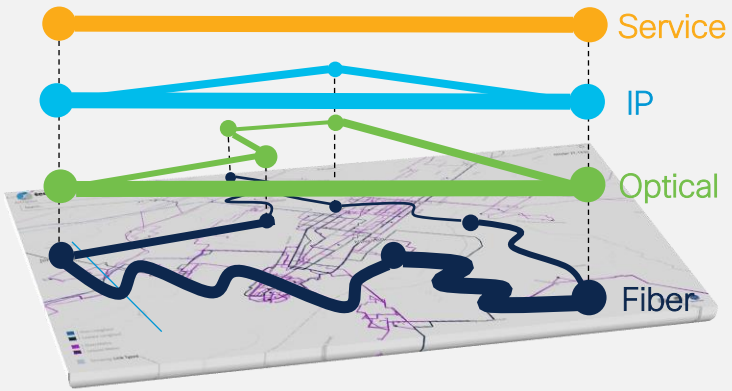
"All WDM links that are down and affect an LSP that is down":

```
link[.layer = "LSP" and .operStatus = "DOWN"] | downward | port |
link[.layer = "OMS" and .operStatus = "DOWN"]
```

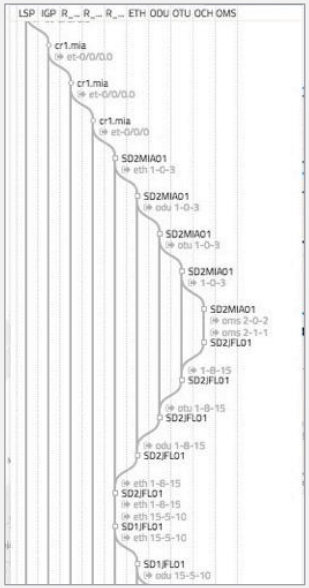
Reduce cost of integration with network apps by 30-70%

Service-to-fiber visibility

The Crosswork Hierarchical Controller Network Model – from service to fiber



Layered service view in Crosswork Hierarchical Controller UI



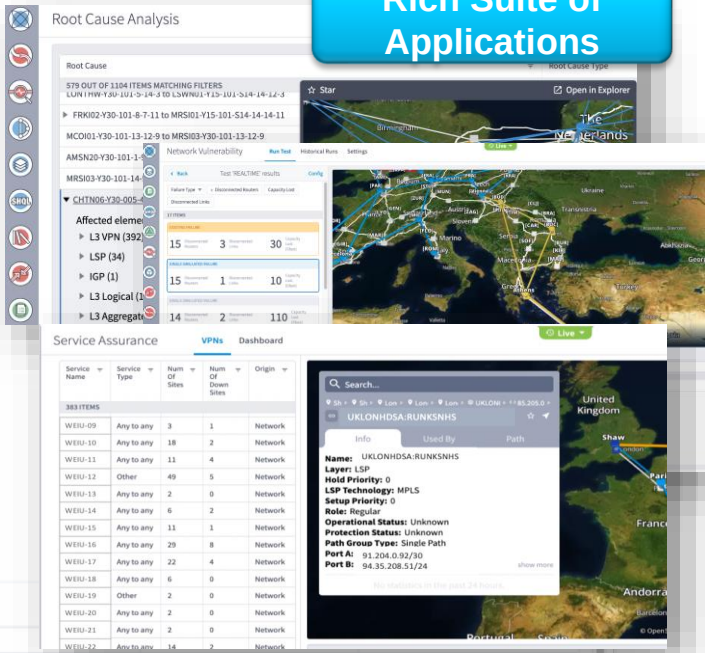
Visualization of a protected private line service – zoom-out and zoom-in views

Cisco Hierarchical Controller Core Functions

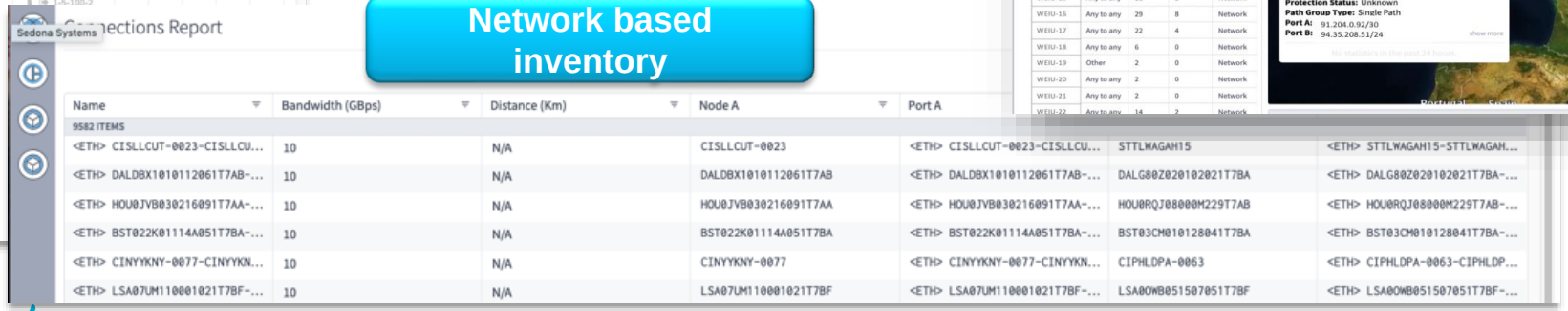
Multi-Layer Paths

Service to Fiber Topology

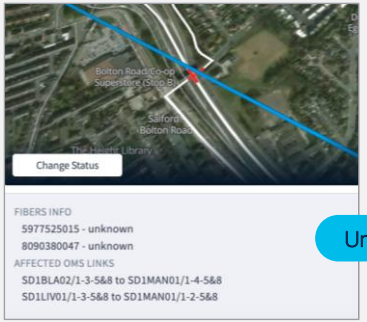
Rich Suite of Applications

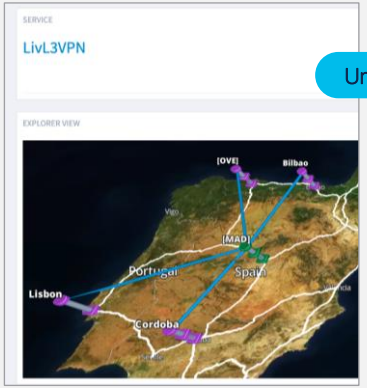


Network based inventory



Risk management

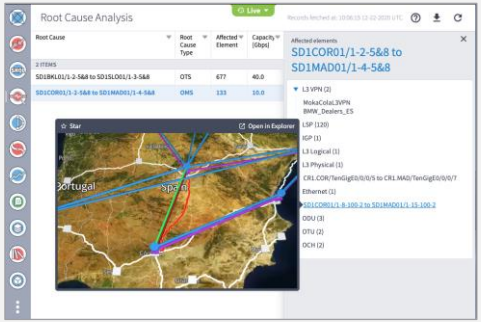




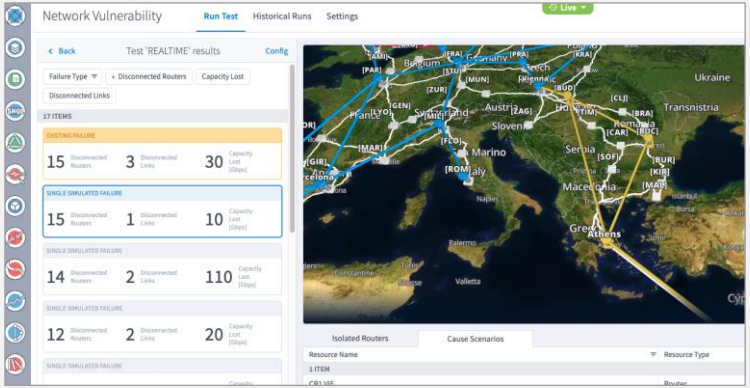
Understand physical risks

Understand traffic route

Identify root cause of service failure



Identify vulnerability to additional failures



Main Crosswork Hierarchical Controller differentiators

Preintegrated with all vendors: Both pre-SDN and SDN APIs

Network analytics engine: Understand network anomalies, track changes and degradations over time using powerful query language

Ensuring tight SLA: Provisioning and assurance for both service overlay and underlay

Scalability: Hierarchical control scales to over 10,000 elements in real time

Unique discovery solution for all network layers, all services, and cross-layer and cross-domain links

Supporting evolution from pre-SDN to SDN and from legacy networks to new ones

Sophisticated path computation allowing to optimize path for multilayer constraints using powerful path computation algorithms

Demonstrable leadership for advanced use cases: multilayer restoration, optimization, predictive failure avoidance

The only deployed network controller in market today

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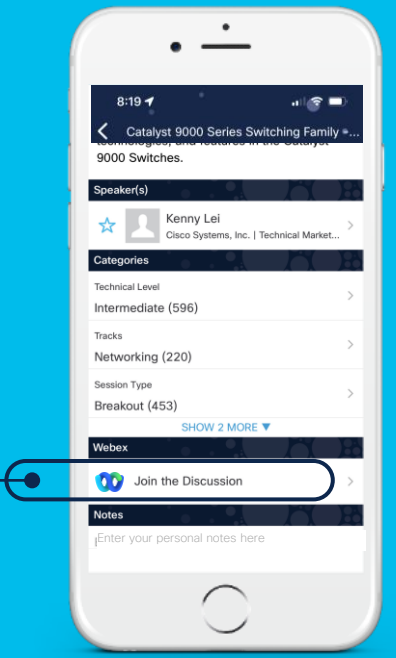

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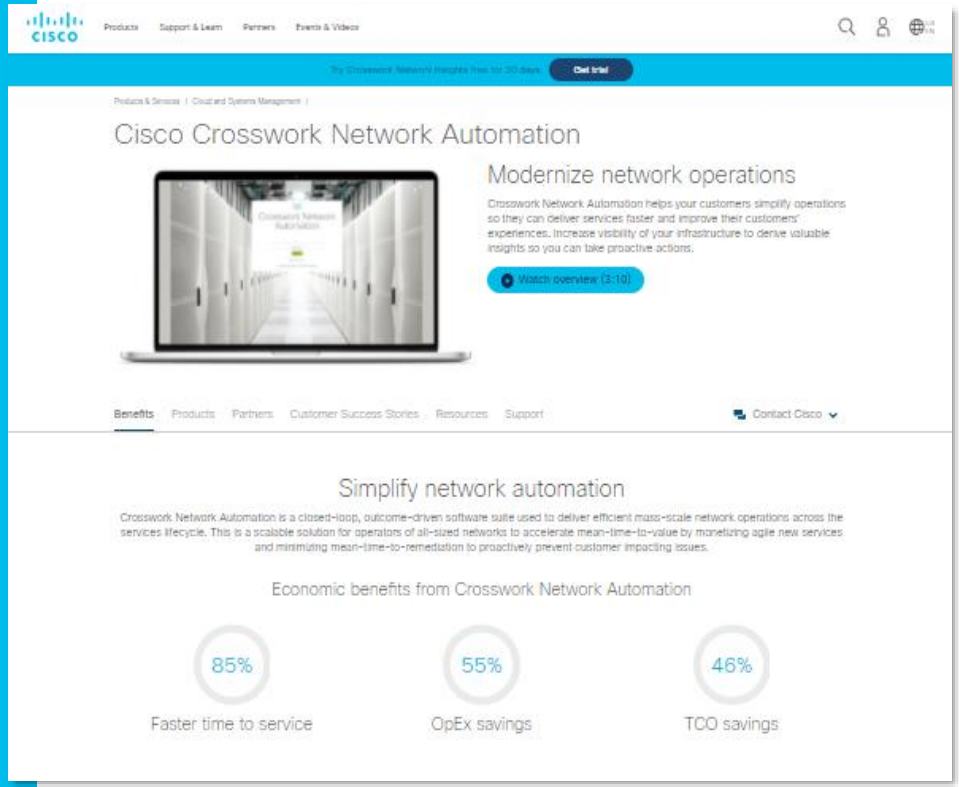


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