Monitoring and Fault Correlation for Optical and IP Networks

Smarts OTM for

Optical Networks

Value of Smarts

Automated Actionable Intelligence

Pinpoint service-affecting problems in real time
Quantify impact to prioritize action
Model and update automatically to adapt to infrastructure changes

Cross-Domain Correlation

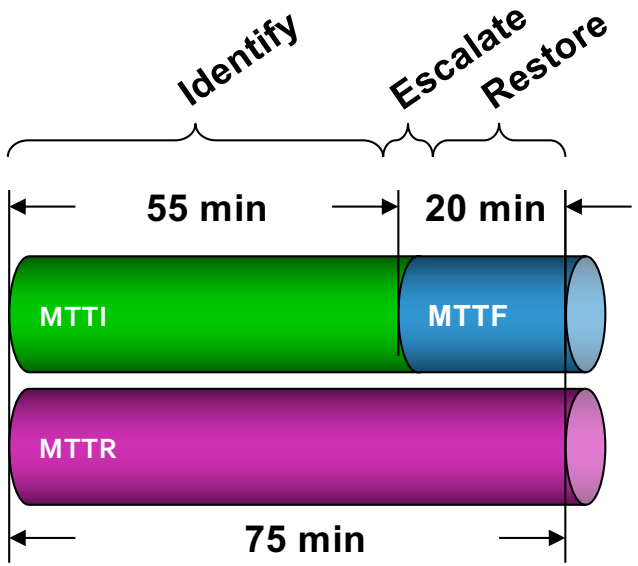
Correlate information, applications, infrastructure, virtual and business services across management silos

Business-Impact Analysis

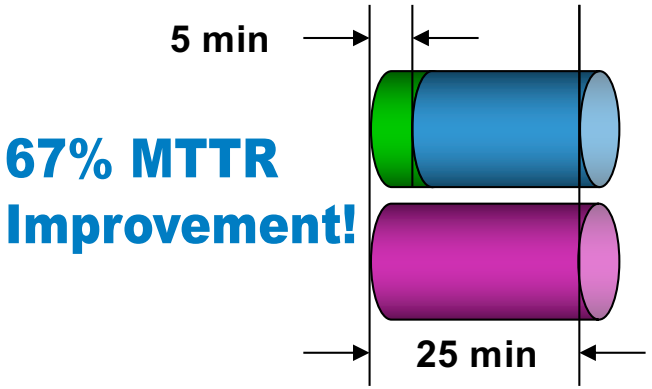
Understand exactly how IT problems affect services and customers

Value of Automated Root Cause Analysis

- 75% of the time to resolve a service affecting failure can be attributed to finding the source
- Accelerate resolution
  - Lower operational costs
- Terminology
  - MTTI = Mean Time to Identify – the time to identify the cause of the incident
  - MTTF = Mean Time to Fix – the time to actually restore service once the cause is isolated
  - MTTR = Mean Time to Resolution



The Impact of Automated Analysis



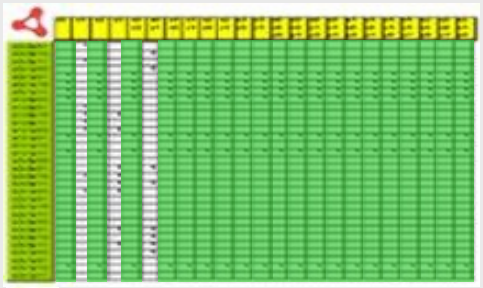
Smarts

Discovery, monitoring and analysis of the infrastructure

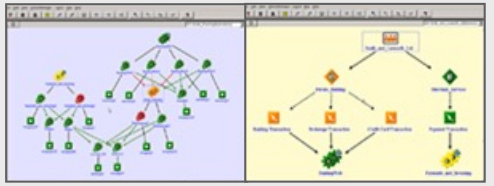
Correlation

Uses model and Codebook to correlate events for all technologies

4 Codebook Correlation



6 Root Cause



Business Impact

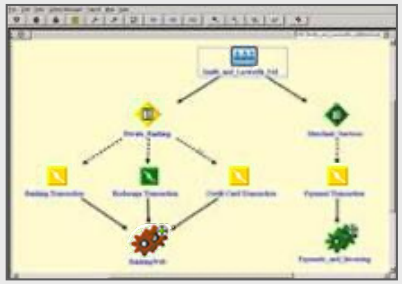
Topology

ECIM: EMC Common Information Model

1 ECIM Library

- Service Subscriber
- Hosted Application
- Switch
- Server
- Router
- Service Offering

3 ECIM



Collection

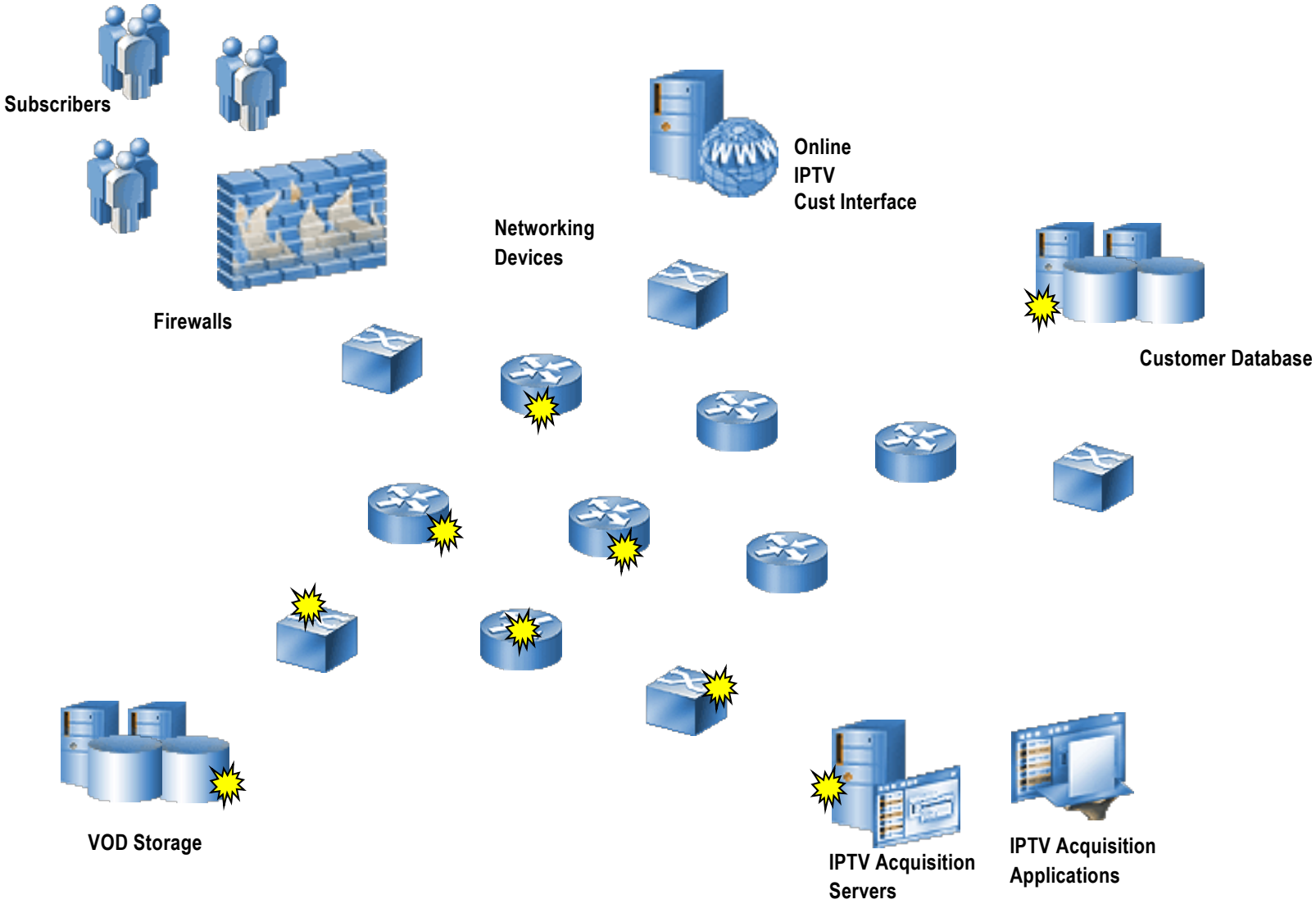
Discovery, mediation, polling

2 Discovery

5 Event Collection

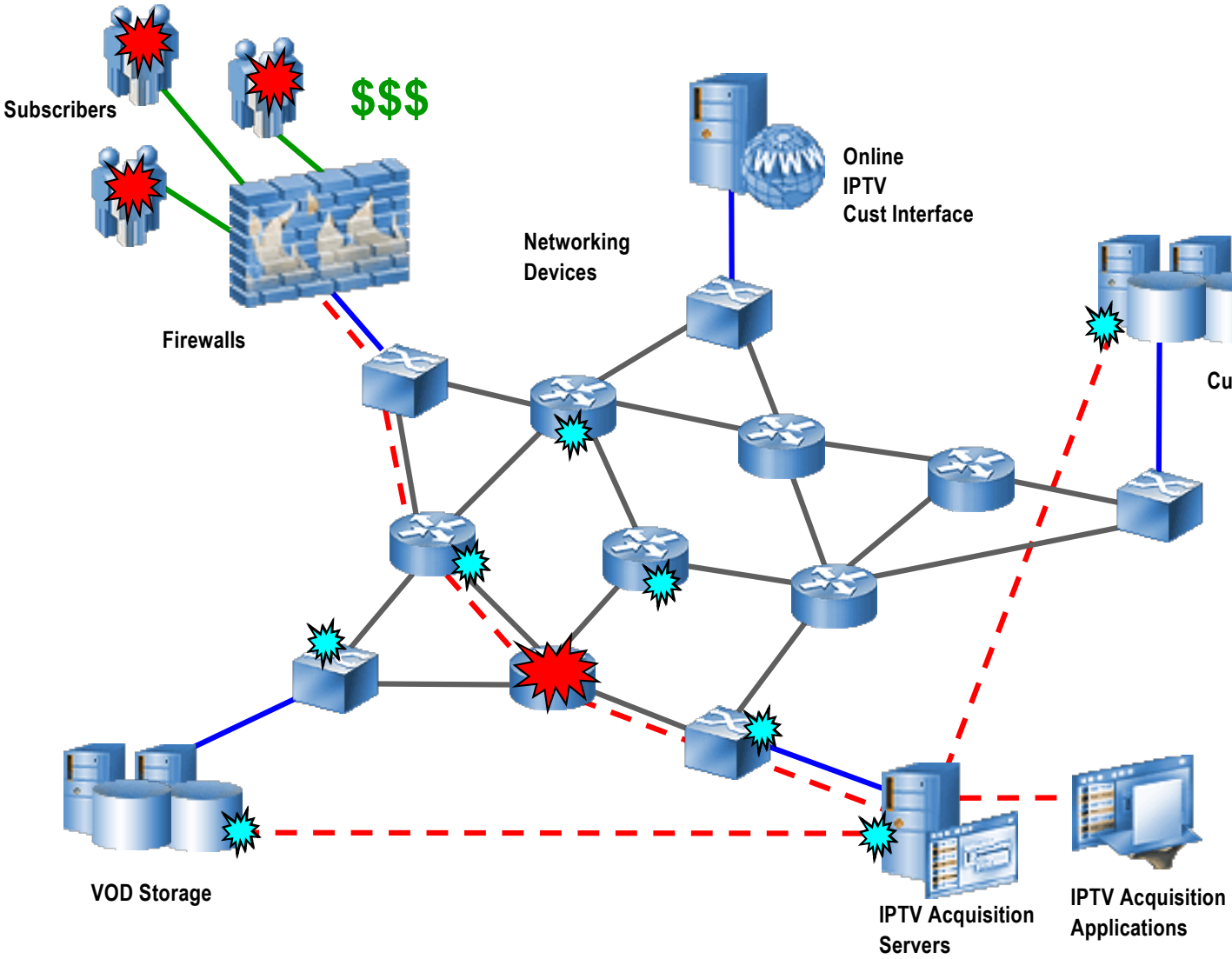
Storage • Applications • Network • Virtualization • Server • Third-party • Security • Clouds

Smarts Topology Based Correlation



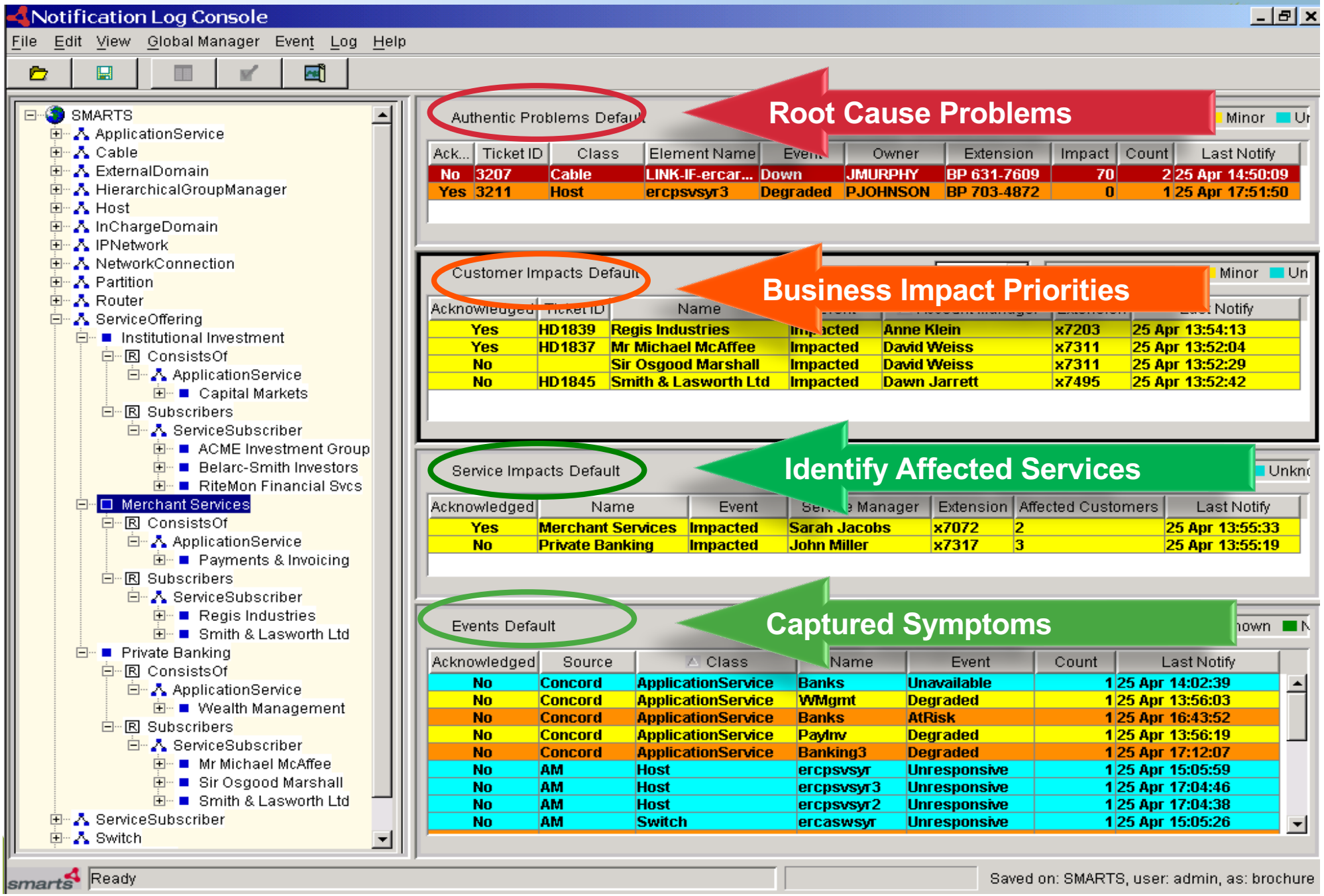
Smarts Topology Based Correlation

Multi-Layered Relationships



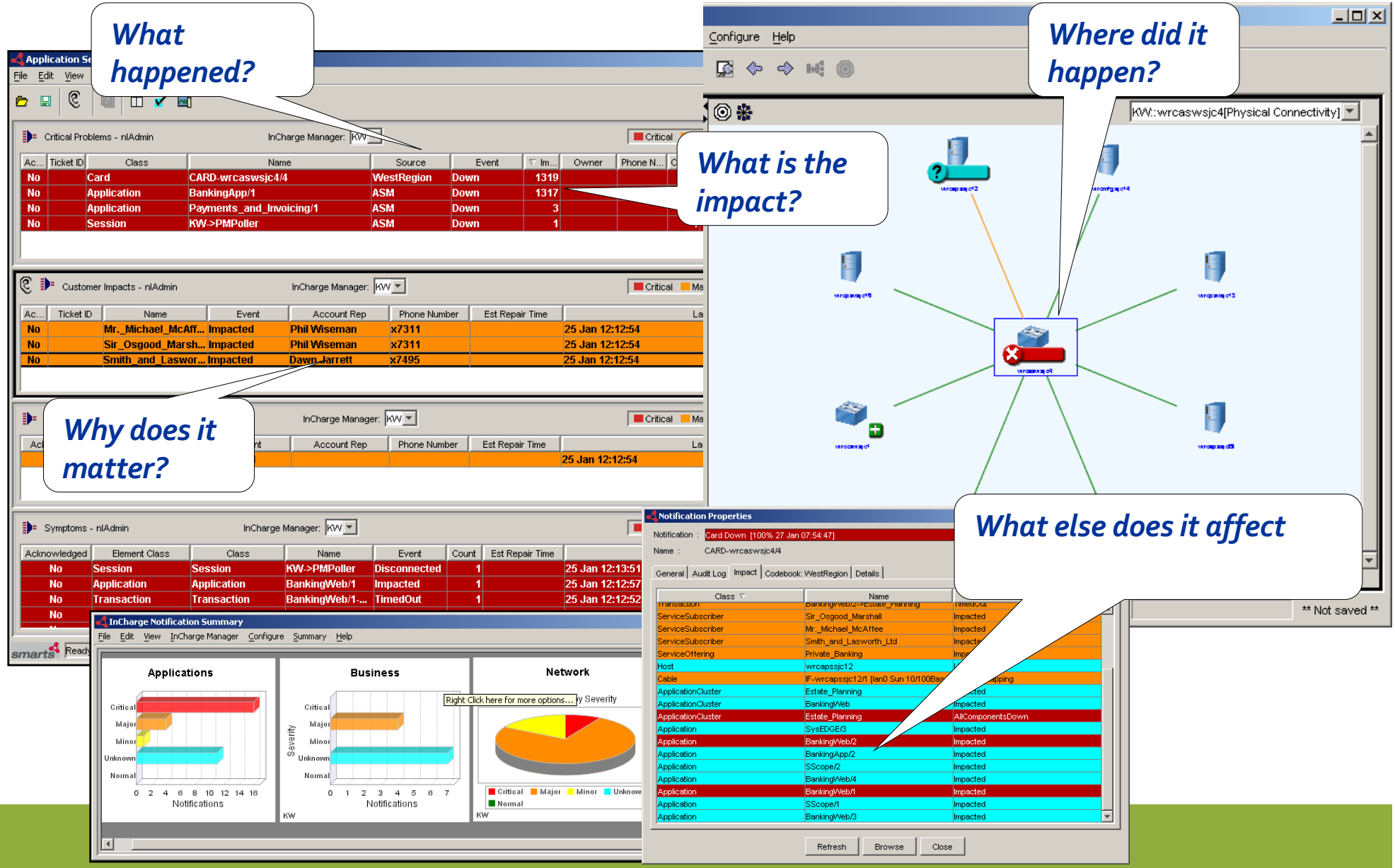
- L2 Logical (VLANs, PVCs)
- L3 IP Subnets
- Multicast Trees
- BGP Adjacencies
- MPLS LSPs and Hops
- VRFs and VPNs
- Network to Host
- Application to Host
- Transactions/Sessions
- E2E Transactions
- Infrastructure to Services & Customers

Results of Root Cause analysis

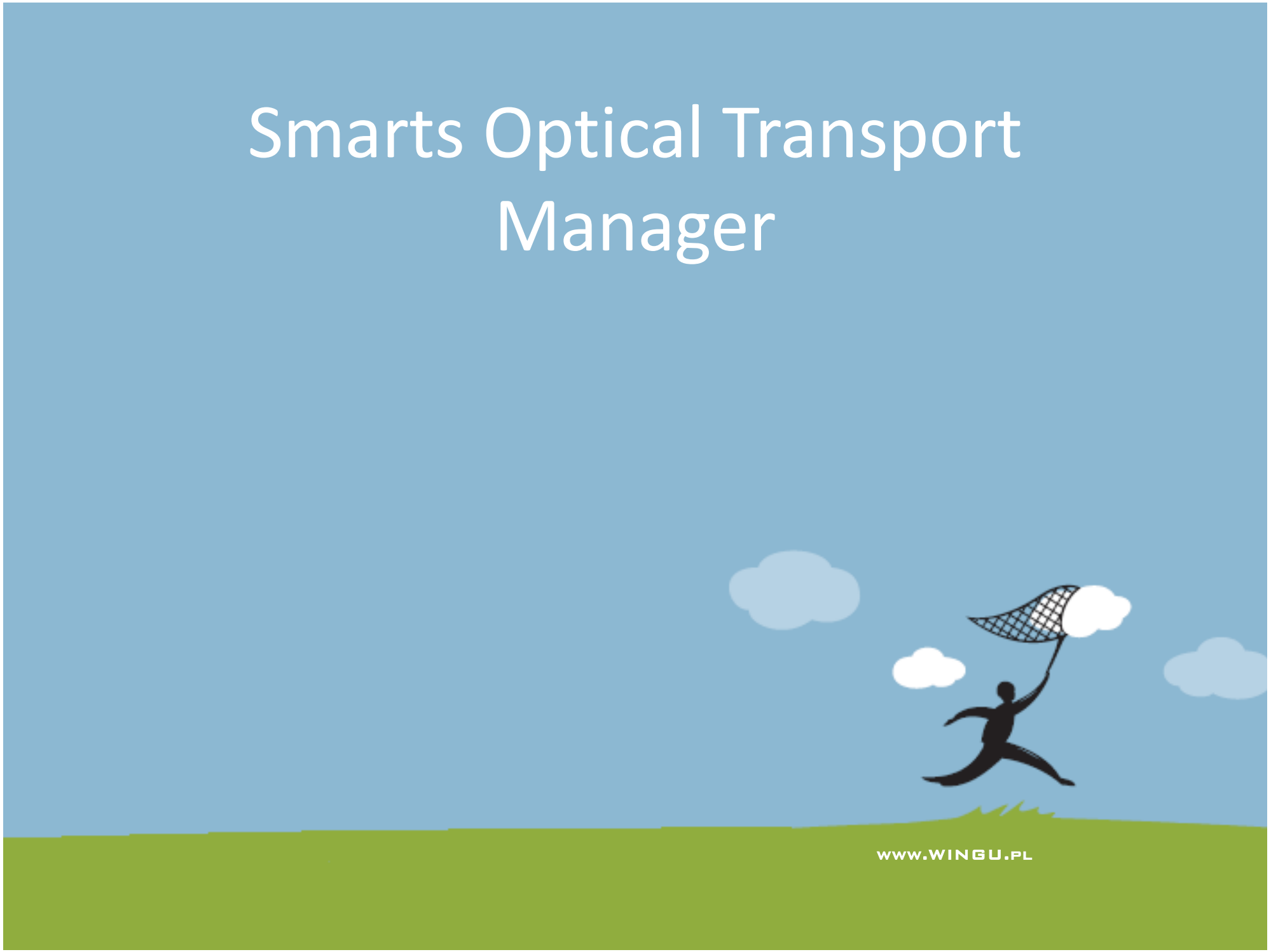


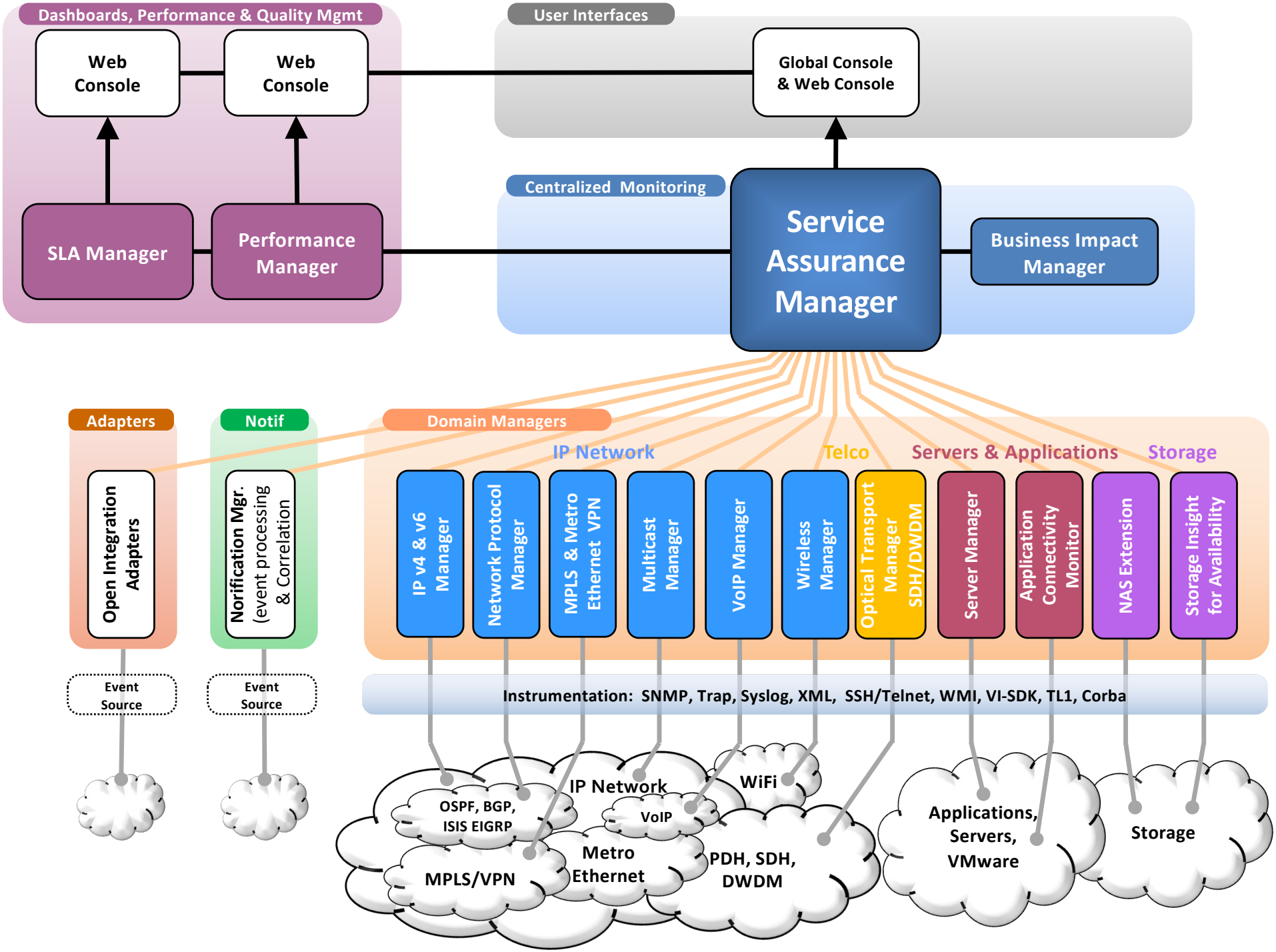
Centralized Service Assurance Management

Single Focal Point for Monitoring, Analysis and Control



Smarts Optical Transport Manager



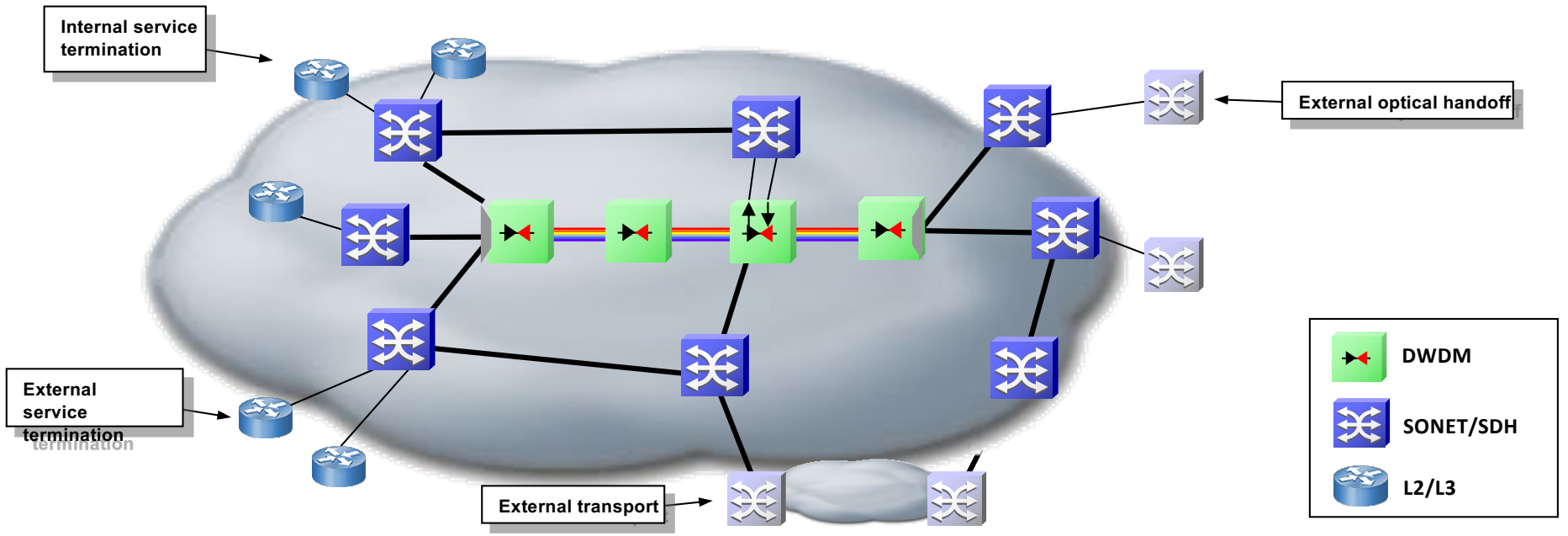

Dashboards, Performance & Quality Mgmt
Web Console
Web Console
User Interfaces
Global Console & Web Console
SLA Manager
Performance Manager
Centralized Monitoring
Service Assurance Manager
Business Impact Manager
Adapters
Notif
Domain Managers
IP Network
Telco
Servers & Applications
Storage
Open Integration Adapters
Norification Mgr. (event processing & Correlation
IP v4 & v6 Manager
Network Protocol Manager
MPLS & Metro Ethernet VPN
Multicast Manager
VoIP Manager
Wireless Manager
Optical Transport Manager SDH/DWDM
Server Manager
Application Connectivity Monitor
NAS Extension
Storage Insight for Availability
Event Source
Event Source
Instrumentation: SNMP, Trap, Syslog, XML, SSH/Telnet, WMI, VI-SDK, TL1, Corba
IP Network
OSPF, BGP, ISIS EIGRP
VoIP
WiFi
MPLS/VPN
Metro Ethernet
PDH, SDH, DWDM
Applications, Servers, VMware
Storage

OTM Functionality Overview

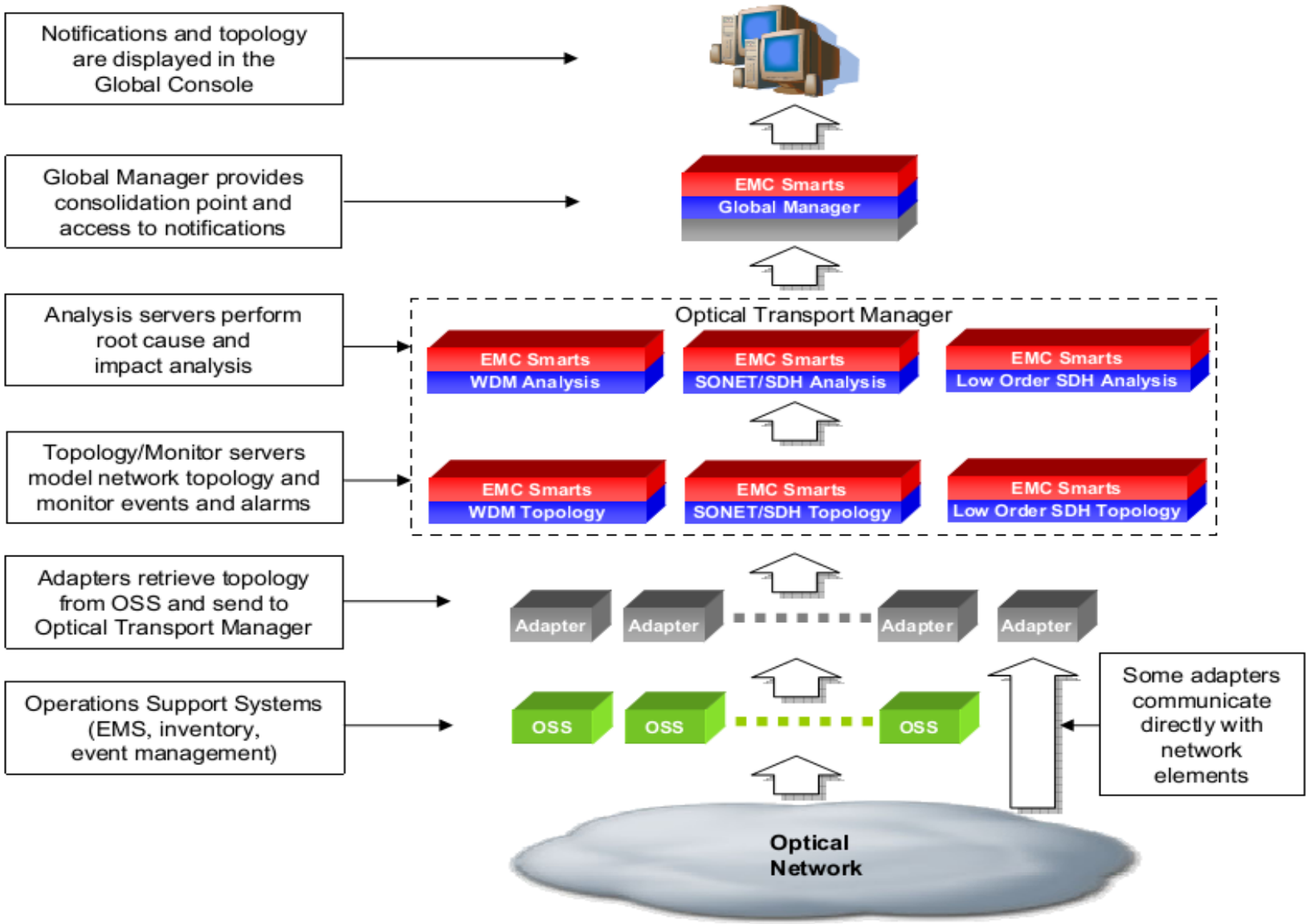
- Transports
  - DWDM
  - SDH
  - PDH
- Multi-vendor Support

- Model
  - Network element, card, physical/logical ports
  - Topological Links
  - SubNetwork Connections
  - Client Circuits, Trails
  - Protections

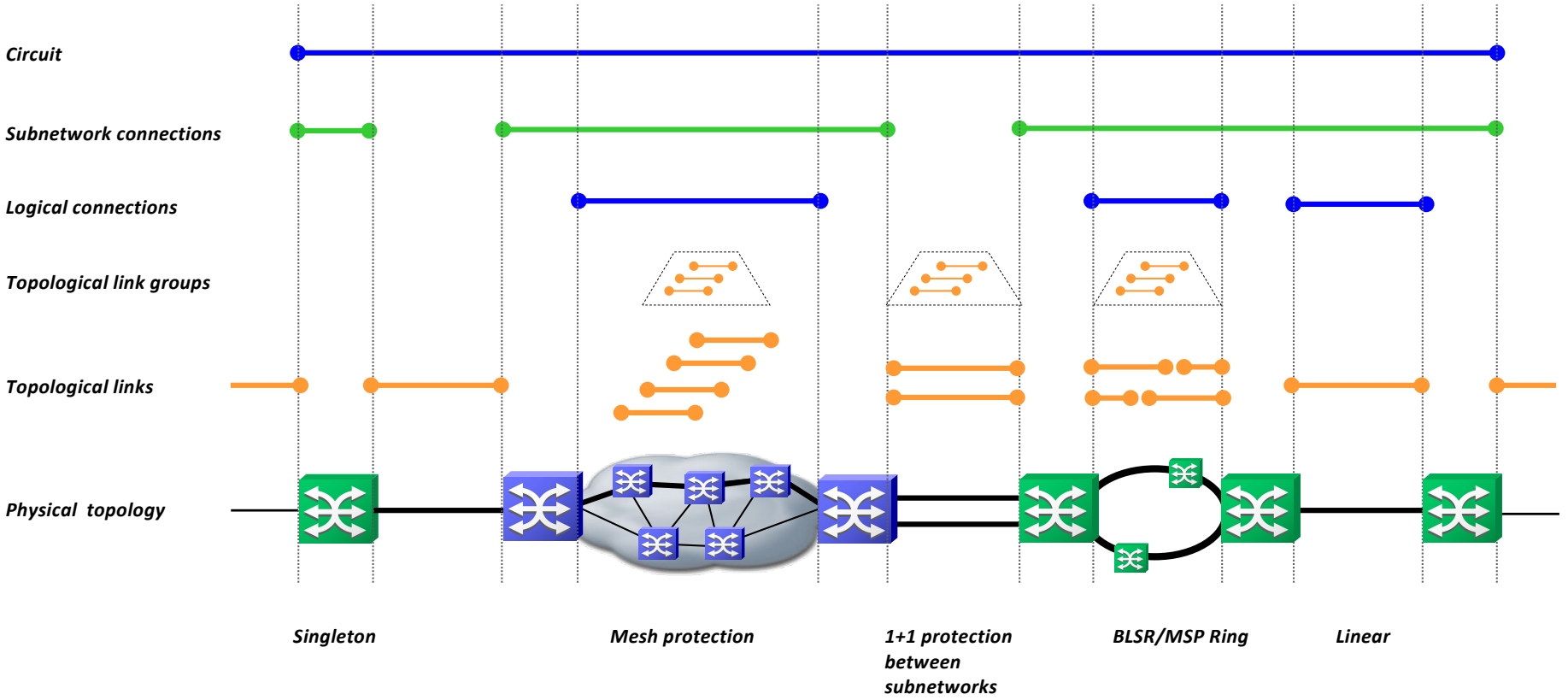
- Analysis
  - Optical root causes for
    - WDM
    - SDH
    - PDH
  - Optical root cause across layers all the transport layers WDM/OTN/SDH/PDH
  - Cross-Domain Correlation Optical to IP Network



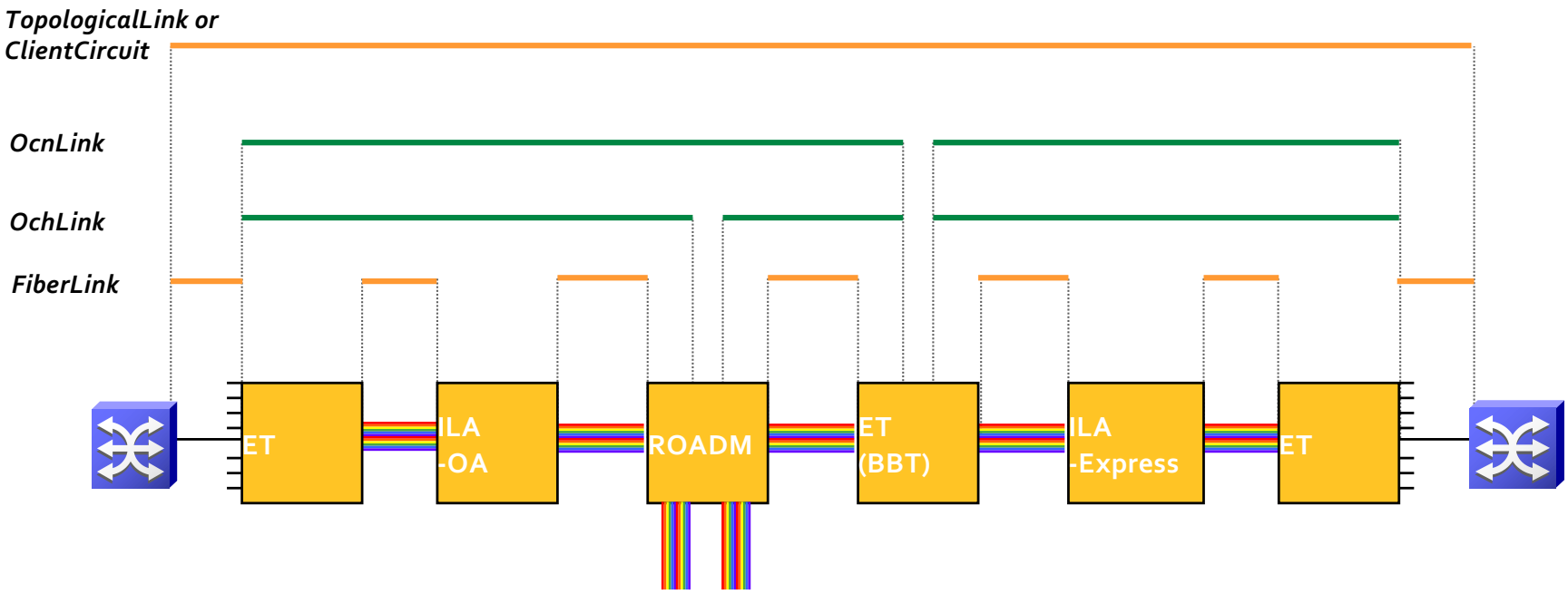
OTM Architecture



SDH Layered Model



WDM Model

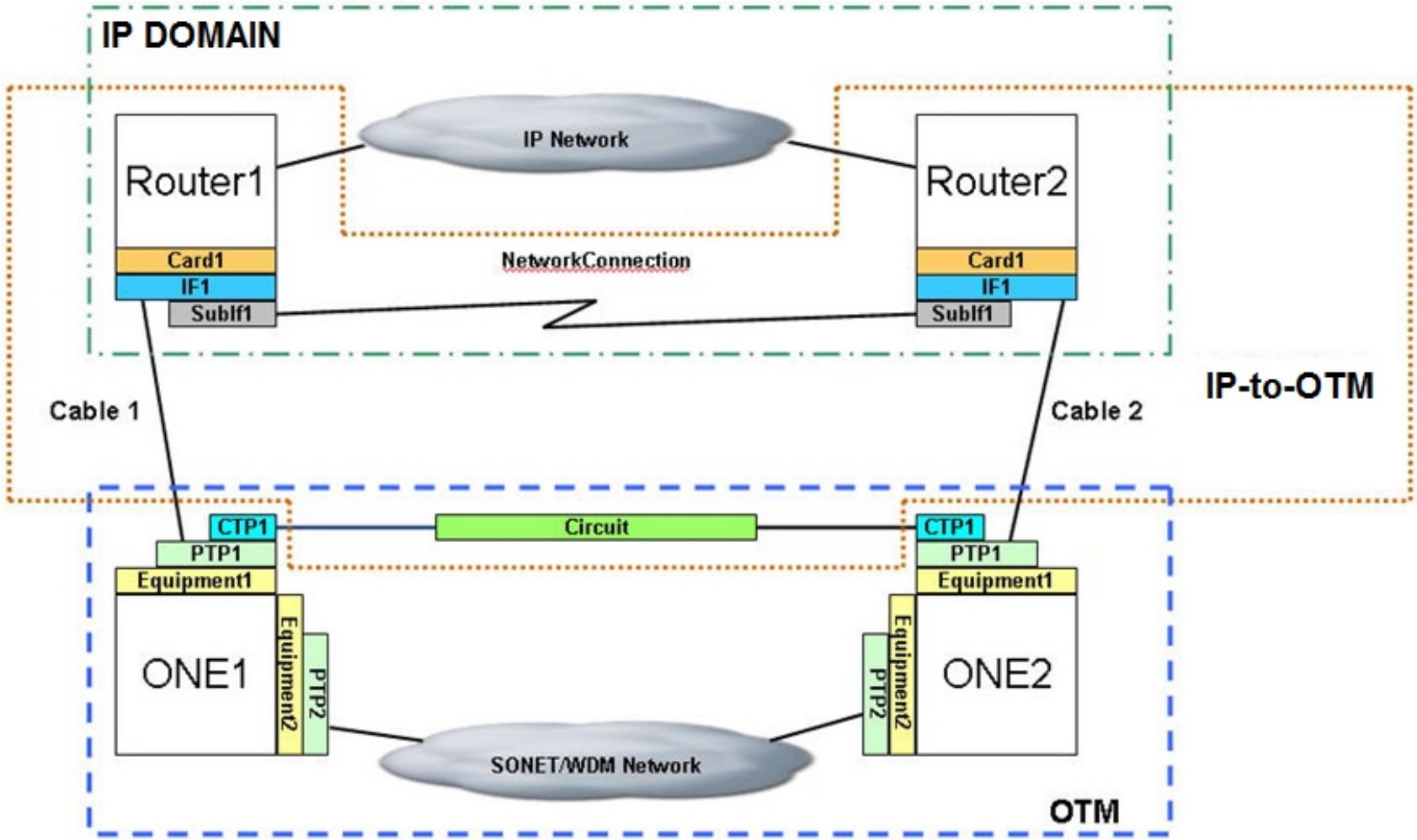


SONET/SDH Network Element

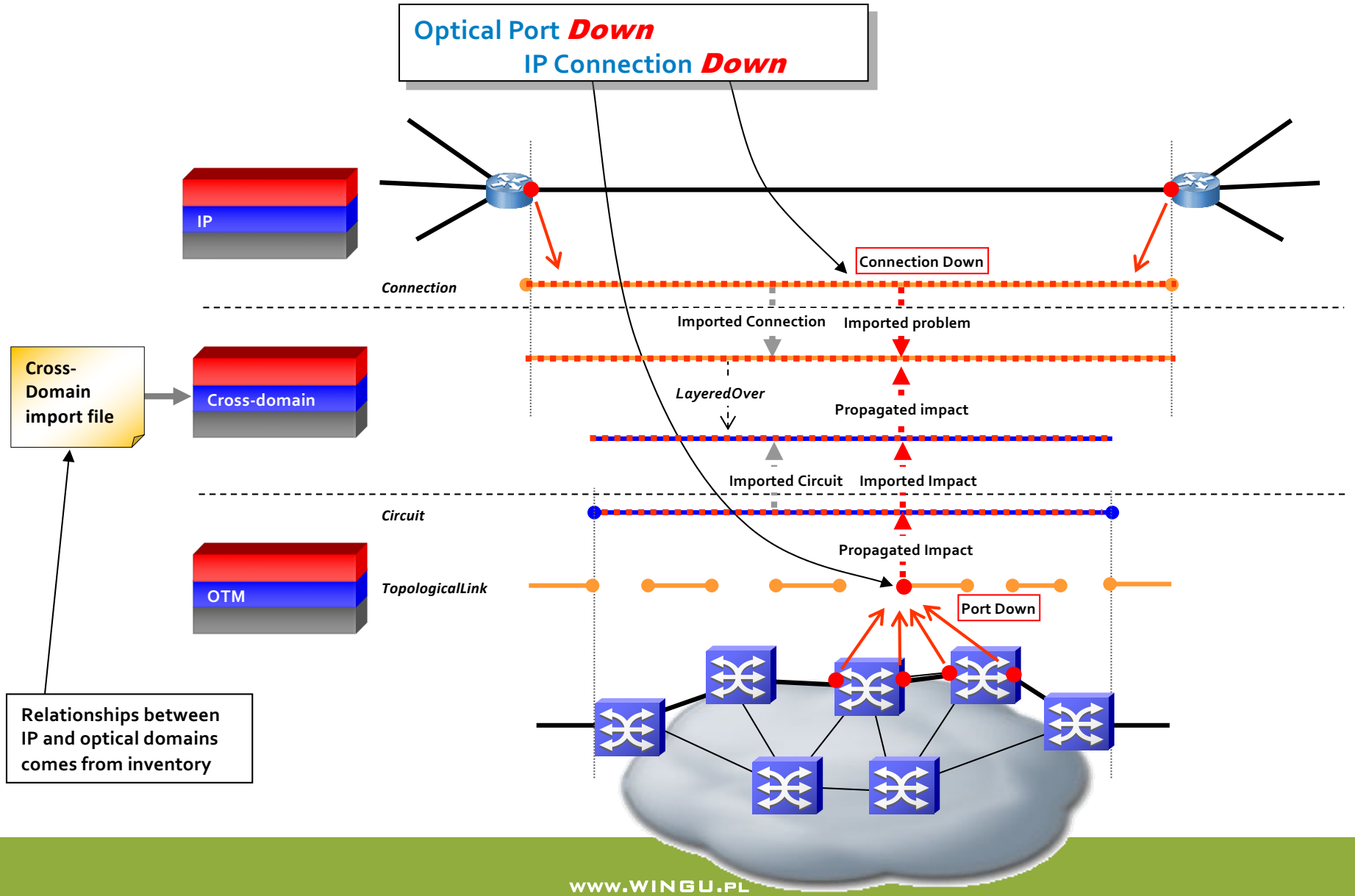
WDM Network Element

ET – End Terminal
ILA-OA – In Line Amplifier-Optical Amplifier
ILA-Express – In Line Amplifier-Express Node
ROADM – Reconfigurable Optical Add-Drop Multiplexer
ET (BBT) – End Terminal with Back-to-back transponder

IP over OTM Topology Model



IP to OTM Cross-Domain Correlation



OTM System

Integration with

Huawei U2000

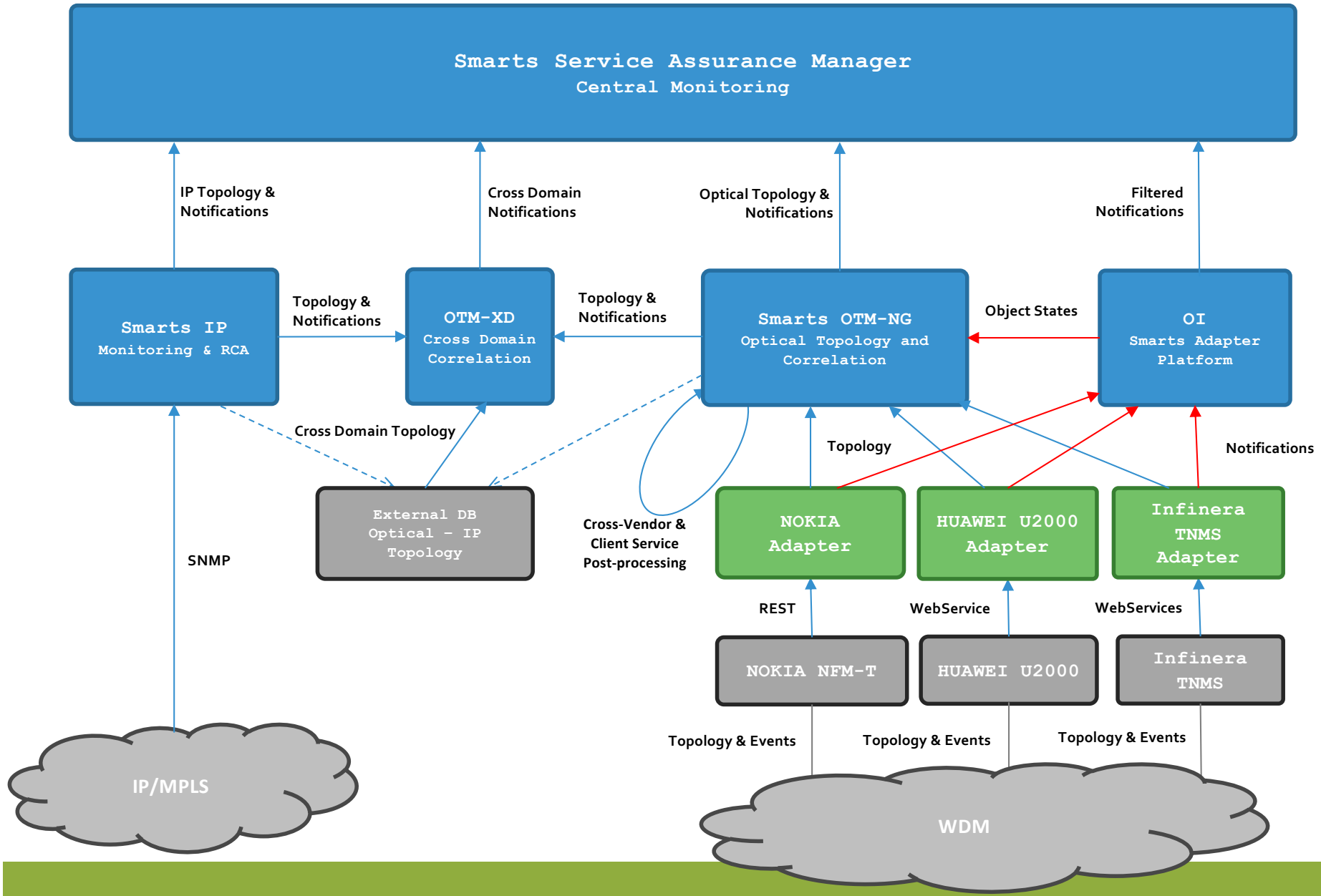
Nokia NFM-T

Infinera TNMS

System Configuration

- **EMC Smarts Service Assurance Manager** – integrates data from all domains and presents it to the users
- **EMC Smarts OTM Next Generation (OTM-NG)** – implements optical network model and root cause analysis
- **EMC Smarts IP Manager** – manages IP network
- **EMC Smarts IP OTM XD** - implements IP to Optical model allowing cross-domain correlation
- **OTM Adapters** - import optical topology into Smarts OTM
  - Huawei U2000 Adapter
  - Nokia NFM-T Adapter
  - Infinera TNMS Adapter

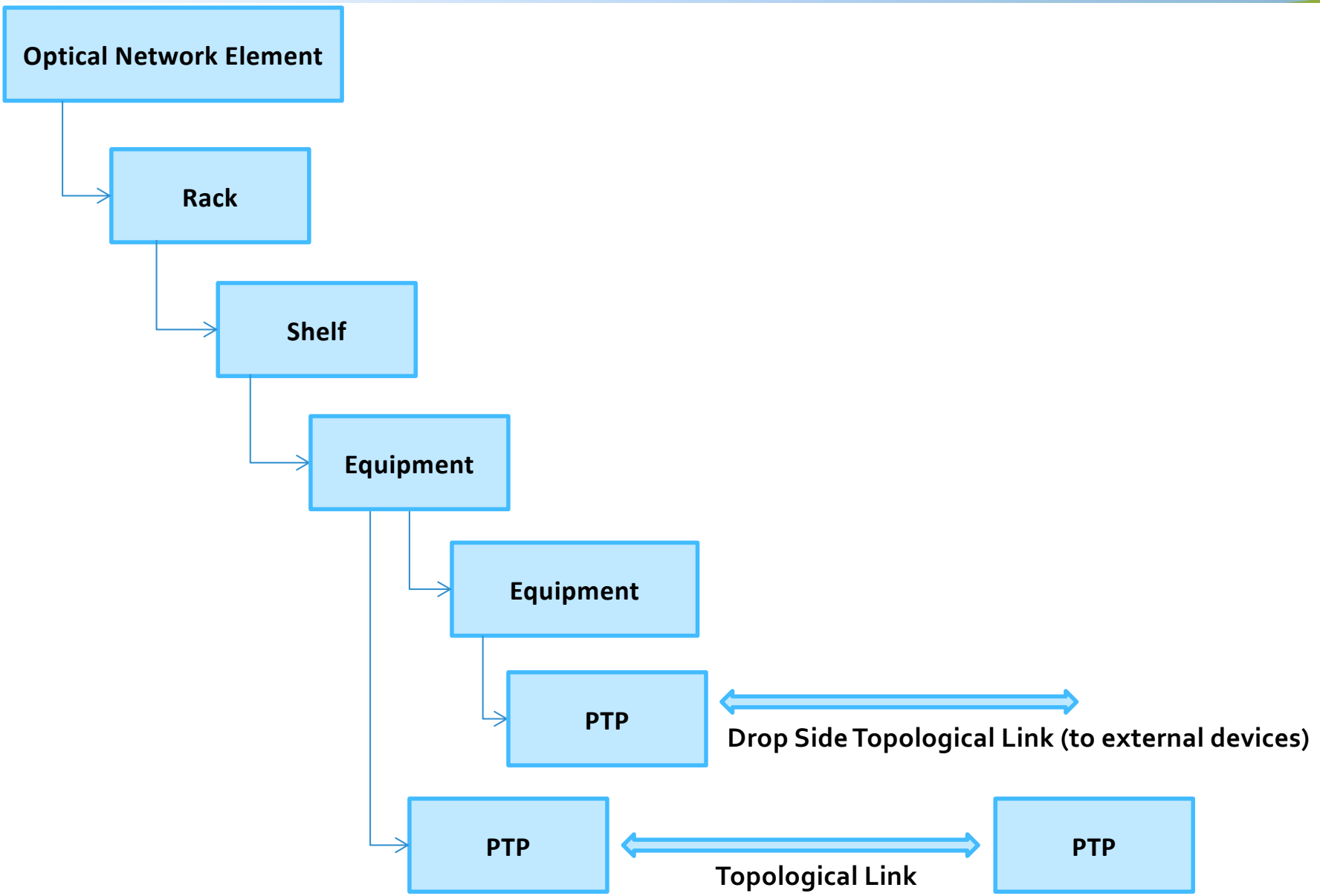
System Architecture



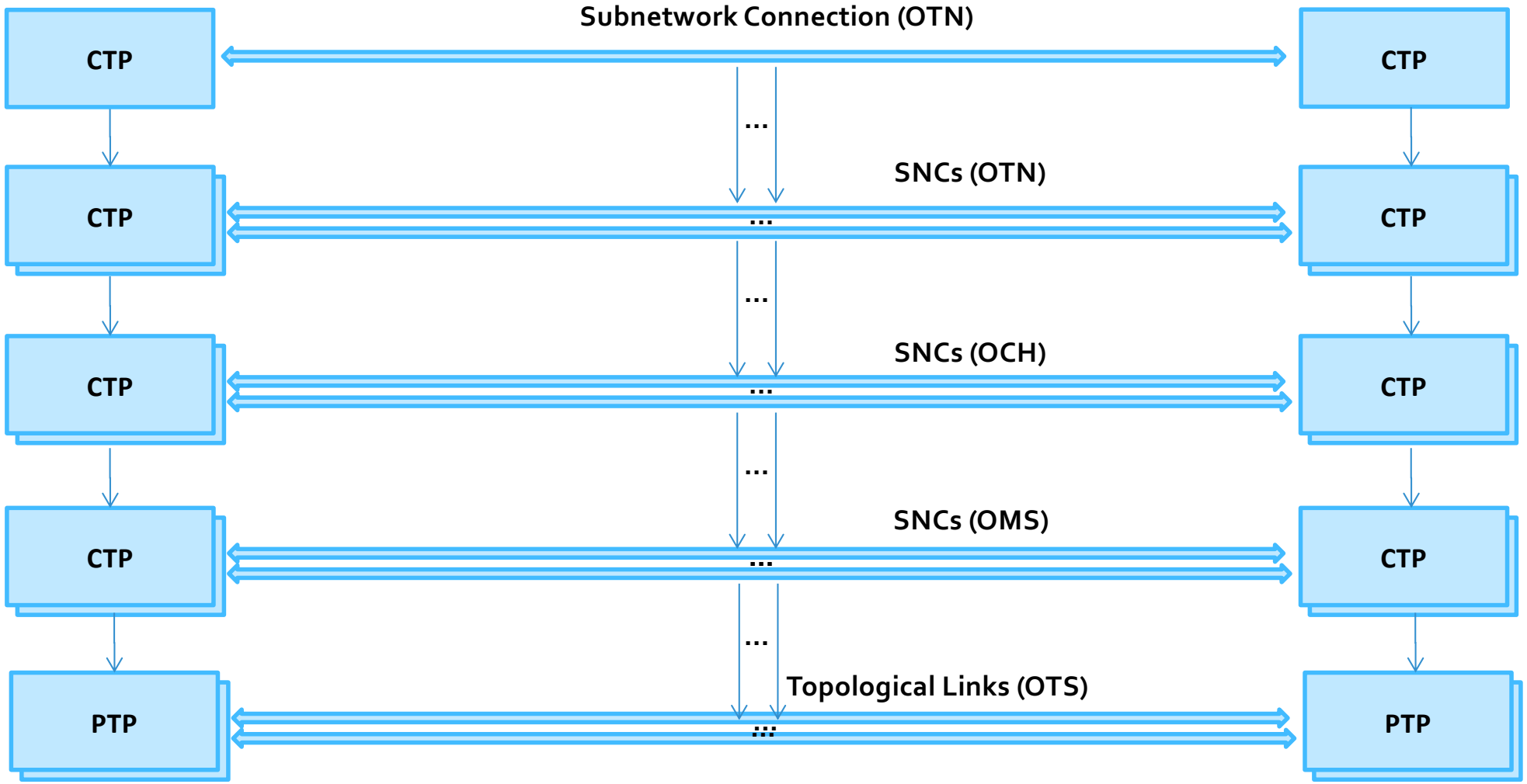
Huawei Adapter

- Supports mapping of Huawei objects into Smarts OTM-NG Processes Huawei Corba reports and creates objects in OTM repository
  - Optical Equipment
    - Optical Network Elements (Network Nodes)
    - Cards/Equipment
    - Ports
  - Topological Links
    - Internal within network nodes
    - External between network nodes
  - Subnetwork Connections (representing connections in different optical layers)
  - Routes for Subnetwork Connections (showing through which links the SNC goes)
- Processes Corba Notifications into Topology object states allowing topology based root cause analysis in OTM

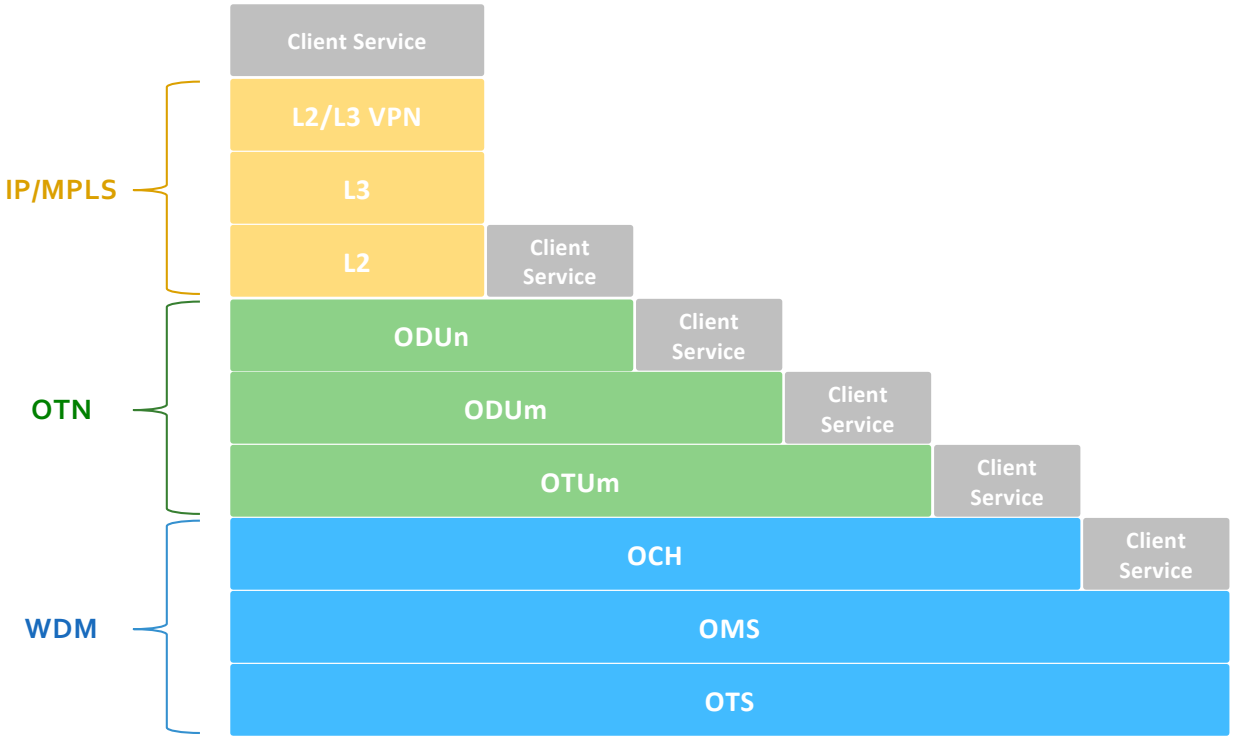
WDM-NG Physical Model based on MTOSI standard



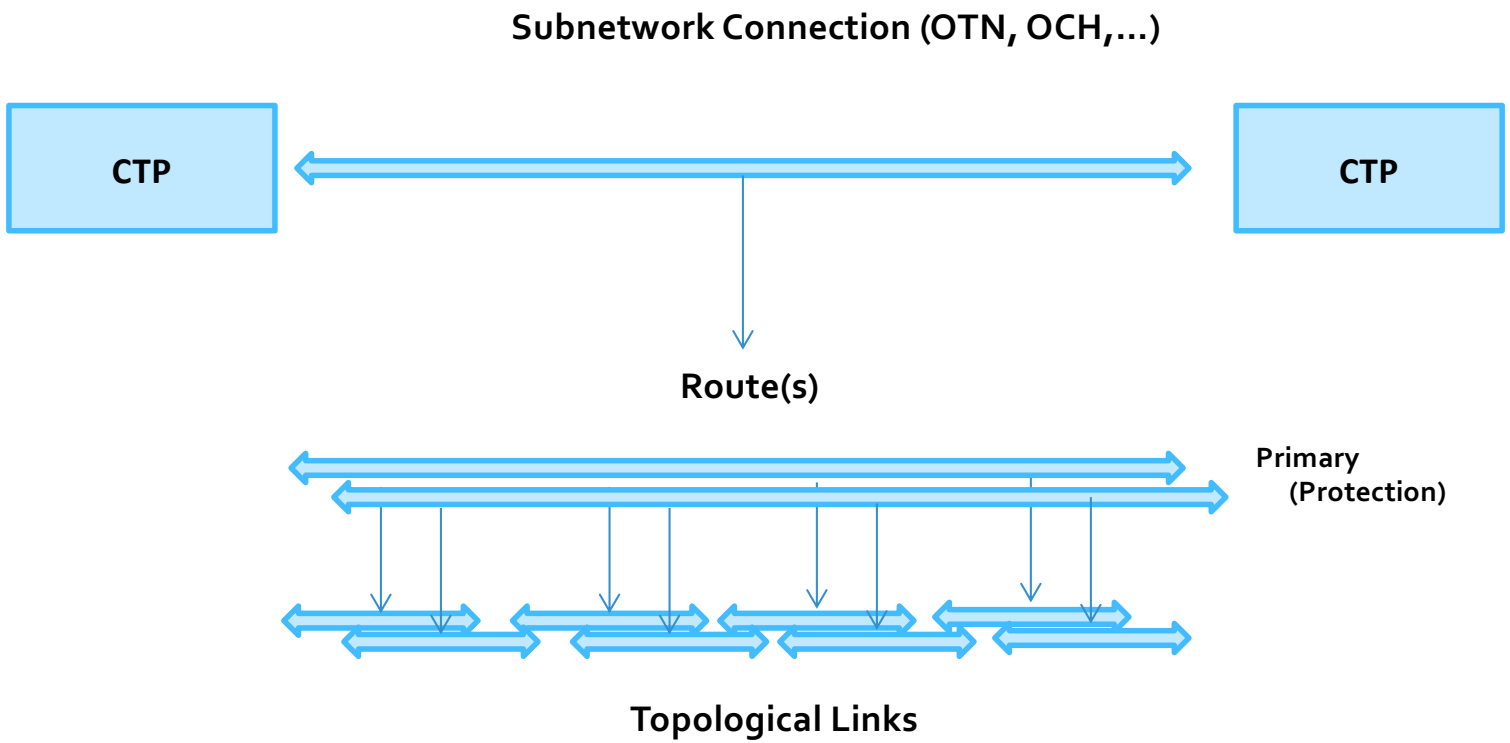
WDM-NG Hierarchical Model (based on MTNM)



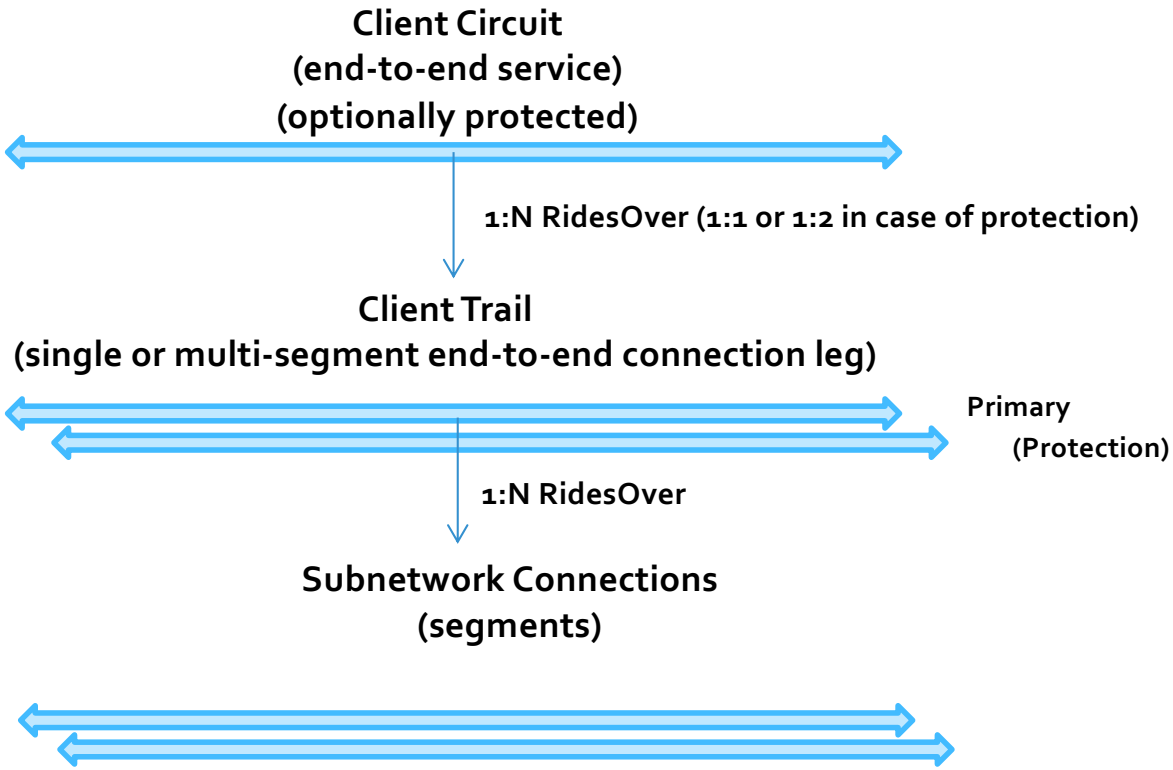
WDM-NG Hierarchical Model (based on MTNM)



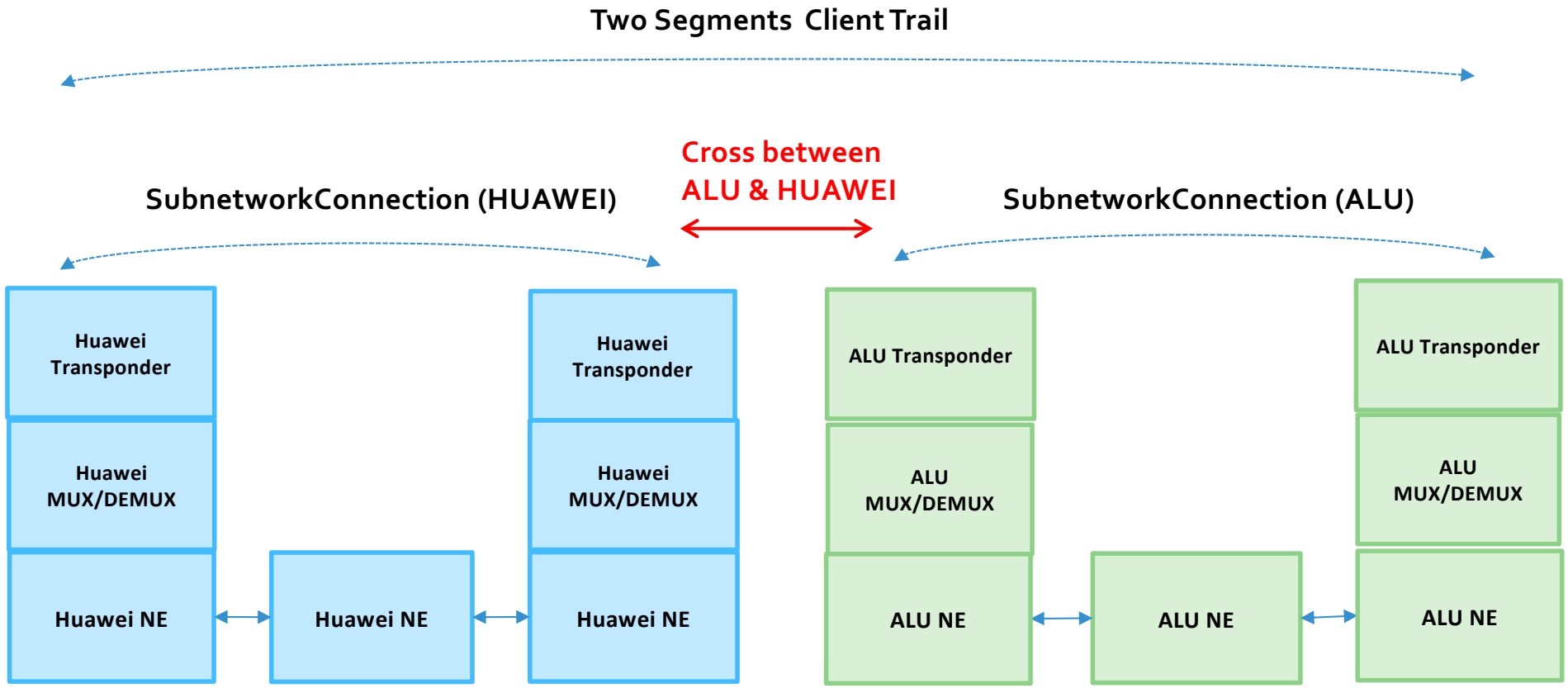
WDM-NG “Routed” Model based on MTOSI



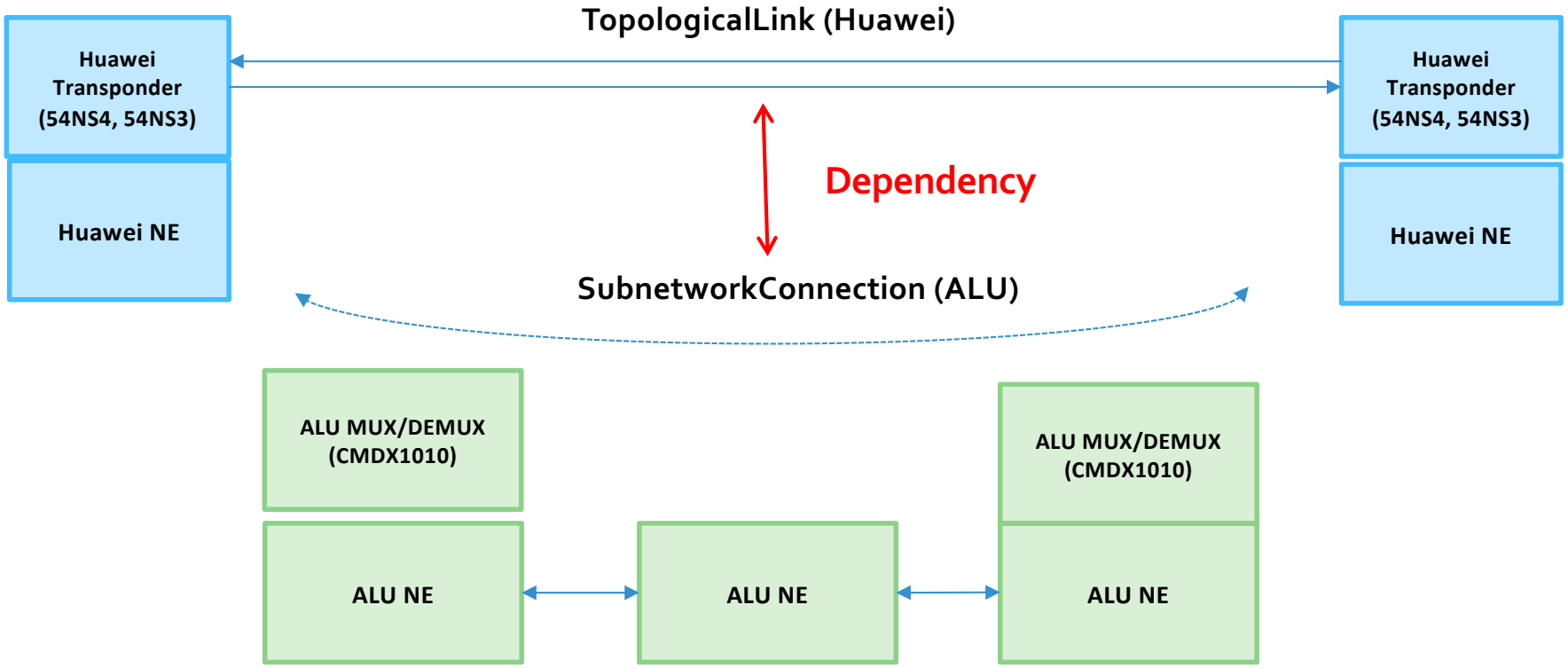
WDM-NG Service Model (Extension to MTOSI)



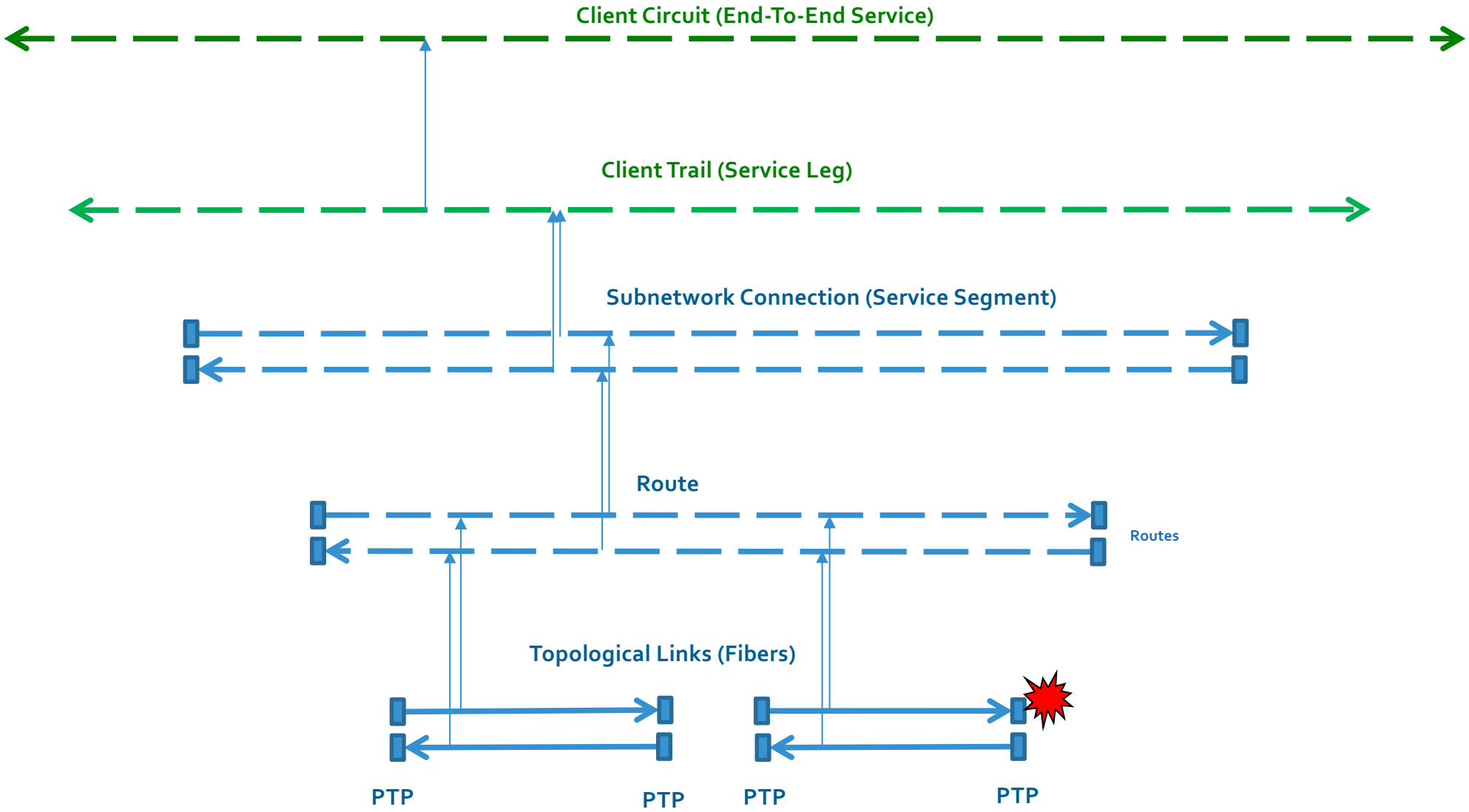
Multi-Vendor Client Trail



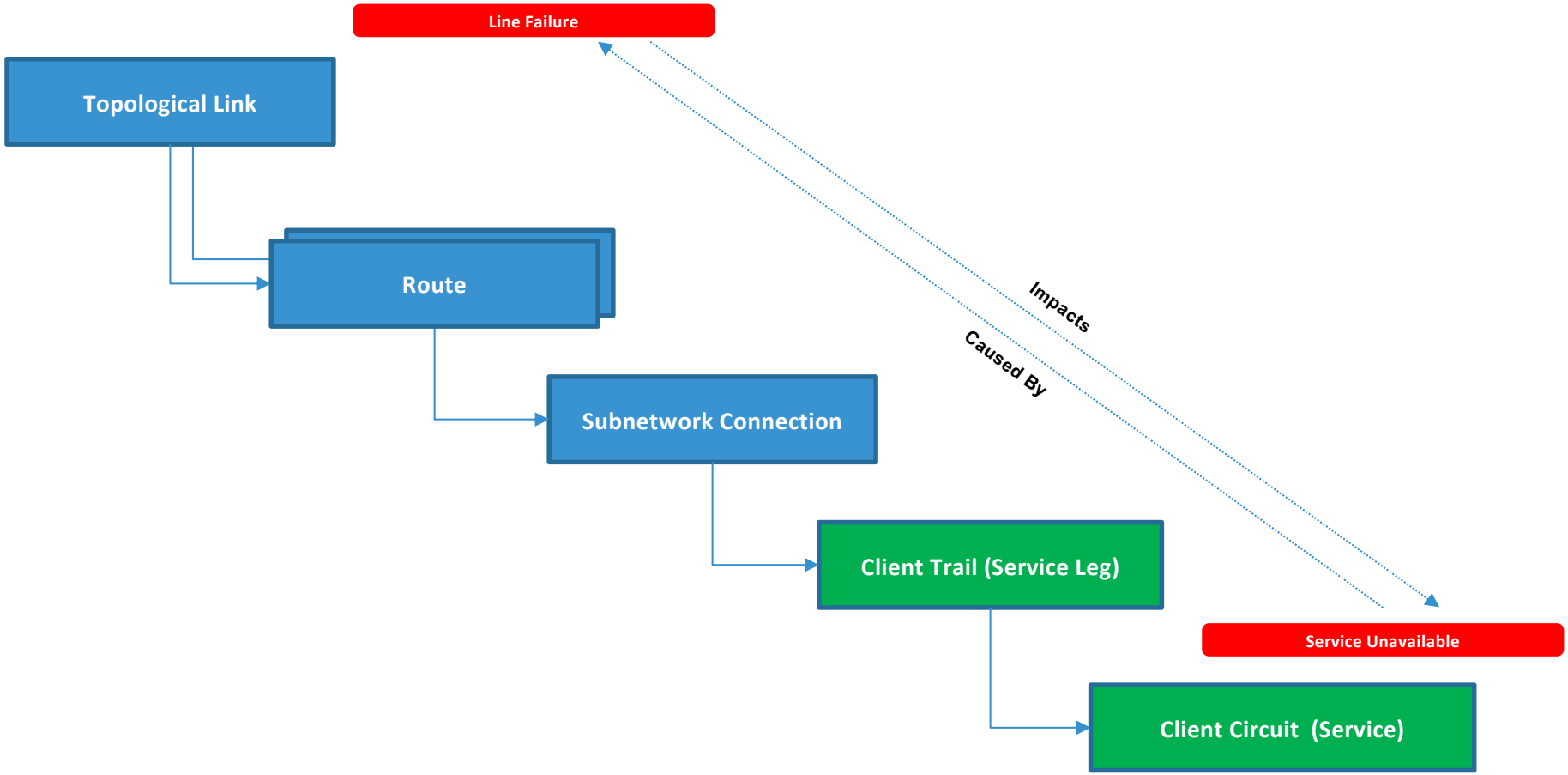
Another Cross-Vendor Topology



How does it work? An example



How does it work?

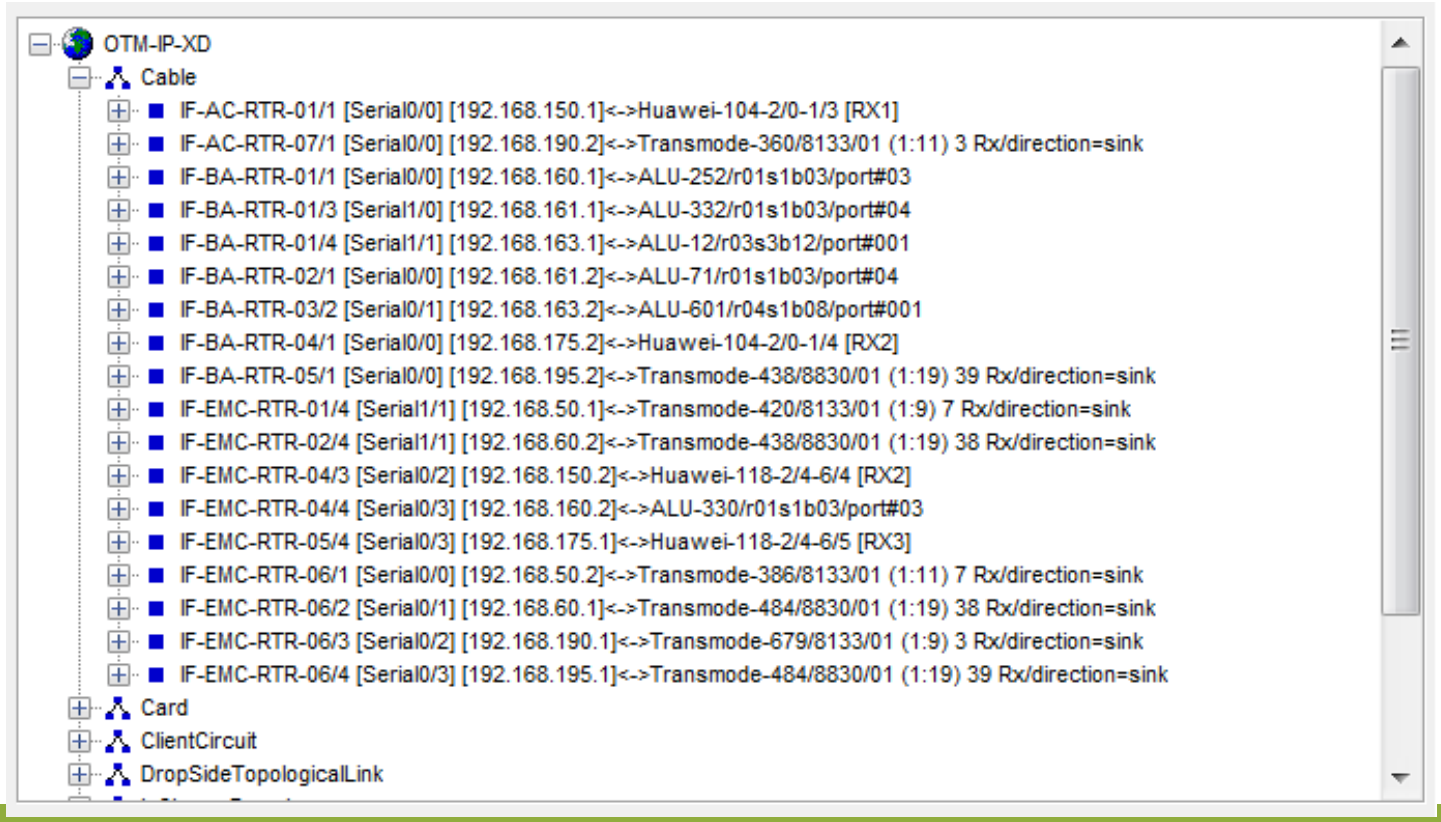


IP to Optical XD Topology for Cross Domain Correlation

- For each IP connection realized in Optical Network, we need import two cross-connections:

  SITE_A_IP_INTERFACE;SITE_A_OPTICAL_INTERFACE

  SITE_Z_IP_INTERFACE;SITE_Z_OPTICAL_INTERFACE



Demo

Based on real topology

Device Equipment and Ports Listing

INCHARGE-SA::OpticalNetworkElement::Huawei-455

PTPs | Equipments

(151 entries) DisplayName	ResourceState	UserLabel	SerialNumber
Huawei-455-1/0-1 [58NS4]	WORKING	58NS4	
Huawei-455-1/0-10 [52UXCH]	WORKING	52UXCH	
Huawei-455-1/0-11 [52SCC]	WORKING	52SCC	
Huawei-455-1/0-13 [54NS4]	WORKING	54NS4	
Huawei-455-1/0-14 [13LSX]	WORKING	13LSX	
Huawei-455-1/0-15 [11LOA]	WORKING	11LOA	
Huawei-455-1/0-17 [54NS3]	WORKING	54NS3	
Huawei-455-1/0-19 [19-54NS3(STND)]	WORKING	19-54NS3(STND)	
Huawei-455-1/0-2 [58NS4]	WORKING	58NS4	
Huawei-455-1/0-20 [54TTX]	WORKING	54TTX	
Huawei-455-1/0-27 [58NS4]	WORKING	58NS4	

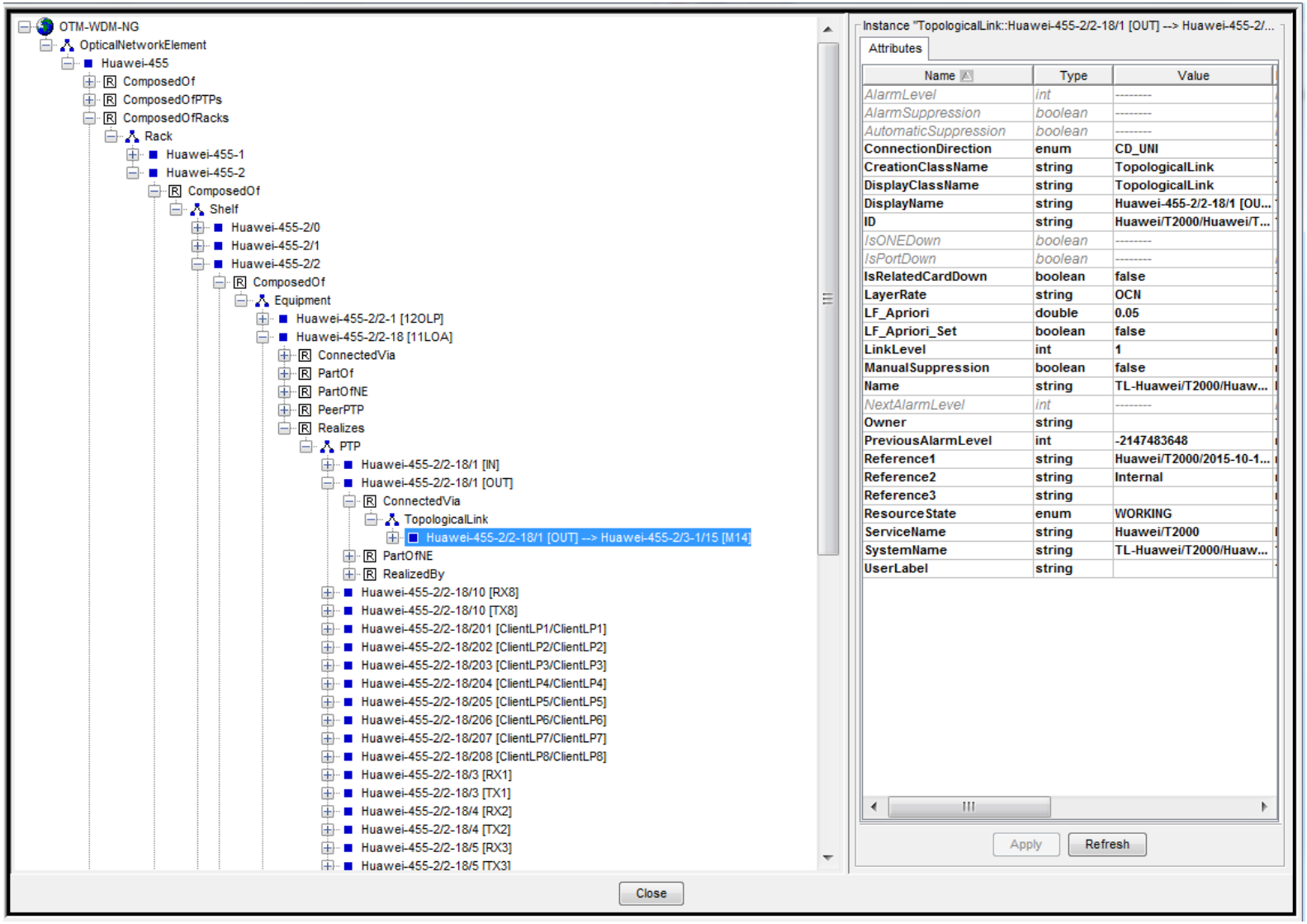
INCHARGE-SA::OpticalNetworkElement::Huawei-455

PTPs | Equipments

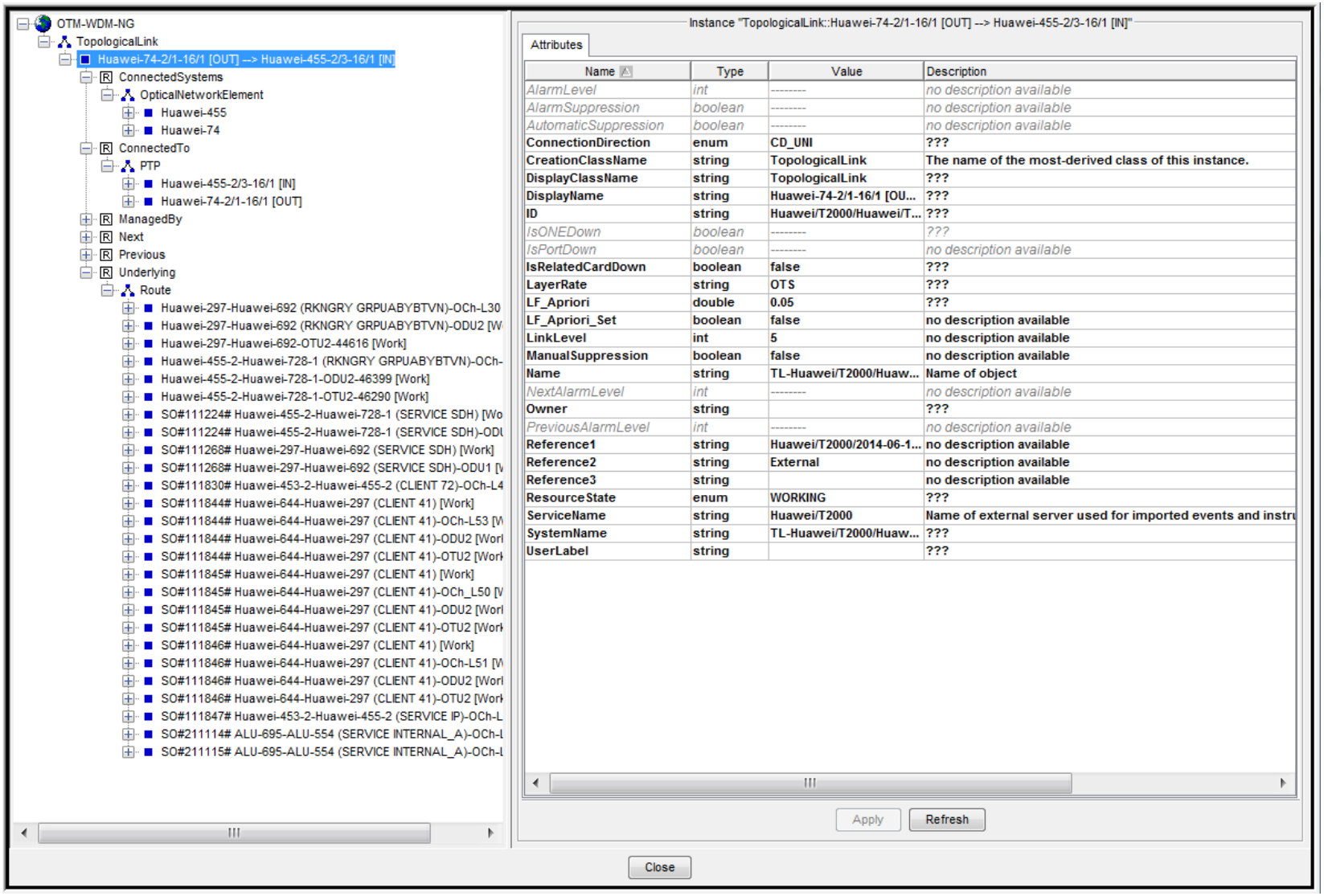
(1538 entries) DisplayName	ResourceState	UserLabel	IsDown
Huawei-455-1/0-1/1 [IN]	WORKING	IN	
Huawei-455-1/0-1/1 [OUT]	WORKING	OUT	
Huawei-455-1/0-13/1 [IN]	WORKING	IN	
Huawei-455-1/0-13/1 [OUT]	WORKING	OUT	
Huawei-455-1/0-14/1 [IN]	WORKING	IN	
Huawei-455-1/0-14/1 [OUT]	WORKING	OUT	
Huawei-455-1/0-14/3 [RX]	WORKING	RX	
Huawei-455-1/0-14/3 [TX]	WORKING	TX	
Huawei-455-1/0-15/1 [IN]	WORKING	IN	
Huawei-455-1/0-15/1 [OUT]	WORKING	OUT	
Huawei-455-1/0-15/10 [RX8]	WORKING	RX8	
Huawei-455-1/0-15/10 [TX8]	WORKING	TX8	
Huawei-455-1/0-15/201 [ClientLP1/ClientLP1]	WORKING	ClientLP1/ClientLP1	
Huawei-455-1/0-15/202 [ClientLP2/ClientLP2]	WORKING	ClientLP2/ClientLP2	
Huawei-455-1/0-15/203 [ClientLP3/ClientLP3]	WORKING	ClientLP3/ClientLP3	
Huawei-455-1/0-15/204 [ClientLP4/ClientLP4]	WORKING	ClientLP4/ClientLP4	
Huawei-455-1/0-15/205 [ClientLP5/ClientLP5]	WORKING	ClientLP5/ClientLP5	
Huawei-455-1/0-15/206 [ClientLP6/ClientLP6]	WORKING	ClientLP6/ClientLP6	
Huawei-455-1/0-15/207 [ClientLP7/ClientLP7]	WORKING	ClientLP7/ClientLP7	
Huawei-455-1/0-15/208 [ClientLP8/ClientLP8]	WORKING	ClientLP8/ClientLP8	
Huawei-455-1/0-15/3 [RX1]	WORKING	RX1	
Huawei-455-1/0-15/3 [TX1]	WORKING	TX1	
Huawei-455-1/0-15/4 [RX2]	WORKING	RX2	
Huawei-455-1/0-15/4 [TX2]	WORKING	TX2	
Huawei-455-1/0-15/5 [RX3]	WORKING	RX3	
Huawei-455-1/0-15/5 [TX3]	WORKING	TX3	
Huawei-455-1/0-15/6 [RX4]	WORKING	RX4	
Huawei-455-1/0-15/6 [TX4]	WORKING	TX4	
Huawei-455-1/0-15/7 [RX5]	WORKING	RX5	
Huawei-455-1/0-15/7 [TX5]	WORKING	TX5	
Huawei-455-1/0-15/8 [RX6]	WORKING	RX6	
Huawei-455-1/0-15/8 [TX6]	WORKING	TX6	
Huawei-455-1/0-15/9 [RX7]	WORKING	RX7	

Refresh | Browse | Save Table | Close

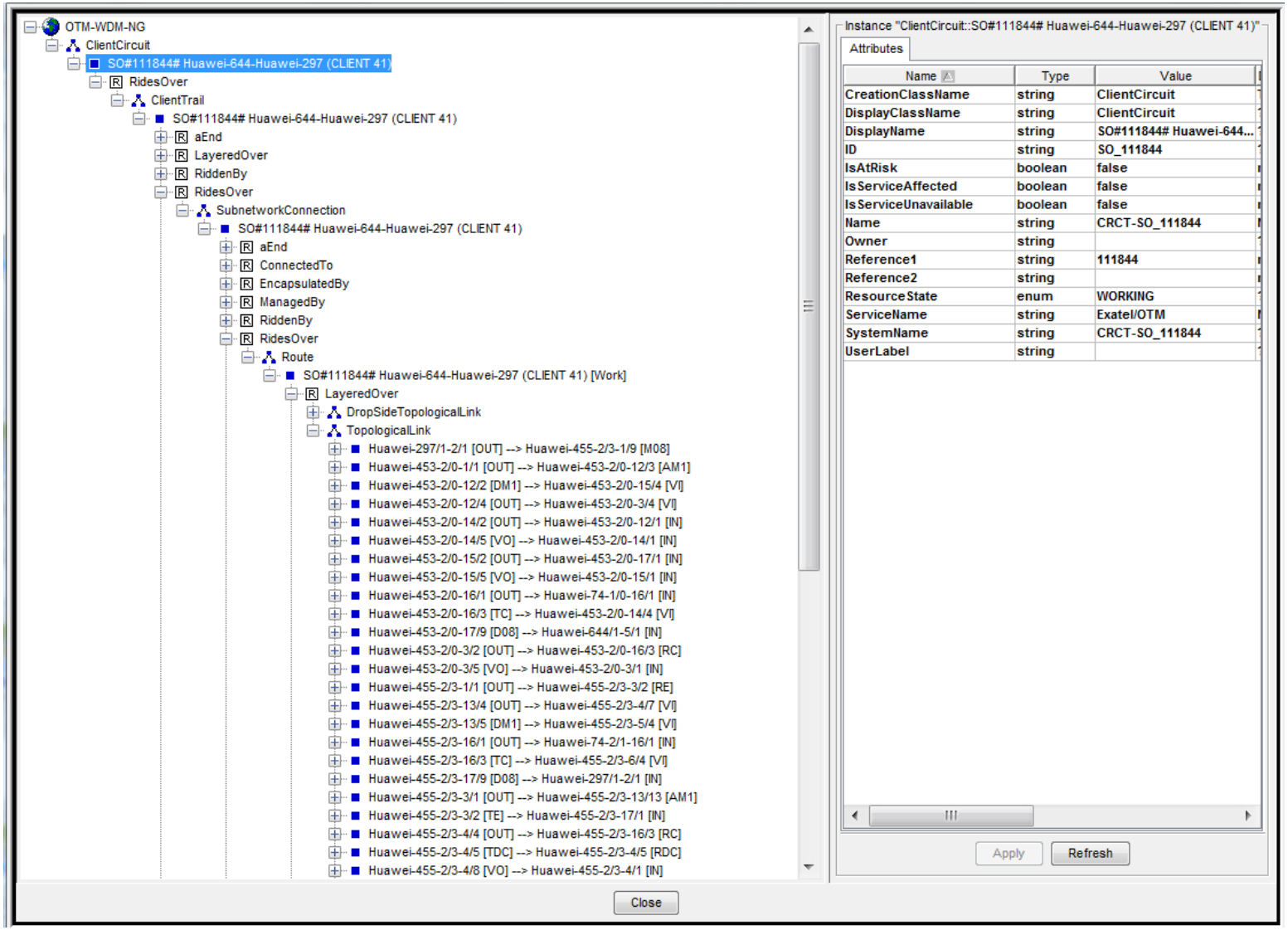
Detailed Device Configuration Tree



Physical Links



Client Circuits



Root Cause Analysis in the Optical Network

- Scenario 1 - Fiber Link fault in the Optical Network
  - Smarts shows a Line Failure notification as the Root Cause, and multiple Service Unavailability notifications correlated into it.
- Scenario 2 - Two independent faults in the Optical Network
  - Two independent Line Failures are identified as the Root Causes. Some of the services are affected by both failures - corresponding Service Unavailability notifications are linked to both root causes.

IP to Optical Network correlation

- Scenario 3 – Fiber Link fault in the Optical Network affects SDH & IP connectivity
  - Single Line Failure notification becomes the Root Cause for the link failures in the IP Network and client circuits in SDH. The IP and SDH faults are no more root causes; cross-domain correlation links them to the underlying WDM Optical Network fault.
- Scenario 4 – Fiber Link fault between an IP device and an Optical device
  - Cross-Domain correlation identifies a client fiber link as the new Root Cause of both: IP link fault and Optical Service Unavailability.

Scenario 1 - Fiber Link fault in the Optical Network

System shows single Optical Fault as the Root Cause

Notification Log - Default. Manager: INCHARGE-SA

Single Optical Root Cause affects 8 services

Critical | Major | Minor | Unknown | Normal

Se...	Ack...	IsRoot	Owner	Class	Impact	Name	Event
⊗	No	Yes		FiberLink	8	3145742/1-1-1-1/OTS-Out-->3145729/1-1-113-7/OTS-In	LineFailure

Notification Log - Default. Manager: INCHARGE-SA

List of affected Client Services

Critical | Major | Minor | Unknown | Normal

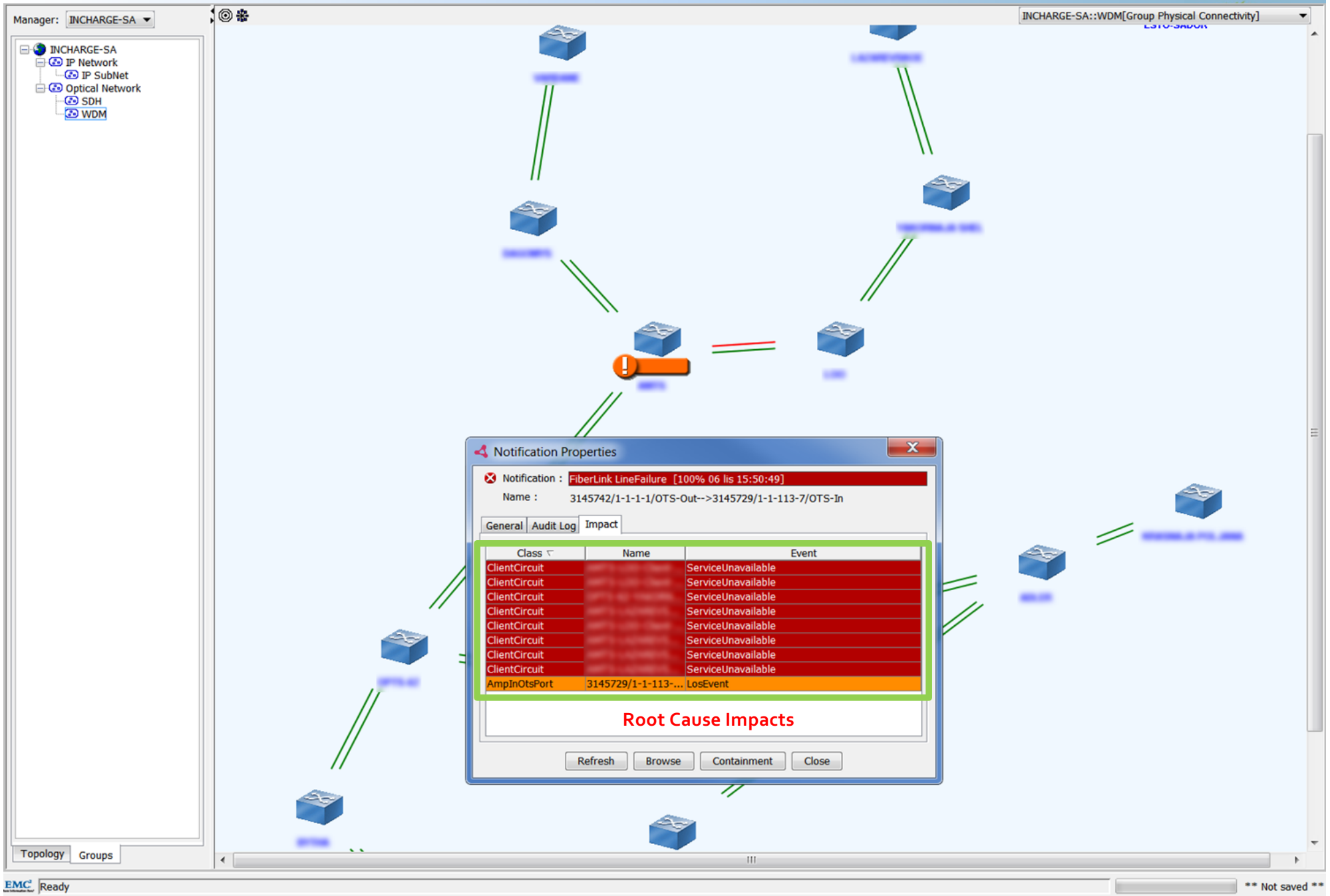
Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	Last...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...

Notification Log - Default. Manager: INCHARGE-SA

Critical | Major | Minor | Unknown | Normal

Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	Las...
⊗	No	FiberLink	[illegible]	LineFailure	OTM-WDM-ANALYSIS	3	06 lis 13:24:58	06 lis 12:04:27	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...
!	No	AmpInOtsPort	3145729/1-1-113-7/OTS-In	LosEvent	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 ...

Scenario 1 - Fiber Link fault – WDM View



Scenario 2 - Two independent faults in the Optical Network

System shows two Optical Fault as the Root Causes

Notification Log - Default. Manager: INCHARGE-SA

Each of two Optical Root Causes affects 8 services

Critical | Major | Minor | Unknown | Normal

Se...	Ack...	IsRoot	Owner	Class	Impact	Name	Event
⊗	No	Yes		FiberLink	8	3145741/1-1-1-1/OTS-Out-->3145742/1-1-14-7/OTS-In	LineFailure
⊗	No	Yes		FiberLink	8	3145742/1-1-1-1/OTS-Out-->3145729/1-1-113-7/OTS-In	LineFailure

Notification Log - Default. Manager: INCHARGE-SA

List of affected Client Services (11 in total)

Critical | Major | Minor | Unknown | Normal

Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	Last...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	06 li...

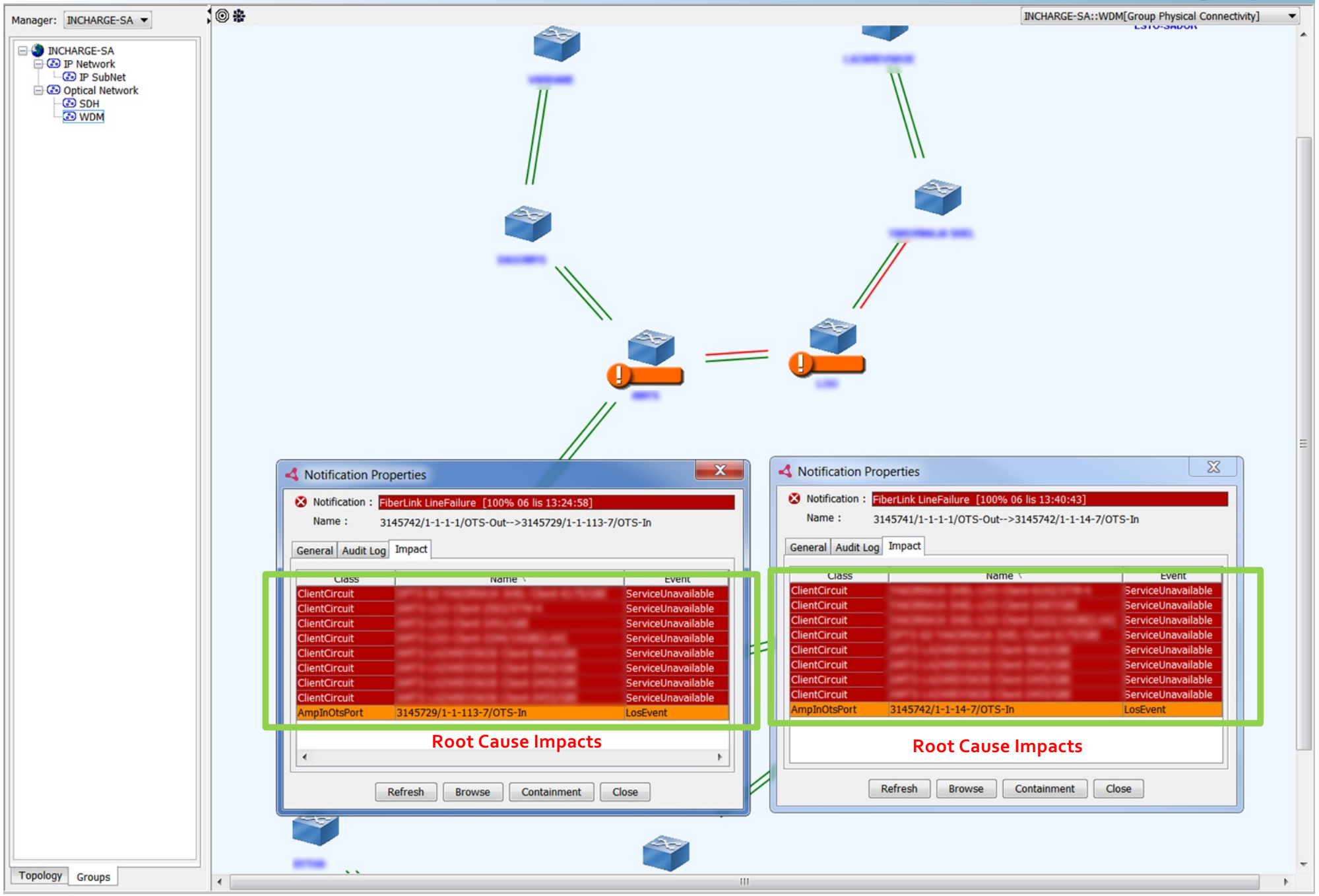
Notification Log - Default. Manager: INCHARGE-SA

Critical | Major | Minor | Unknown | Normal

Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	...
⊗	No	FiberLink	3145741/1-1-1-1/OTS-Out-->3145742/1-1-14-7/OTS-In	LineFailure	OTM-WDM-ANALYSIS	2	06 lis 13:40:43	06 lis 12:15:32	...
⊗	No	FiberLink	3145742/1-1-1-1/OTS-Out-->3145729/1-1-113-7/OTS-In	LineFailure	OTM-WDM-ANALYSIS	3	06 lis 13:24:58	06 lis 12:04:27	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
⊗	No	ClientCircuit	[redacted]	ServiceUnavailable	OTM-WDM-ANALYSIS	3	06 lis 13:24:29	06 lis 12:04:11	...
!	No	AmpInOtsPort	3145742/1-1-14-7/OTS-In	LosEvent	OTM-WDM-ANALYSIS	2	06 lis 13:40:42	06 lis 12:15:28	...

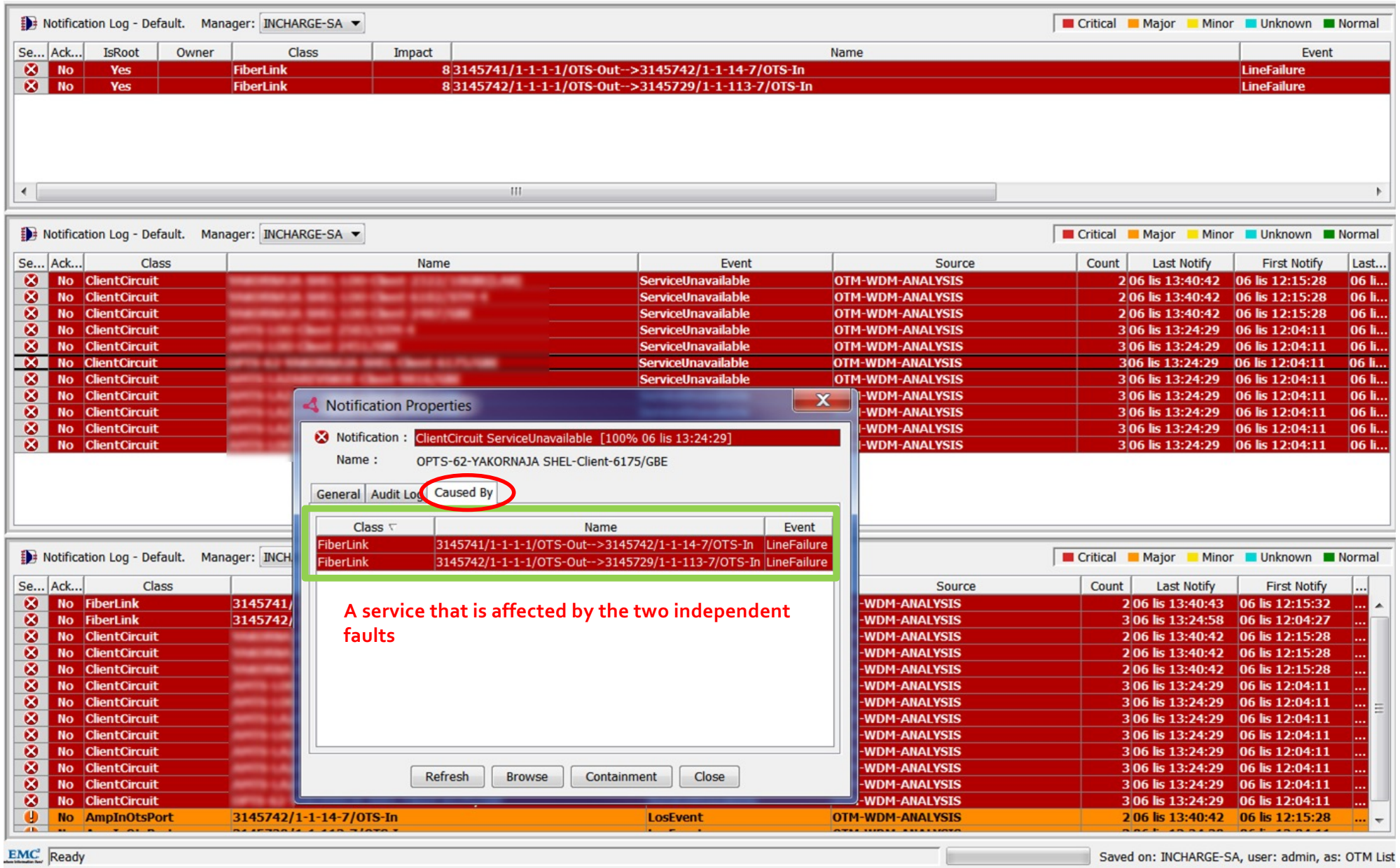
EMC | Ready | Saved on: INCHARGE-SA, user: admin, as: OTM List

Scenario 2 - Two independent faults in the Optical Network



Scenario 2 - Two independent faults in the Optical Network

System shows two Optical Fault as the Root Causes



Scenario 3 – Fiber Link fault in the Optical Network affects SDH & IP connectivity

System shows single Optical Fault as the Root Cause

Notification Log - Default. Manager: INCHARGE-SA

Single WDM Root Cause affects SDH & WDM services & IP connections

Critical Major Minor Unknown Normal

Se...	Ack...	IsRoot	Owner	Class	Impact	Name	Event
⊗	No	Yes		FiberLink	16	3145730/1-1-101-1/OTS-Out-->3145732/1-1-14-4/OTS-In	LineFailure

Notification Log - Default. Manager: INCHARGE-SA

List of affected WDM & SDH Client Services and IP connections

Critical Major Minor Unknown Normal

Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	Last...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	NetworkConnection	[illegible]	Down	INCHARGE-AM-PM, OTM-IP-XD	9	06 lis 15:02:48	16 wrz 12:22:24	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	06 li...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-IP-XD, OTM-WDM-ANALYSIS	6	06 lis 15:02:48	12 wrz 00:05:47	06 li...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	06 li...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	06 li...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	06 li...

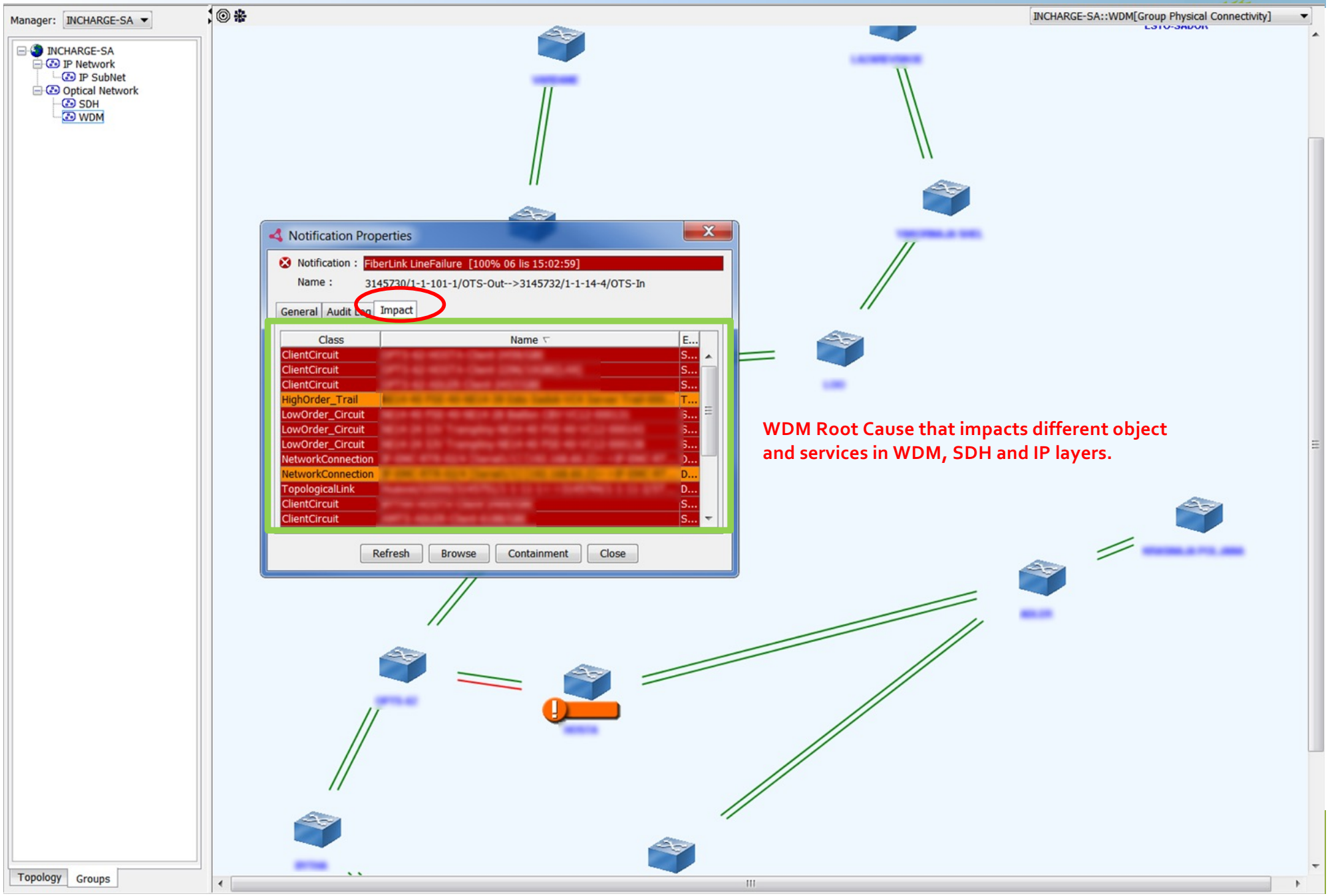
Notification Log - Default. Manager: INCHARGE-SA

Critical Major Minor Unknown Normal

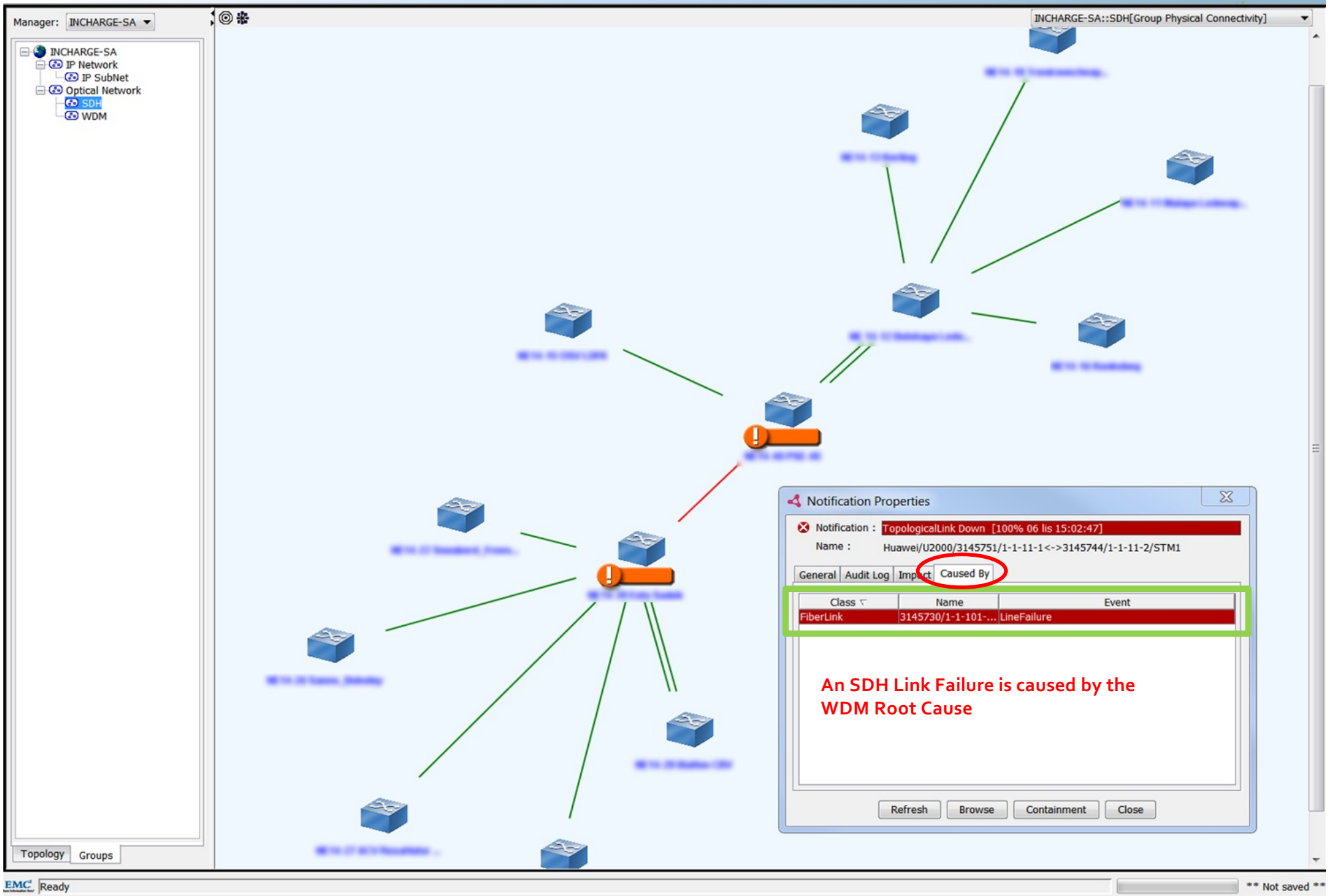
Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	...
⊗	No	FiberLink	3145730/1-1-101-1/OTS-Out-->3145732/1-1-14-4/OTS-In	LineFailure	OTM-WDM-ANALYSIS	4	06 lis 15:02:59	12 wrz 00:08:58	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-IP-XD, OTM-WDM-ANALYSIS	6	06 lis 15:02:48	12 wrz 00:05:47	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	NetworkConnection	IF-EMC-RTR-02/4 [Serial1/1] [192.168.60.2]<->IF-EMC-RTR-06/...	Down	INCHARGE-AM-PM, OTM-IP-XD	9	06 lis 15:02:48	16 wrz 12:22:24	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	ClientCircuit	[illegible]	ServiceUnavailable	OTM-WDM-ANALYSIS	4	06 lis 15:02:48	12 wrz 00:08:41	...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	...
⊗	No	LowOrder_Circuit	[illegible]	ServiceUnavailable	OTM-PDH-ANALYSIS	4	06 lis 15:02:47	11 wrz 10:48:27	...

EMC Ready Saved on: INCHARGE-SA, user: admin, as: OTM List

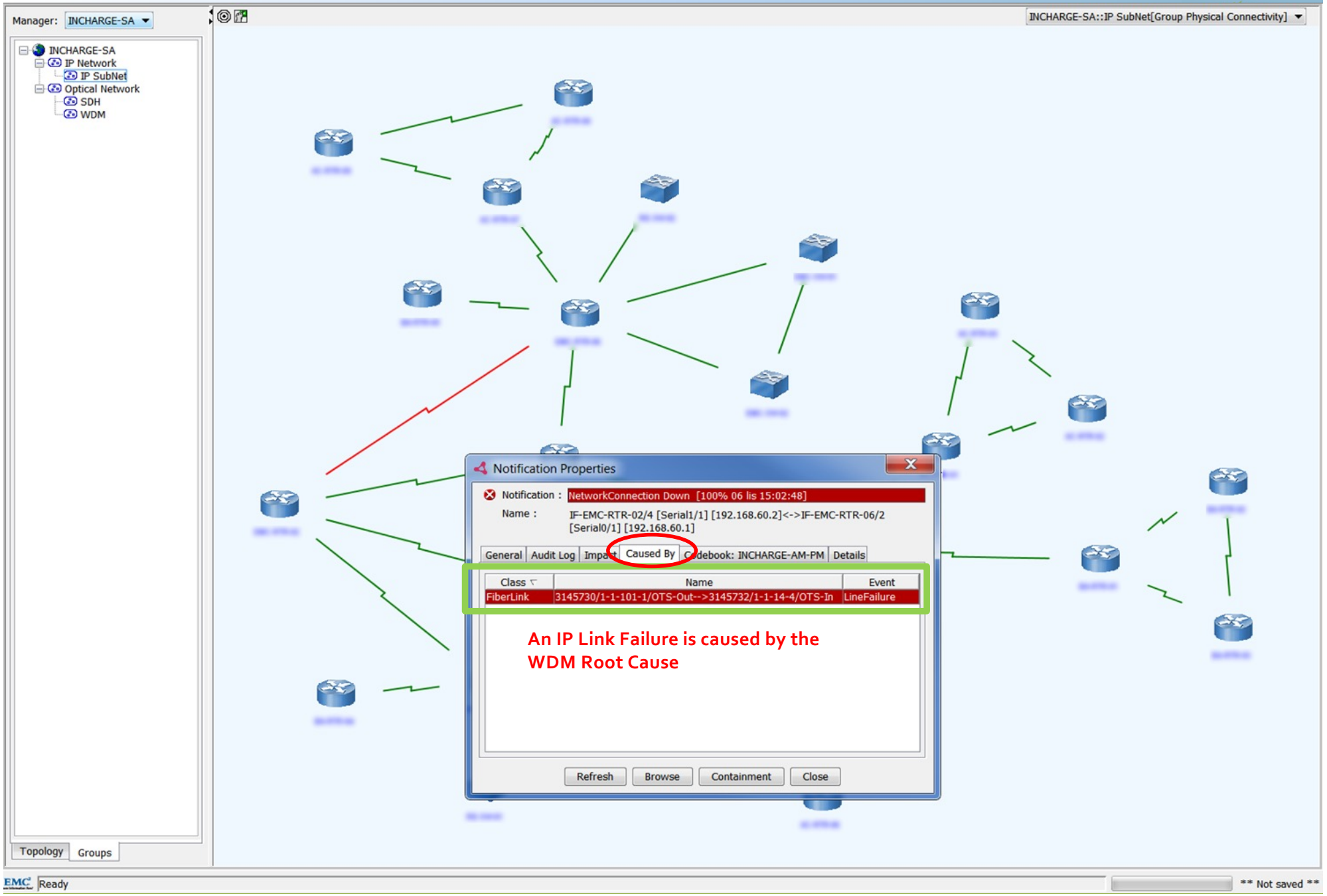
Scenario 3 – Fiber Link fault – WDM View



Scenario 3 – Fiber Link fault – SDH View



Scenario 3 – Fiber Link fault – IP View



Scenario 4 – Fiber Link fault between an IP device and an Optical device

Smarts identifies that the root cause is between IP and Optical network

Notification Log - Default. Manager: INCHARGE-SA

Critical Major Minor Unknown Normal

Se...	Ack...	IsRoot	Owner	Class	Impact	Name	Event
	No	Yes		Cable	2	IF-EMC-RTR-02/4 [Serial1/1] [192.168.60.2]<->3145735/1-1-26-3/RX1	Down

A Cross-Domain Root Cause is identified, which is a Cable Failure between an IP and a WDM device

Notification Log - Default. Manager: INCHARGE-SA

Affected WDM service and related IP Connection

Critical Major Minor Unknown Normal

Se...	Ack...	Class	Name	Event	Source	Count	Last Notify	First Notify	Last...
	No	NetworkConnection		Down	INCHARGE-AM-PM, OTM-IP-XD	10	06 lis 15:43:38	16 wrz 12:22:24	06 li...
	No	ClientCircuit		ServiceUnavailable	OTM-WDM-ANALYSIS	7	06 lis 15:43:10	12 wrz 00:05:47	06 li...

Notification Properties

Notification : Cable Down [100% 06 lis 15:43:18]

Name : IF-EMC-RTR-02/4 [Serial1/1] [192.168.60.2]<->3145735/1-1-26-3/RX1

General | Audit Log | Impact | Codebook: OTM-IP-XD

Class	Name	Event
TransponderInOc...		LosLofEvent
NetworkConnection		DownOrFlapping
NetworkConnection		Down
FiberLink		LineFailure
ClientCircuit		ServiceUnavailable

Refresh | Browse | Containment | Close

Notification Log - Default. Manager: INCHARGE-SA

Critical Major Minor Unknown Normal

Se...	Ack...	Class	Count	Last Notify	First Notify	Las...
	No	Cable	3	06 lis 15:43:18	06 lis 12:59:37	06 ...
	No	FiberLink	3	06 lis 15:43:14	06 lis 12:59:18	06 ...
	No	FiberLink	3	06 lis 15:43:14	06 lis 12:59:18	06 ...
	No	NetworkConnection	10	06 lis 15:43:38	16 wrz 12:22:24	06 ...
	No	ClientCircuit	7	06 lis 15:43:10	12 wrz 00:05:47	06 ...
	No	NetworkConnection	16	06 lis 15:43:10	11 wrz 12:04:45	06 ...
	No	TransponderInOcnPort	3	06 lis 15:43:10	06 lis 12:58:52	06 ...
	No	FiberLink	3	06 lis 15:43:14	06 lis 12:59:18	06 ...

Correlated both Optical and IP Failures


Thanks