



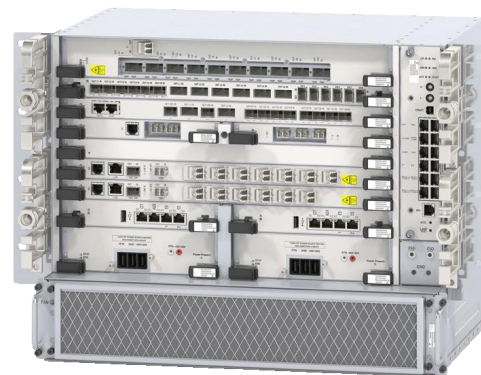
DENOG 7 Lightning Talk “IP meets Optics”

Matthias Hahn

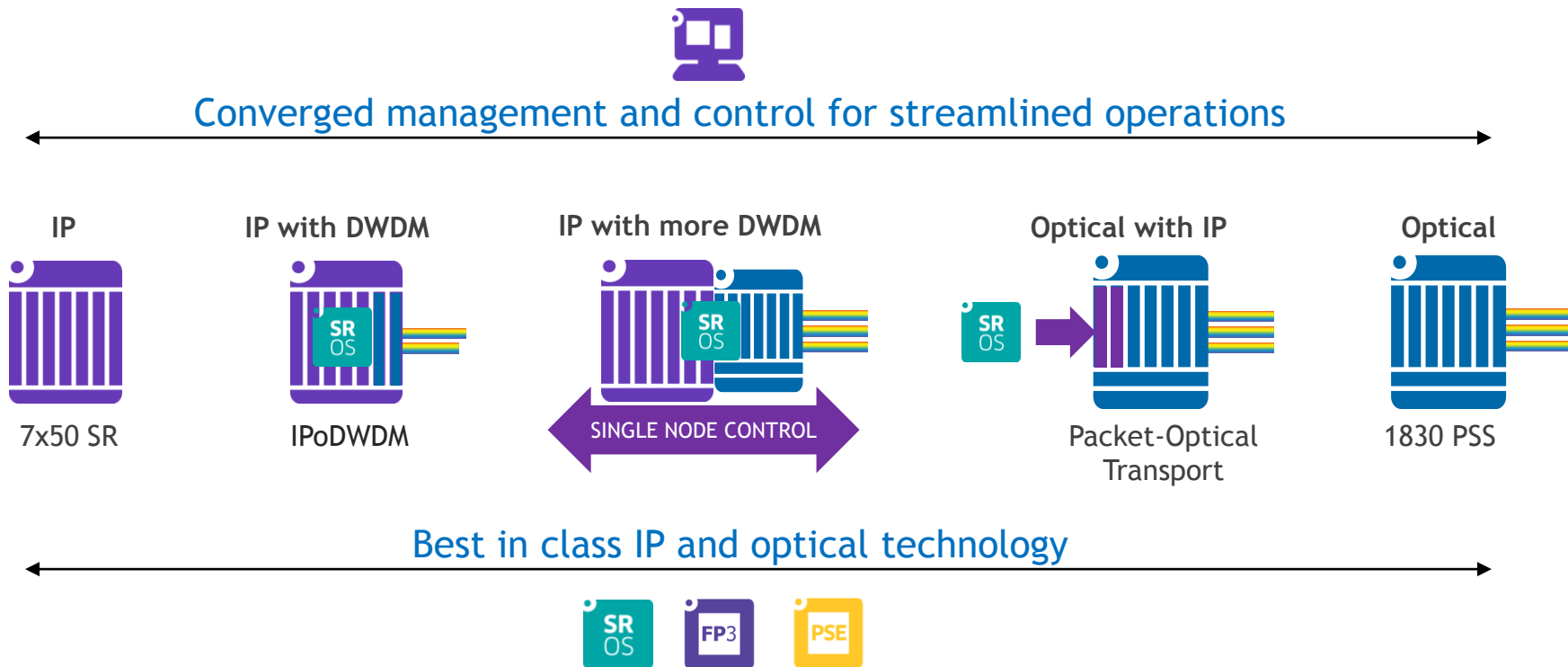
October 30, 2015



IP meets Optics



IP-Optical Data Plane Integration



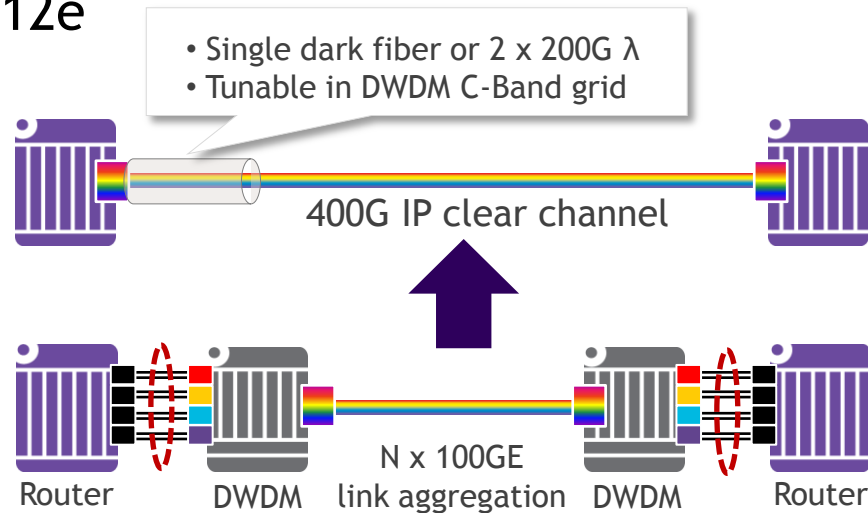
400G IPoDWDM for 7950 XRS, 7750 SR-12e



Powered by



- LC fiber connector
- 400G clear channel
- Single MAC address
- Single flow at L2/L3



- 1 port 400G clear channel line card for 7950 XRS and 7750 SR-12e
- Integrated coherent DWDM optics for metro reach applications (60 km unamplified, ~600 km with ILA)
- Powered by Alcatel-Lucent's proven 400G FP3 silicon. Deployable on existing hardware platforms
- Saves on optical transponders and DWDM transport. Integrated routing & transport OAM

4x link speed to efficiently transport video and big data traffic

Addressing Higher IPoDWDM Connectivity Needs

ISSUES ADDRESSED

- Tunable optics for routers are costly and have low port density
- Router optics typically trail transport optics in evolution

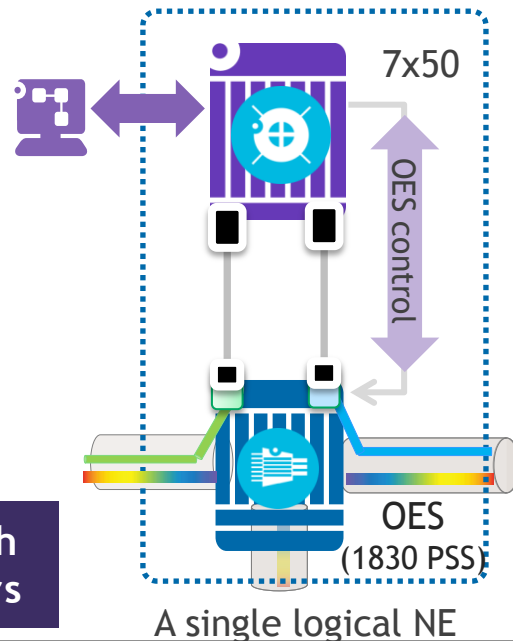
OES connects using standard gray router optics (!)

- Low cost interface solution without impacting port density
- Transport OAM visibility via OES control port

Leverages the 1830 PSS platform as OES

- Benefits from using state-of-the-art optics
- Scales by connecting multiple OES shelves
- Fully managed by router through OES control interface

Optical extension shelves offer better scalability in high density IPoDWDM scenarios than integrated transponders



Integrated Resource Management Under SROS

Router and OES Operate as a Single Logical NE

Correlation of optical paths with router interfaces

- Propagate transport error information back to router
- “show port a” on the router displays information about a, p and p’ (with same consistent port state model)

Access OES configuration and status via SROS CLI

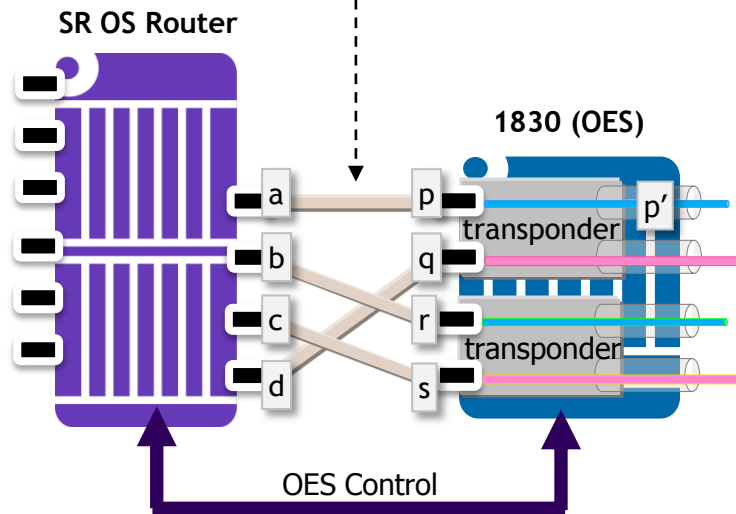
```
*A:bksim3107# show card
```

Card Summary

Slot	Provisioned Type Equipped Type (if different)	Admin State	Operational State
1	xcm-x20	up	up
...			
A	cpm-x20	up	up/active
B	cpm-x20	up	down/standby
oes-1/1	ec	up	up/active
oes-1/2	260scx2	up	unknown
oes-1/18	ec	up	down/standby

Router to OES port mapping

Router Port	OES Port
a	Chassis X, port p
b	Chassis X, port r
c	Chassis X, port s
d	Chassis X, port q



7750 SR / 7950 XRS Product Family



- Chassis of any sizes available - from entry level to very large
- Full MPLS capabilities with extensive VPLS/EVPN feature set
- Common SR OS operating system binary over all chassis variants
- Fully managed by 5620SAM network management system

Routing



7210 SAS - Service Aggregation Switch Product Family

Ethernet Enabled Demarcation, Access & Aggregation



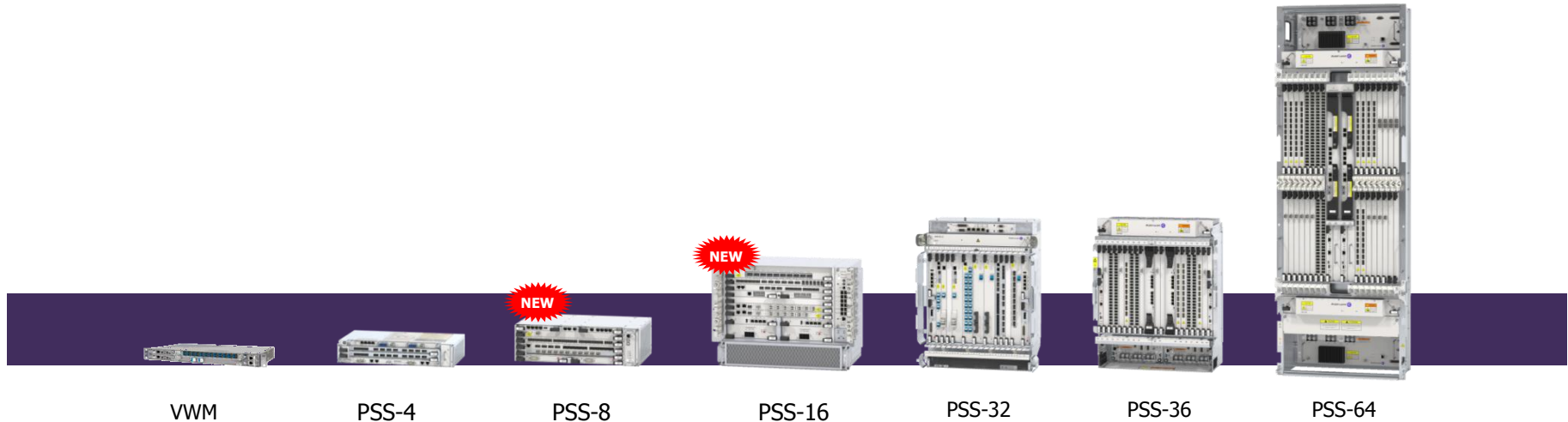
5620 Service Aware Manager

- Chassis of any sizes available - from entry level to very large
- Full MPLS capabilities with extensive VPLS feature set
- Common SR OS operating system binary over all chassis variants
- Fully managed by 5620SAM network management system

Switching



1830 PSS - Photonic Service Switch Product Family



- Systems of any size available - from passive entry level to very large optical core
- Fully managed by the same 5620SAM network management system as 7750 Service Routers
- Single NMS, allowing event correlation and quick root-cause analysis throughout all network layers

5620 SAM - Service Aware Manager - Alarm Management

CHALLENGE WITH TRADITIONAL NMS TIME-CONSUMING FAULT TROUBLESHOOTING

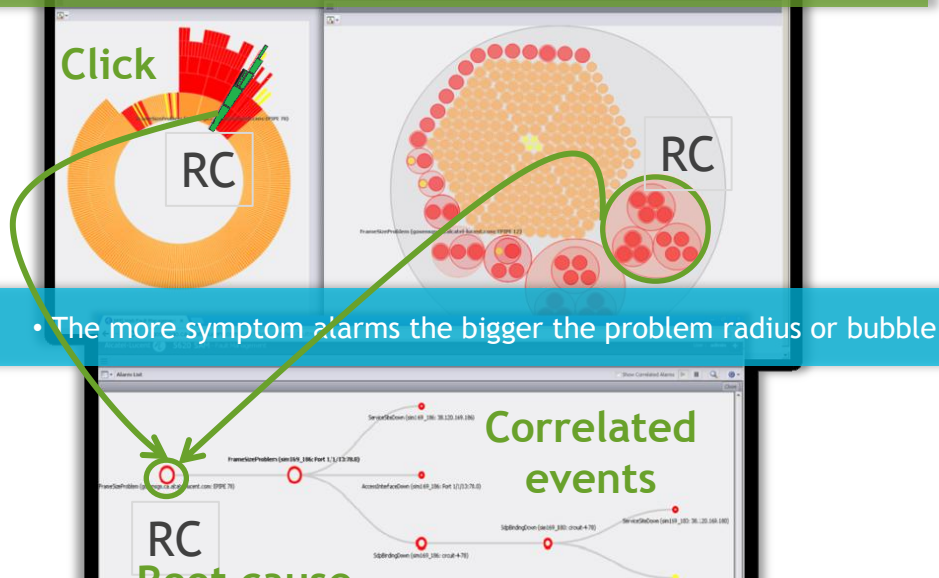
The screenshot displays a network monitoring application with a table of alerts and a detailed view of a selected alert. The table has columns for Impact, Severity, Last Time Detected, Site Name, Object Type, Object Name, Alarm Name, Probable Cause, and Ack. The detailed view shows the alert's configuration, including the object type (Network Device), object name (Cisco Catalyst 3750), and the alarm name (Network Device is Down). The probable cause is listed as 'Network Device is Down'. A large orange circle with the text 'Root Cause?' is overlaid on the right side of the interface.

Root Cause?

GET TO THE ROOT CAUSE IN 2 CLICKS

= MANY CLICKS & LOTS OF SEARCHING

ALCATEL-LUCENT 5620 SAM
VISUALIZATION APPROACH SHOWS MAGNITUDE OF PROBLEM IMPACT
FOR INTUITIVE STARTING POINTS INTO INVESTIGATION

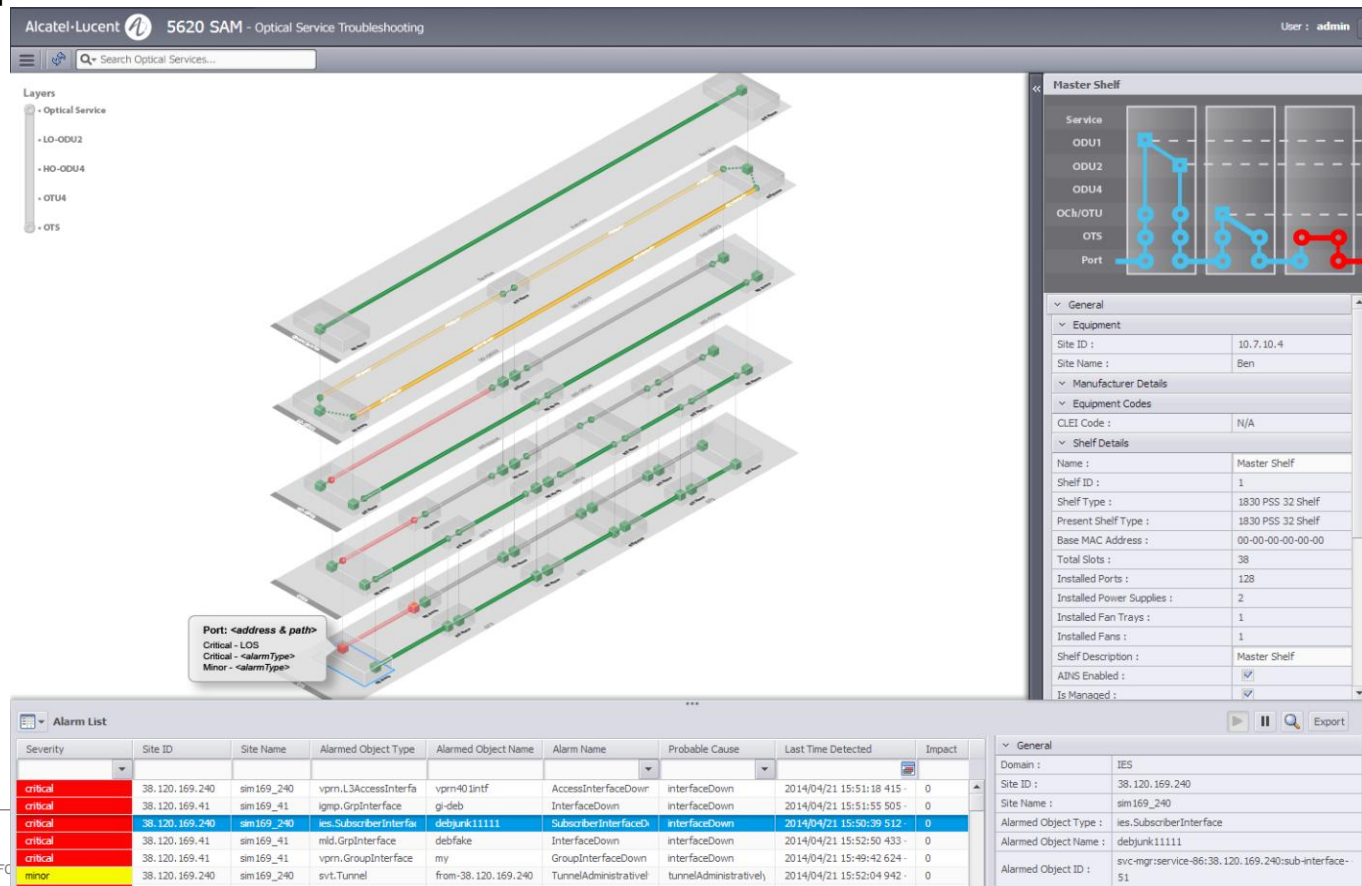


CLAR VIZUALIZATION OF ROOT CAUSE (RC) & SYMPTOM TREE IN A SINGLE CLICK

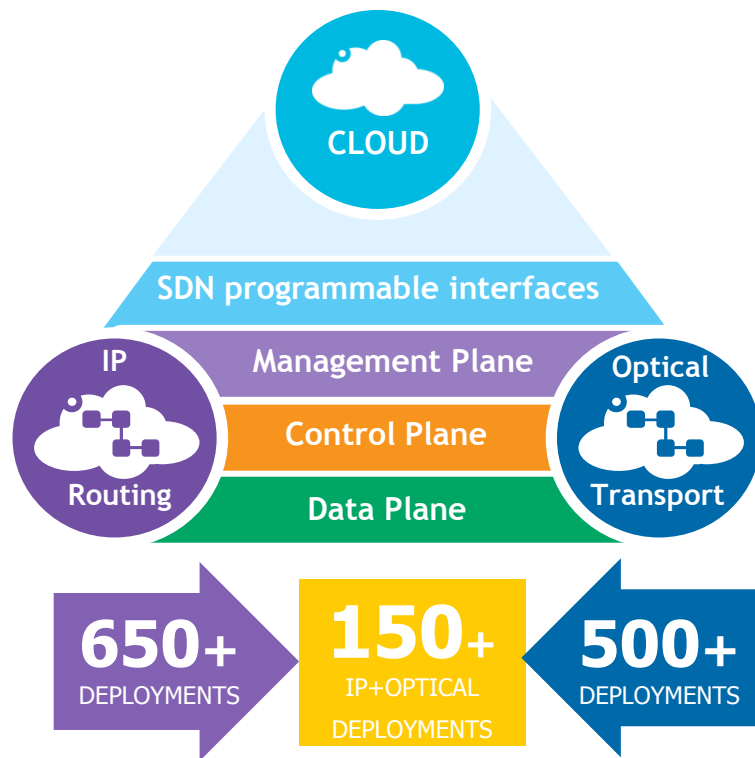
5620 SAM - Service Aware Manager

Multi layer service map

- Instant view of service layers end to end
- Rapidly identify root cause
- See working and protection paths



Alcatel-Lucent's IP-Optical Integration Strategy



A programmable IP Network Fabric with optical cost synergies

Every success has its network