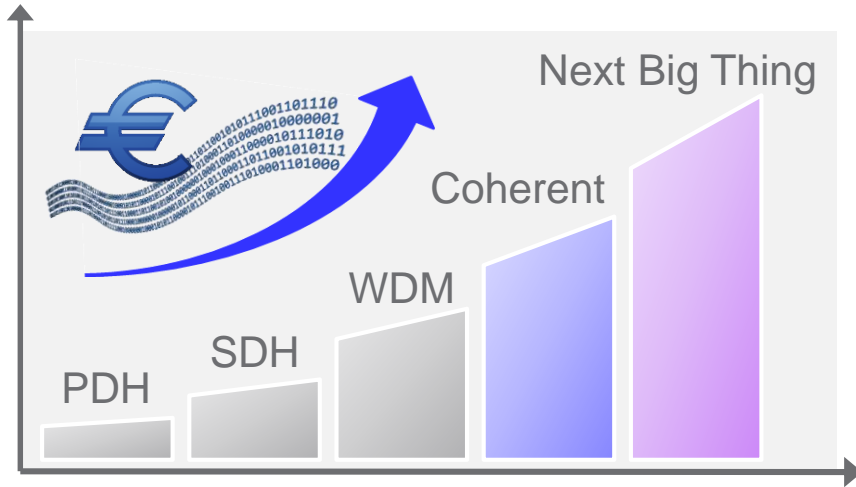


The future of open optical networks

What are the steps and will we get there eventually?

Alexander Niepel, *Director Portfolio Management*

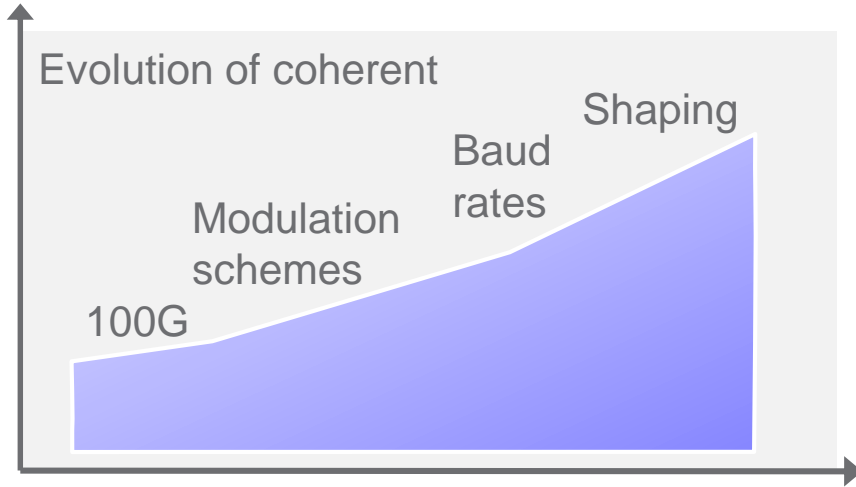
The past and future of optical networks look bright ...



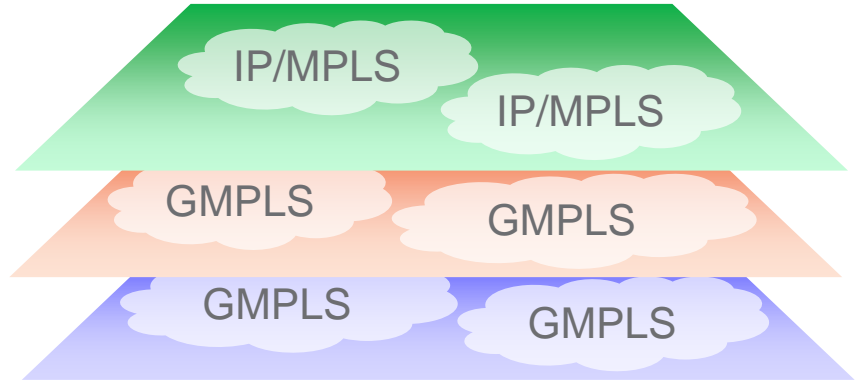
Is “*open*” the next disruption?

It’s the software, stupid!

... what are the challenges today?



Introduction speed of next innovation step?



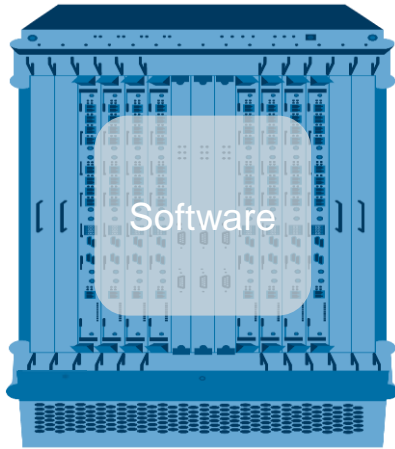
How to build resilient networks?

Traditional way of bringing technology to market

Optical technology



Product design



Network architecture



Operational concept

Lock in situation

- vendor domain
- vendor rack space
- vendor roadmap
- vendor concepts

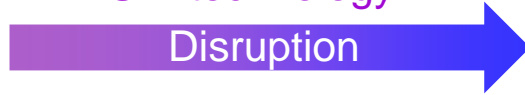
Escape the lock in – the help comes from “above”



DC players

Business model +
SW technology =

Disruption

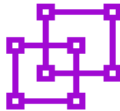


Carrier Networks

Operational concept



Product design



Open APIs, disaggregation

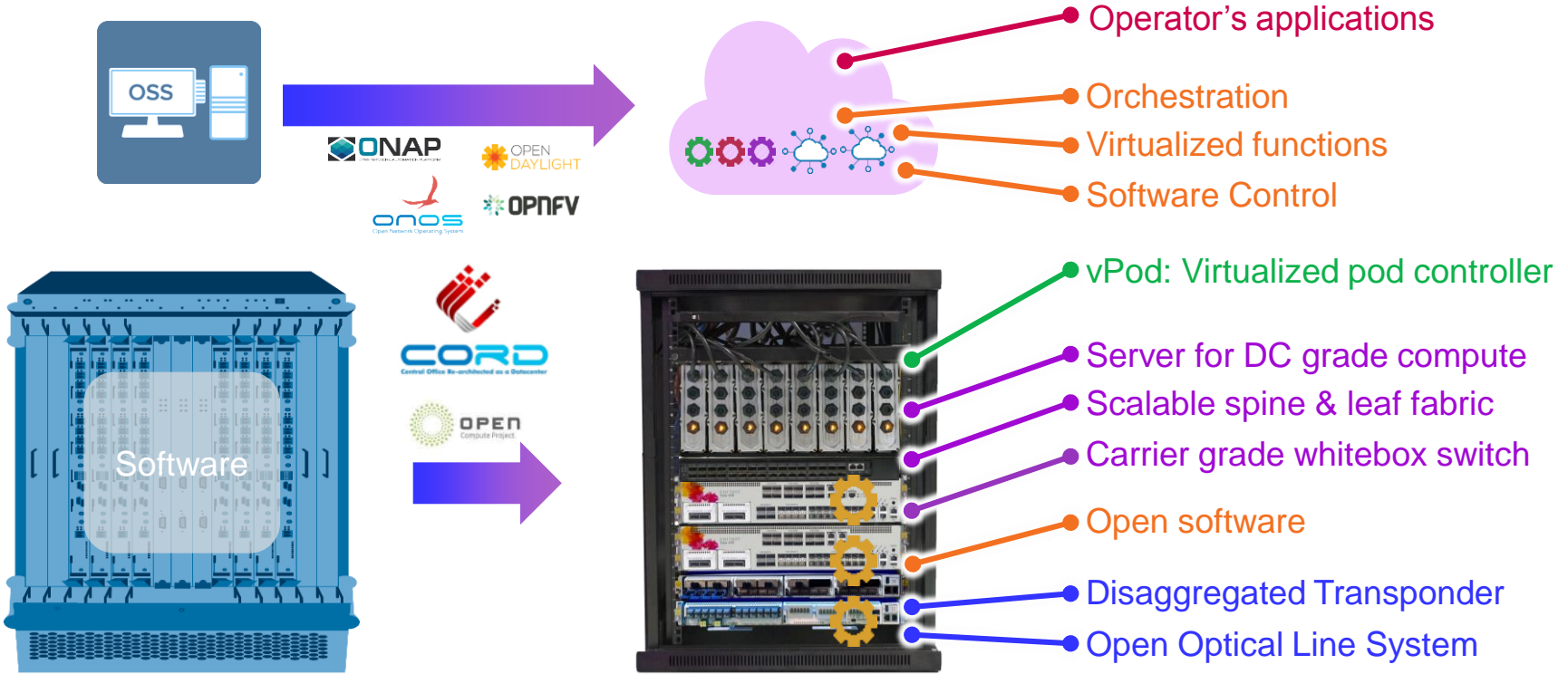
Seamless automation

Fast service introduction

Fast innovation introduction

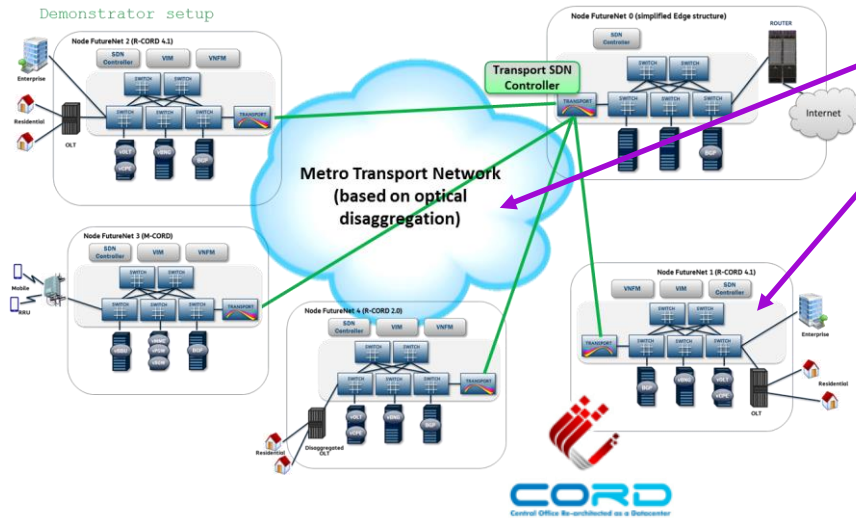
Multi-vendor solutions

The operational concept forms the product design, ...

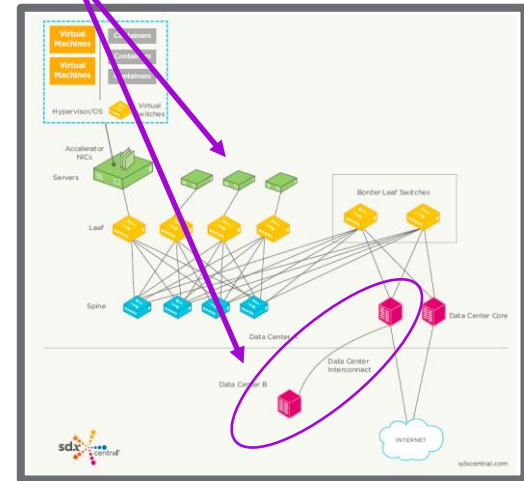


... and the network architecture

TIM FutureNet demonstrator

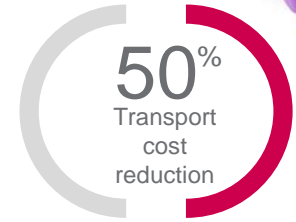


Open and Disaggregated



SDN central: Intra- and Inter DC connect

The beginning: Open, disaggregated transponder



General benefits

DevOps using Open APIs

Fast deployment cycles

Density – power consumption – first-in costs

Uncompromised optical performance



Step 1.5: Alien wavelengths to escape vendor lock-in



Alien wavelengths

Commercial deployments
Competitive benefits through speed

The way ahead

Products built for plug'n'play interop
Practical multi-vendor planning

Step 2: Open ROADM as a potential desired state for OLS

Open ROADM

Disaggregate ROADM nodes
Disaggregate transmission interface
Open standardized interfaces
No single vendor network domains

Current focus for standards

R&S ROADM w/ CD-AD and 100G IF for 500km
Netconf/Yang APIs for all components
No physical specification (depth, width)
Operation temp of -5C to 40C

Current Members

AT&T

Ciena

Fujitsu

Alcatel-Lucent USA (now a subsidiary of Nokia)

SK Telecom

Orange S.A.

Cisco

Saudi Telecom Company

Coriant

Telecom Italia (TIM S.p.A)

Juniper Networks

Deutsche Telekom AG

Infinera Corporation

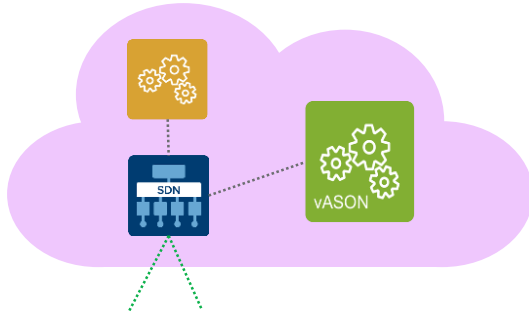
KDDI

Acacia Communications

The way ahead

Expand beyond 100G
Lower cost ROADM function

Step 3 – Back to the point: Operational concept



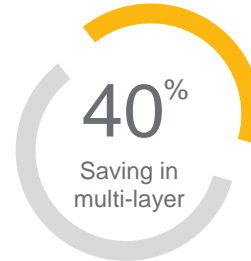
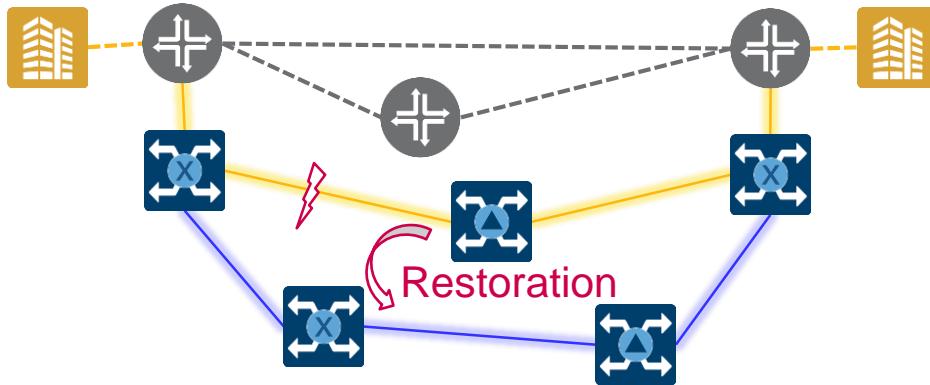
vASON™: SDN based resilience

IP-Optical networks

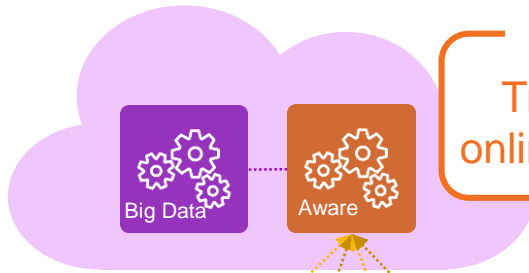
Network resource efficiency L0-3

Disaggregated architectures

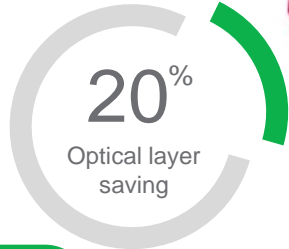
Programmable restoration logic



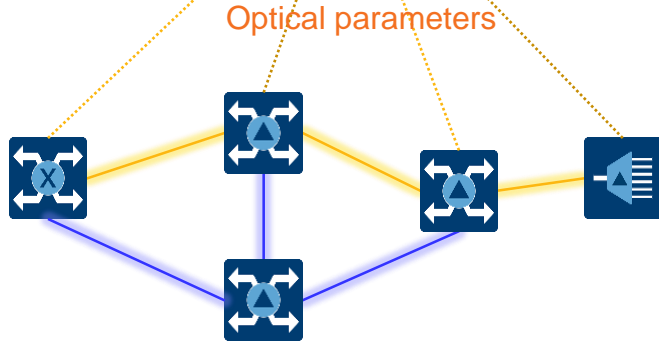
Step 3 – Back to the point: Monitoring of optical layer



Real time optical performance check
Trend analysis, programmable alarming,
online provisioning, capacity re-optimizations



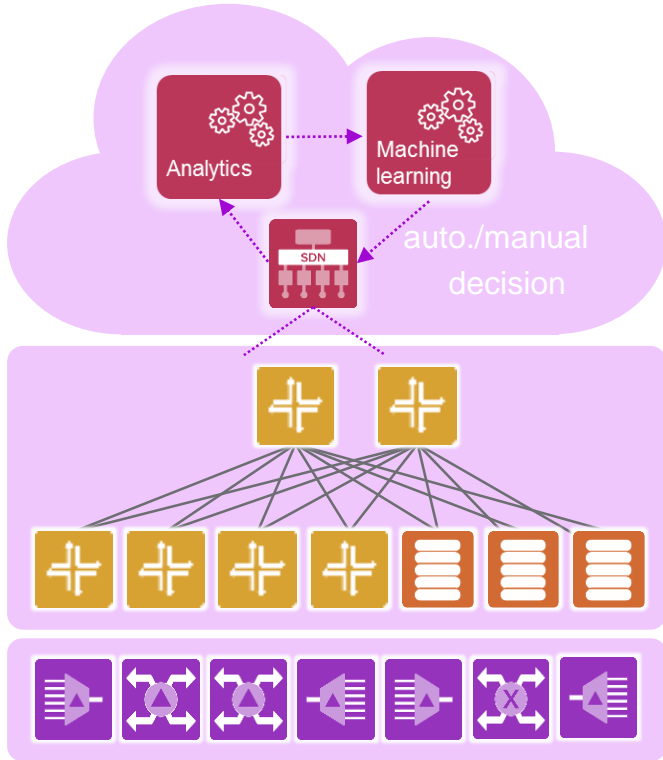
Aware™ strengths
OSNR and (non)-linear link impairments
Designed for multi-vendor
Hardware and DSP independent
Simple user interface



The way ahead
Open API with
optical parameters



The next big thing: The self-driving network



AI based operational concepts

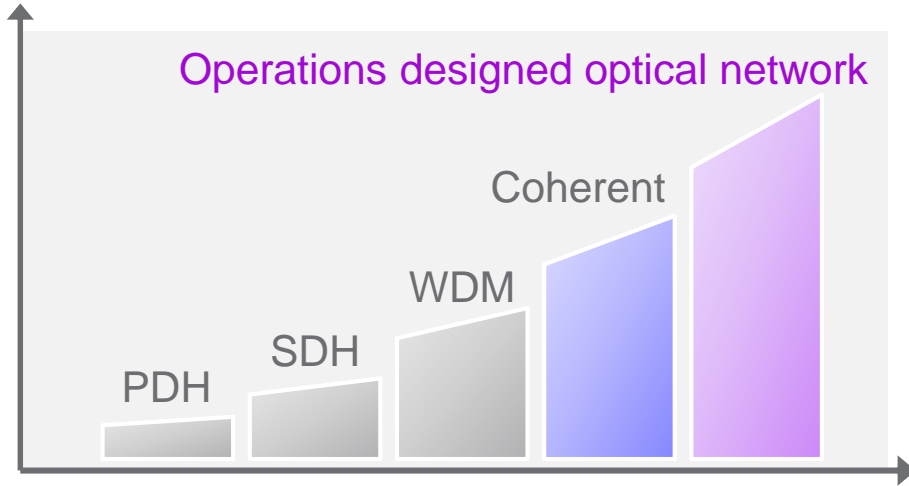
Quality of transmission estimation
→ Optimized optical path routing

Failure prediction
→ Preventive maintenance

Signal equalization (non linearity)
→ Faster & simpler DSP

Traffic prediction
→ Automated network re-configuration

The future of optical networks is not open, but ope(n)rational



Where we are

Open, disaggregated transponder
Alien wavelength
SDN, vASON™, Aware™, AI, ...
Open initiatives

The way ahead

1 open API w/ optical performance data
OpenROADM w/ broader scope
Openness in mind

coriant
THE SOUND OF DISRUPTION



Thank you