



COBO CHANGING OPTICAL NETWORKING

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JUNIPER
NETWORKS

Engineering
Simplicity

Juniper: Engineering Simplicity

Complexity is the new hard problem

- Juniper powers **65+% of the world's Internet transactions**
- **88+% of smart phone traffic** runs across our routers, switches and firewalls
- **All of the top 130 service providers** in the world run Juniper
- We power the world's largest and most demanding networks including **96 of the Fortune 100 and the TOP 5 Social Media Networks**
- **6 of the 7 world's largest stock exchanges** run across Juniper Networks products - that's over **10 billion shares** a day!



WHAT'S NEXT AFTER COBO? **Bookended** OPTICAL NETWORKS



Gert Grammel

Chair OOPT-PSE Working Group

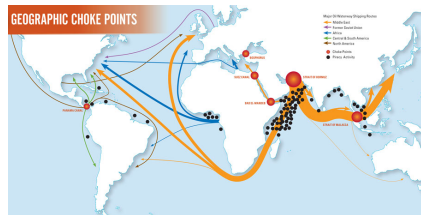
Juniper Networks



What's going on with OPEN Optical Networks?



We started with direct detect modules
Coherent technology
reduces dependency



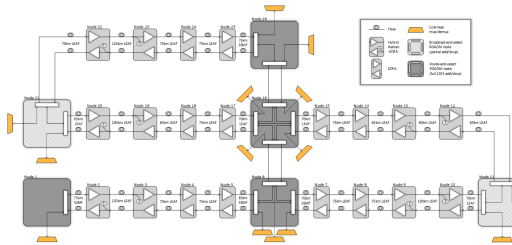
Open Source GNP
Simulating transport
conditions

COBO Transceivers
provide performance
reference

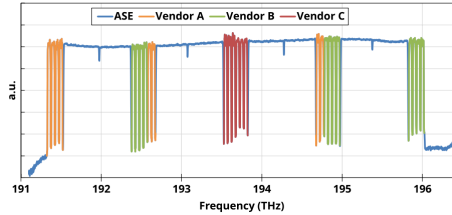


What else is driving OPEN Optical Networks?

Validation of Model accuracy



- 6 ROADM
- 5 * 400km line segments
- 4 Line Amplifiers per line segment
- 4 hybrid Raman amplifiers
- 65km – 120km Fiber segments
- G.652 SSMF and G655 LEAF fiber



- 4 different Wavelength Sources
- ASE Noise for full spectral load
- 26 channels under test
- 34.16 Gbaud
- 3 Modulation Schemes tested:
 - PM-QPSK @ 2000km and 4000km
 - PM-8QAM @ 400, 800, 1200, 1600, 2000 km
 - PM-16QAM @ 400KM, 800KM, 1200KM



- MSFT-controller automated collection of optical parameters
- GNPy directly fed with collected parameters
- 80% of simulations are within 1 dB of error at 400 km.
- 92% of simulations are within 1 dB of error at 800 km,
- 100% of simulations are within 1 dB of error for larger distances.

OPEN Optical Networks

DIGITAL SELF AUTOMATING NETWORKS



- SIMULATION FUELS AUTOMATION
OF PACKET-OPTICAL NETWORKS

NEUTRAL QUALIFICATION



- METRICS ENABLE NETWORK
QUALIFICATION BY NEUTRAL
ORGANIZATION

CATALOG OF FUNGIBLE COMPONENTS



- COMBINING PERFORMANCE
MODEL WITH DATA MODELS
SPEEDS UP DEPLOYMENT



Q&A

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