



Next Generation DWDM



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#18713

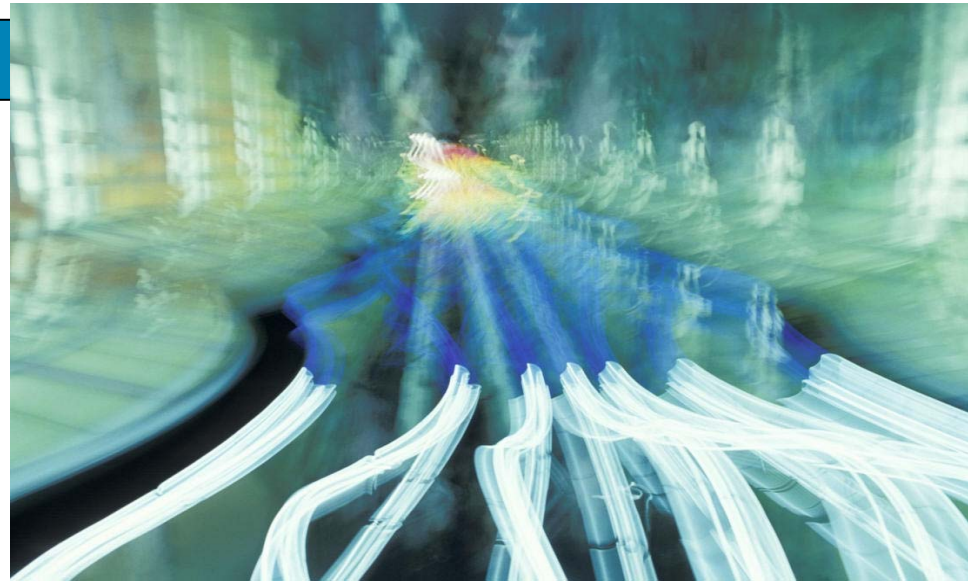
Storage Networking

Roma
29 aprile 2009

Agenda

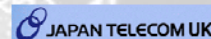
Optical relevance to Cisco

- Monza – Optical Center of Excellence
- CESNET
- Future work



ONS 15454 MSTP Deployments

- **1,200+** customers deploying Cisco optical solutions
- **500+** customers deploying ONS15454 MSTP platform
- Major **Service Provider** adoption worldwide
- Over **60,000** ONS 15454 in-service
 - More than **13,000** DWDM Node shipped in-service
 - More than **8,500** ROADMs shipped
 - More than **200,000** OADM ports shipped
 - More than **18,000** 2.5G channels shipped in-service
 - More than **22,000** 10G channels shipped in-service



Cisco Optical Technology Leadership

Commitment to R&D and Innovation

- **200+ patents in Optical space**
- **>250 R&D Engineers based in Italy**
- **3 x Development centres worldwide**
- **Contributions / Leadership to all major standard bodies (ITU-T, IETF, IEEE...)**



Leading innovator for ROADM market

PALO ALTO, Calif. :

Industry Leaders Recognized with Frost & Sullivan Best Practices Awards

<http://www.frost.com/prod/servlet/press-release.pag?docid=128069537>



2008 Global ROADM Systems Market Leadership of the Year Award Cisco Systems Inc.

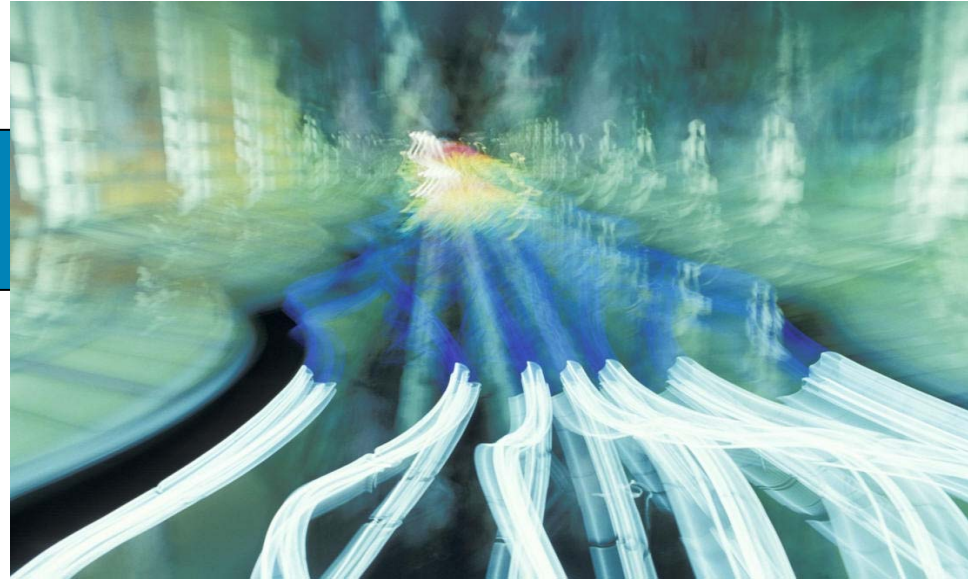
The 2008 Global Frost & Sullivan Award for Market Leadership in the reconfigurable optical add-drop multiplexer (ROADM) systems Market is presented to Cisco Systems Inc. The company has been recognized for its success in understanding customer needs and providing suitable and better solutions. Cisco has been one of the pioneers in the manufacture of ROADM-based systems. Even though the market is highly competitive, the company was able to capture a 40 percent share. This is a result of its projection as a cost-effective solutions provider and because it offers a wide range of products.

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Monza Facility

- Monza = Cisco Optical Centre of Excellence
- 21,000 m2 Facility
- 15,800 m2 Operational
 - Offices 10,600 m2
 - Engineering / R&D Labs 4,000 m2
 - Technical Briefing Centre 1,200 m2

Monza, Italy

EMEA Optical Centre of Excellence

Cisco.com



Customer Briefings

Networking trends, strategy
and product updates

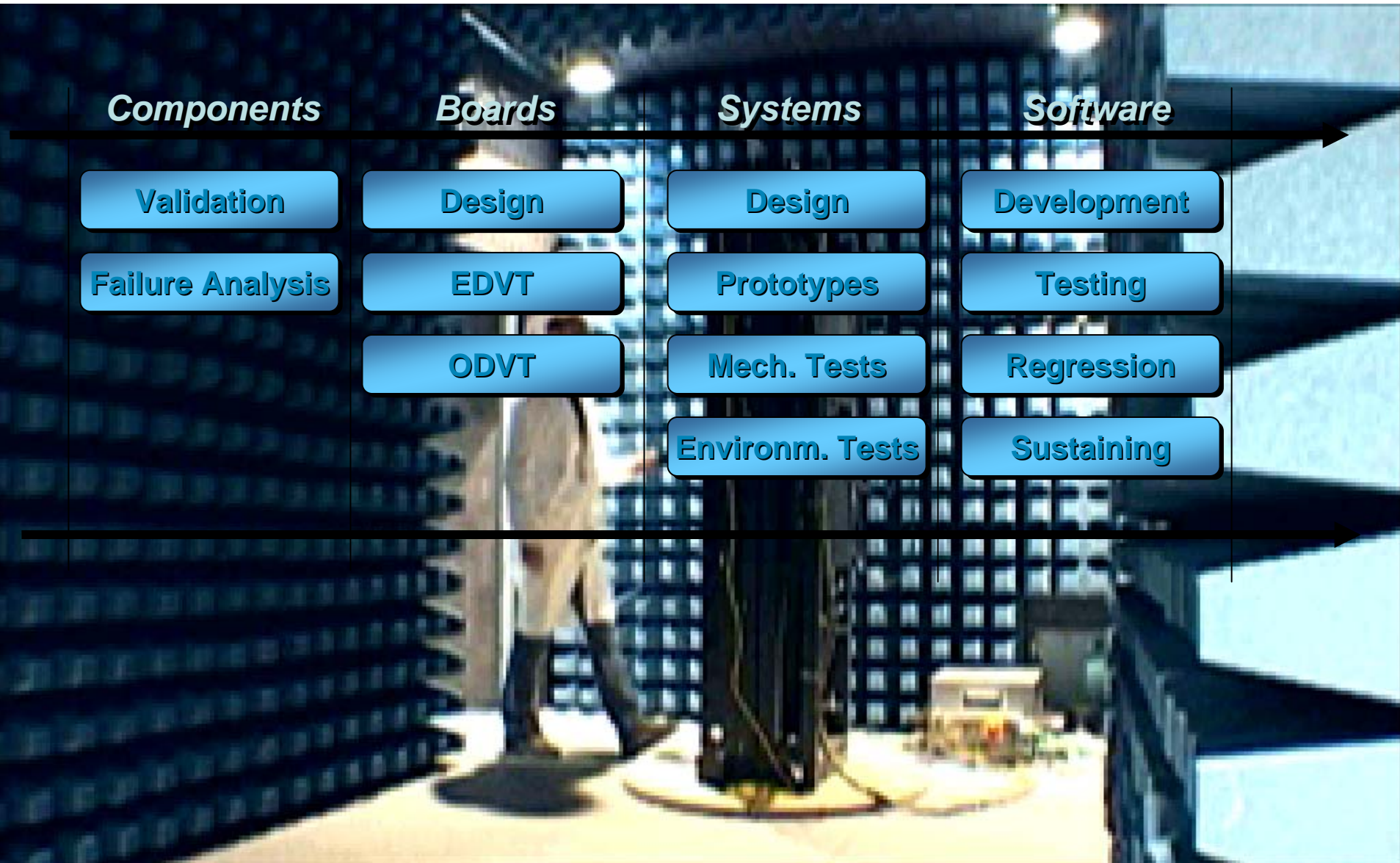
"Proof-of-Concept" Classrooms and Labs

Solutions' Demo Simulation and
Validation of Specific of
Customer's Applications /
Requirements

Partner & Customer Training

Product installation,
commissioning
and maintenance

Engineering Labs

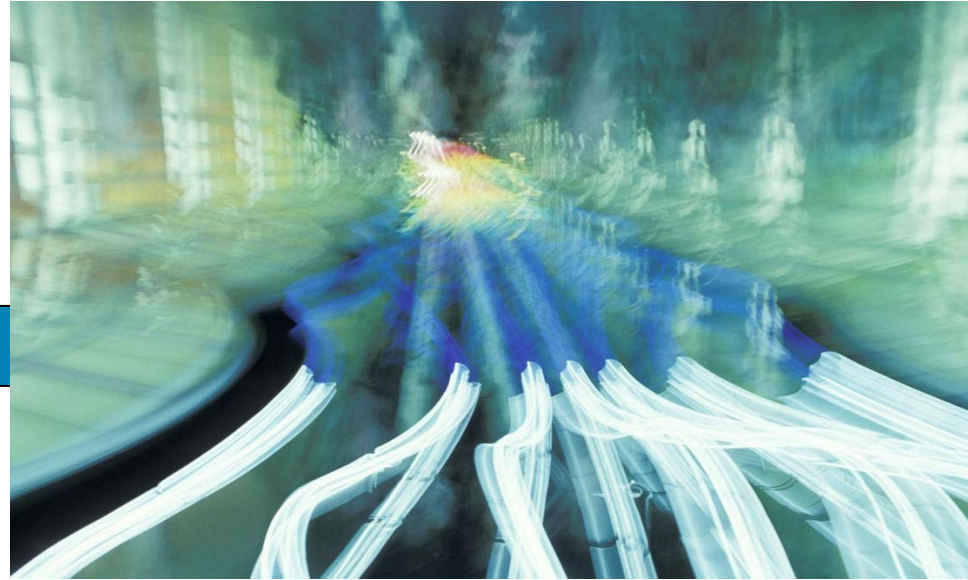


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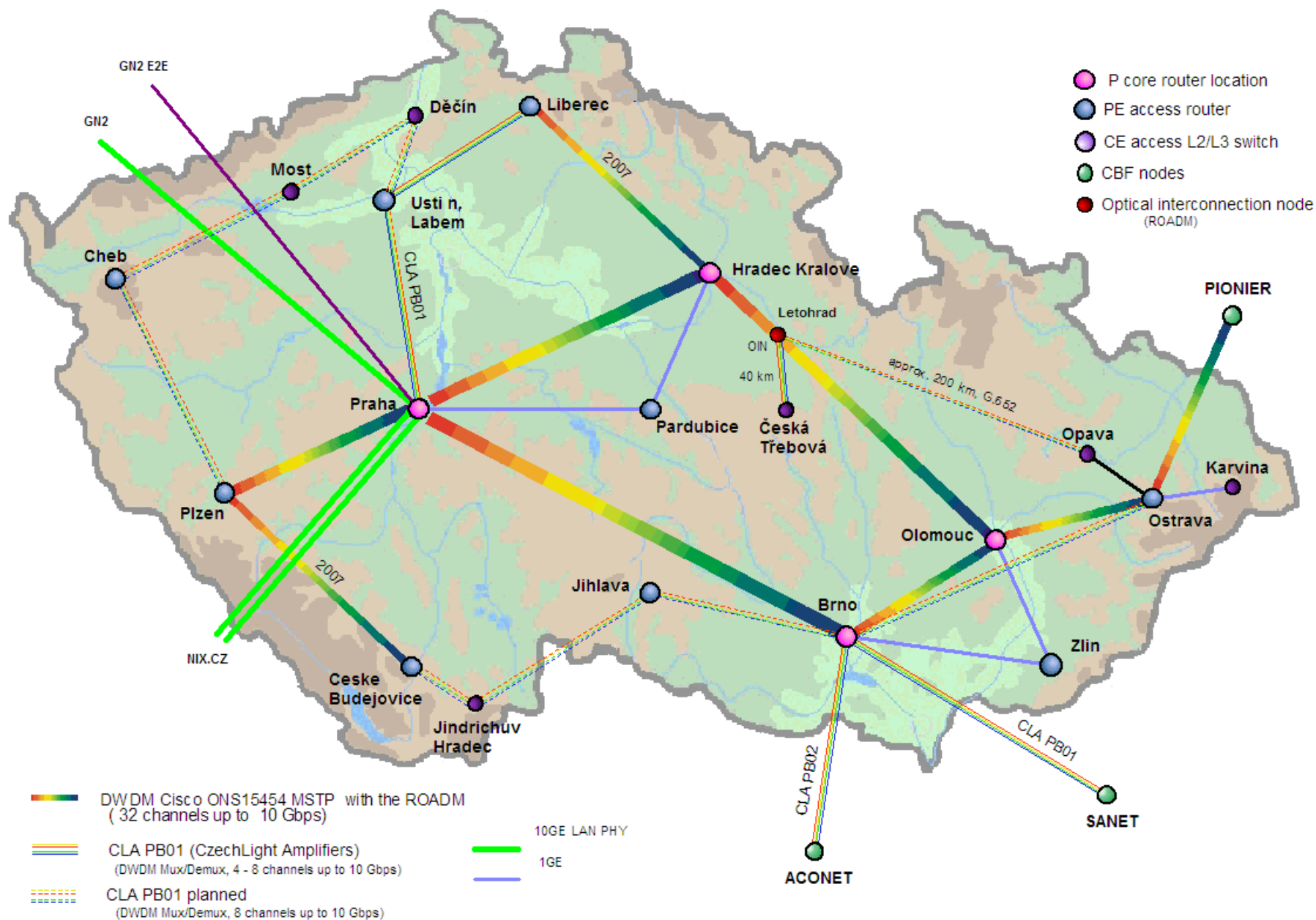
CESNET

- Future work



CESNET Introduction

- The CESNET (Czech Educational and Scientific Network) association was formed by the Czech universities (27) and Czech Academy of Sciences in 1996
- Non-profit organization, funded by Ministry of Education, Youth and Sports of the Czech Republic, association members and external sources (EU)
- 7-year research plan “Optical High Speed National Research Network and Its New Applications” (2004-2010)



CESNET2 DWDM Deployment

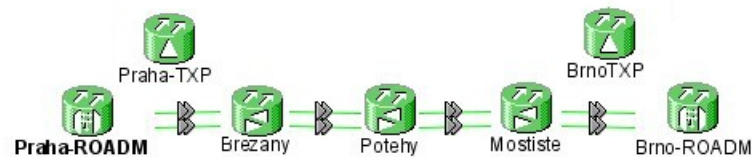
■ CESNET expectations

IP/MPLS network capacity upgrades (10 Gbps and more)

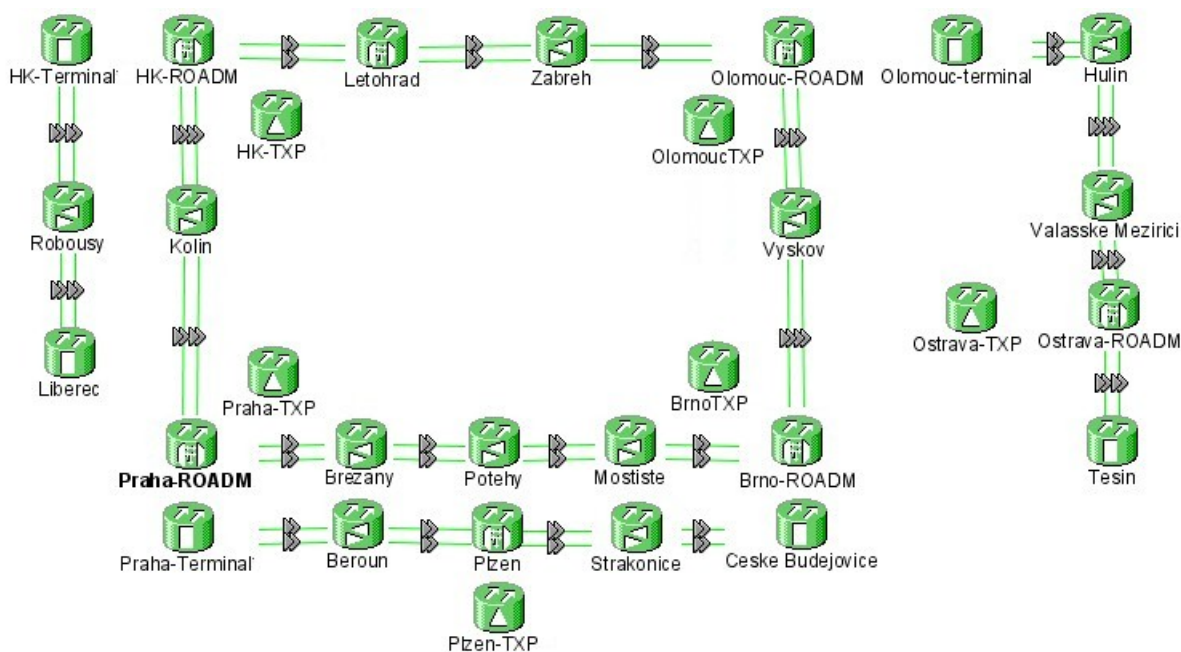
Migration from single-channel “gray” solution to many independent optical transmission channels (lambdas)

Flexible provisioning E2E optical services at L1 and Ethernet services at L2 to meet the research activities requirements

CESNET network Evolution -The beginning (12/2004)



CESNET network Evolution - Today



CESNET Future Work

- CESNET2 DWDM network future plans

- 40 Gbps transport

- Integration with the IP network layer (IPoDWDM, GMPLS)

- Optical protection (alien wavelengths included)

- More optical channels (50 GHz spacing, L-band extension)

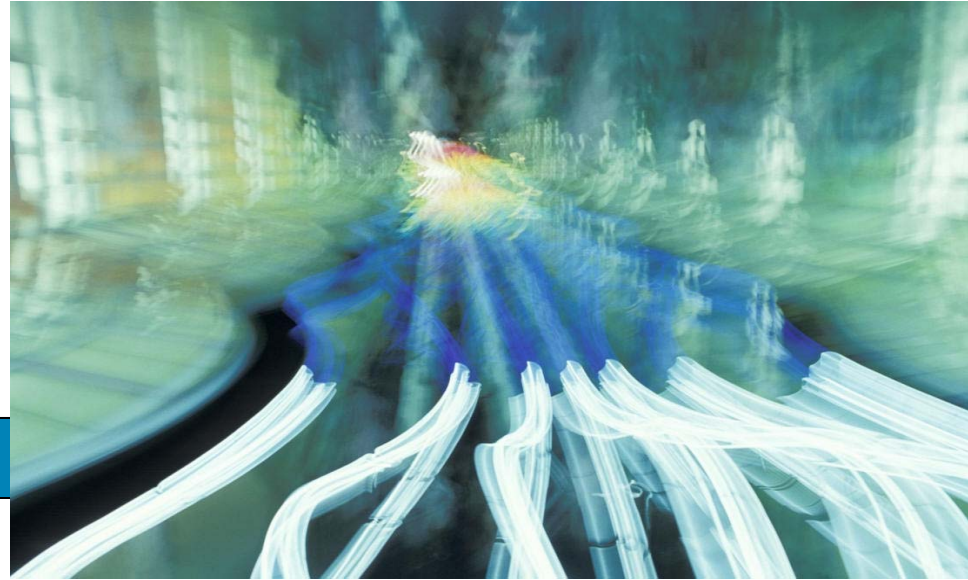
- 100 Gbps transport

- Colorless & Omnidirectional ROADMs idea and IP/DWDM integration

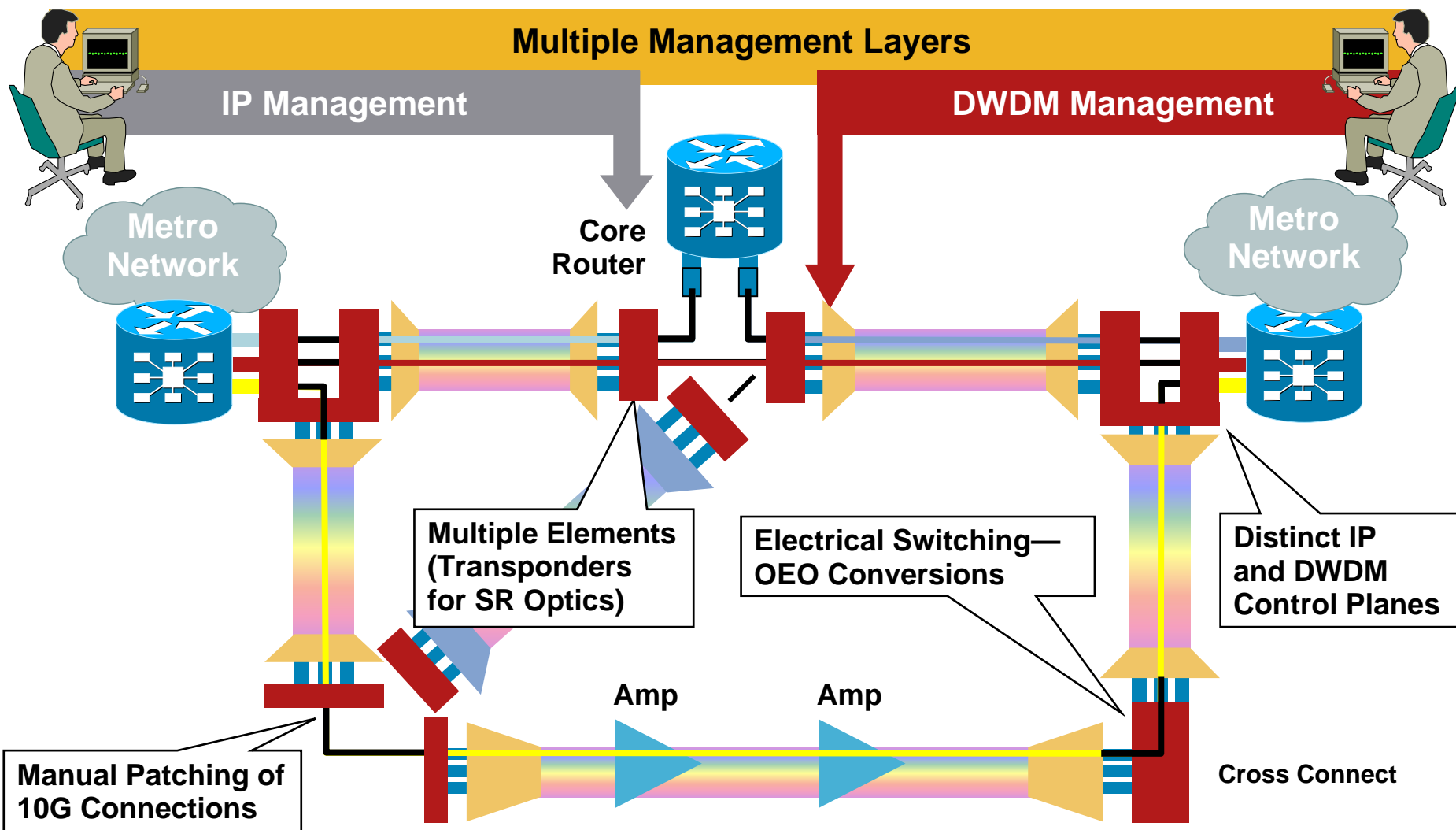
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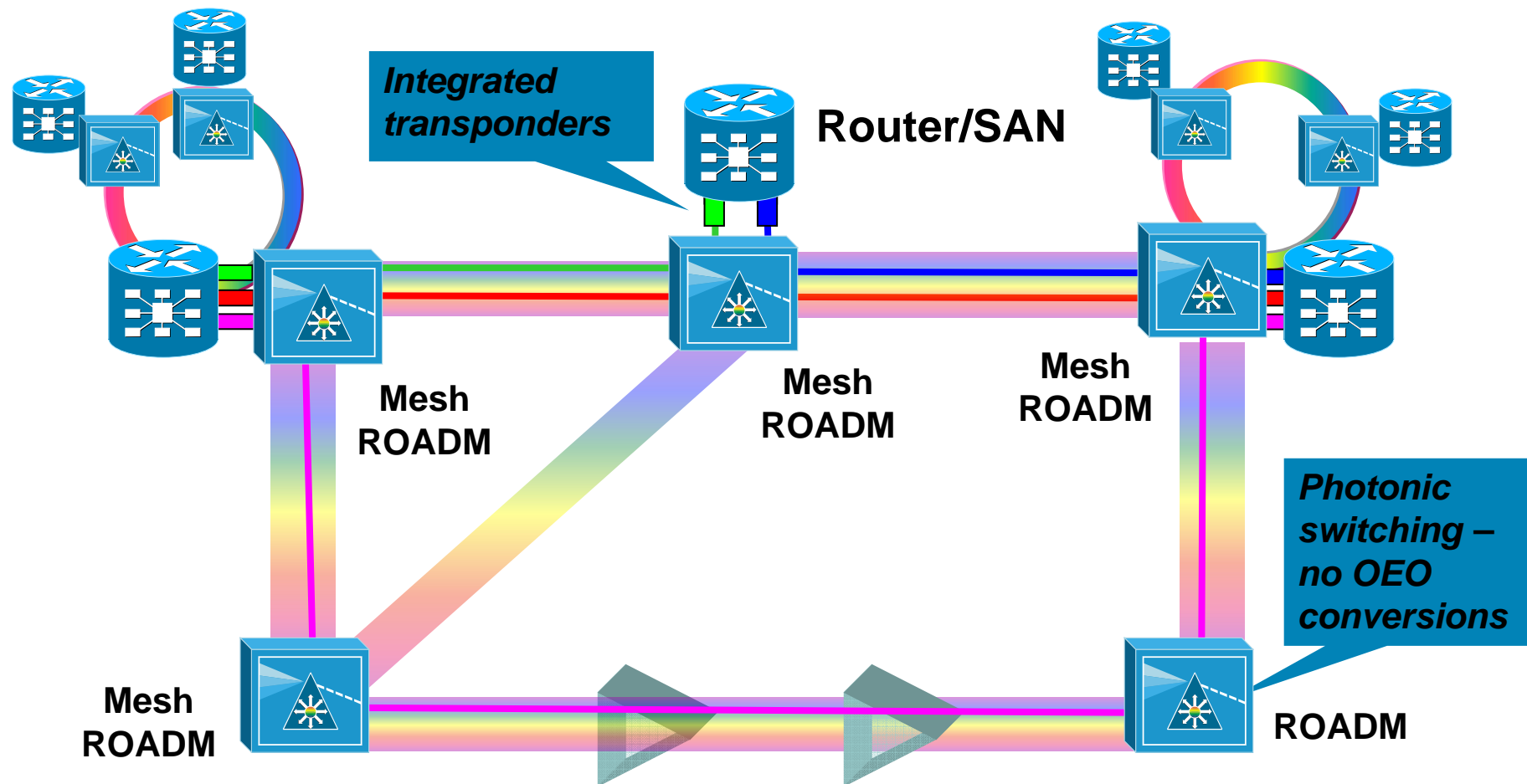


Challenges for IP and DWDM Networks



Cisco IP NG Network

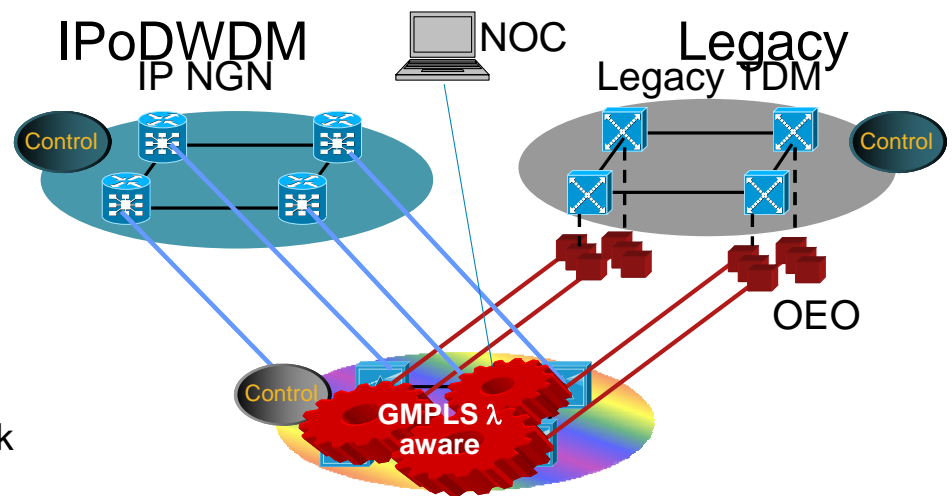
Common Network Management and Control Plane



It is important to focus on the **optimization of network as a whole**, not of the single pieces

DWDM aware Intelligent Control Plane

- **Automatic discovery**
 - Network topology
 - Network resources
- **Reduced planning**
- **Automatic wavelength provisioning**
 - bandwidth on demand
 - Avoids over provisioning of network
- **Open model to alien wavelength**
- **DWDM aware control plane**
 - Linear and non linear effect
 - Optical reach verification
- **IPoDWDM Extensions**
 - Capex and Opex radical reduction



GMPLS DWDM Aware for NG DWDM scalable networks.

