ADVA™ Optical Networking

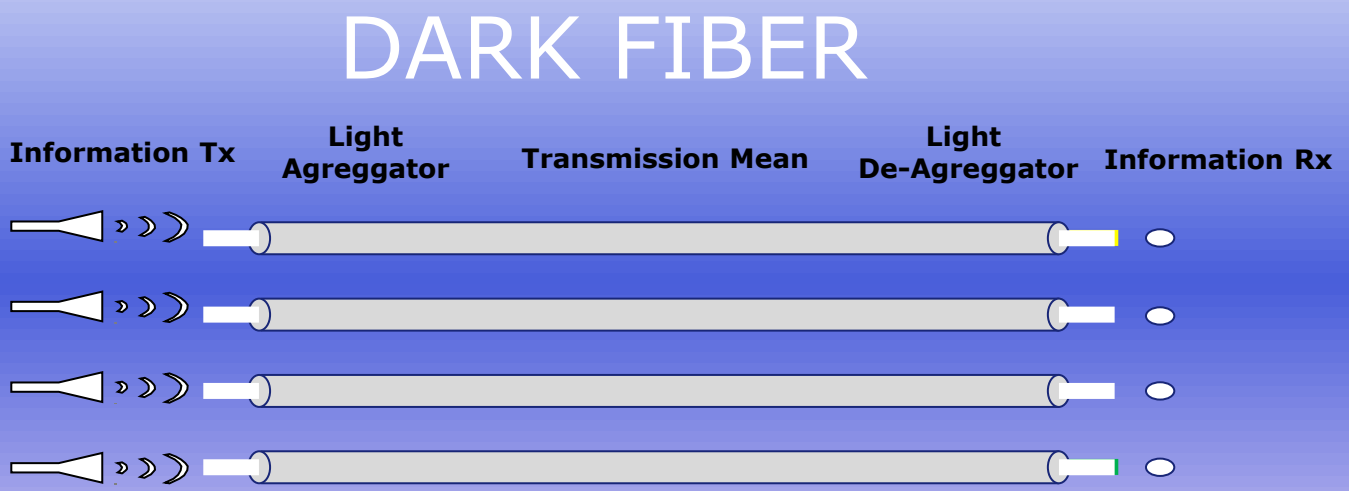
Aplicações da Tecnologia WDM:
Das redes passivas as redes de 100Gbps de Altíssima Capacidade

2012, Alejandro Rivera

Porque Fibra Óptica?

- Cabo Metálico
  - Transmissão Elétrica
  - Campo Magnético
  - Distância de enlace curto
  - Maior a Frequencia menor a distância
- Ar
  - Transmissão via Ondas Eletromagneticas
  - Campo EletroMagnético
  - Maior distância que cabo elétrico porém menor que fibra
  - Maior a Frequencia menor a distancia
- Fibra Optica
  - Transmissão óptica
  - Sem interferencia eletromagnetica entre componentes
  - Grandes distância de enlace
  - Velociade da Luz
  - Grande Capacidade de transmissão

WDM: Wavelength Division Multiplex Concepts



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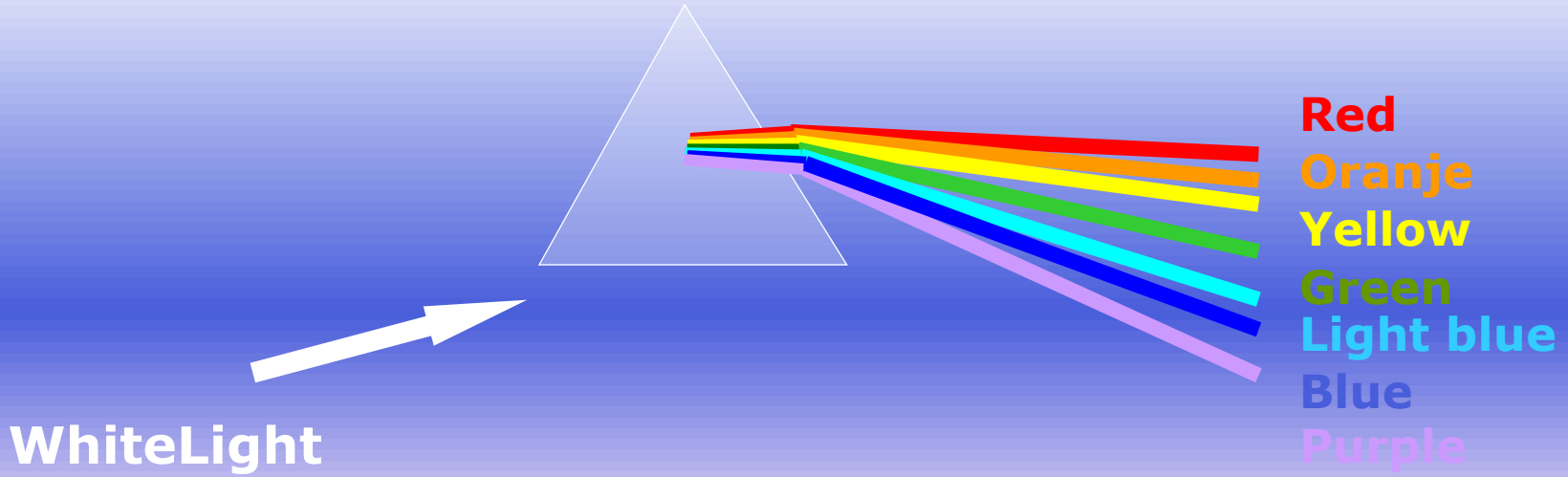

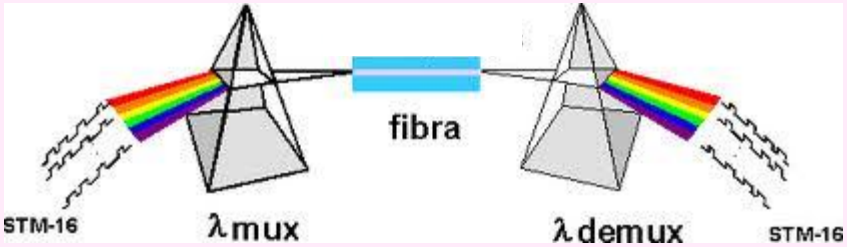

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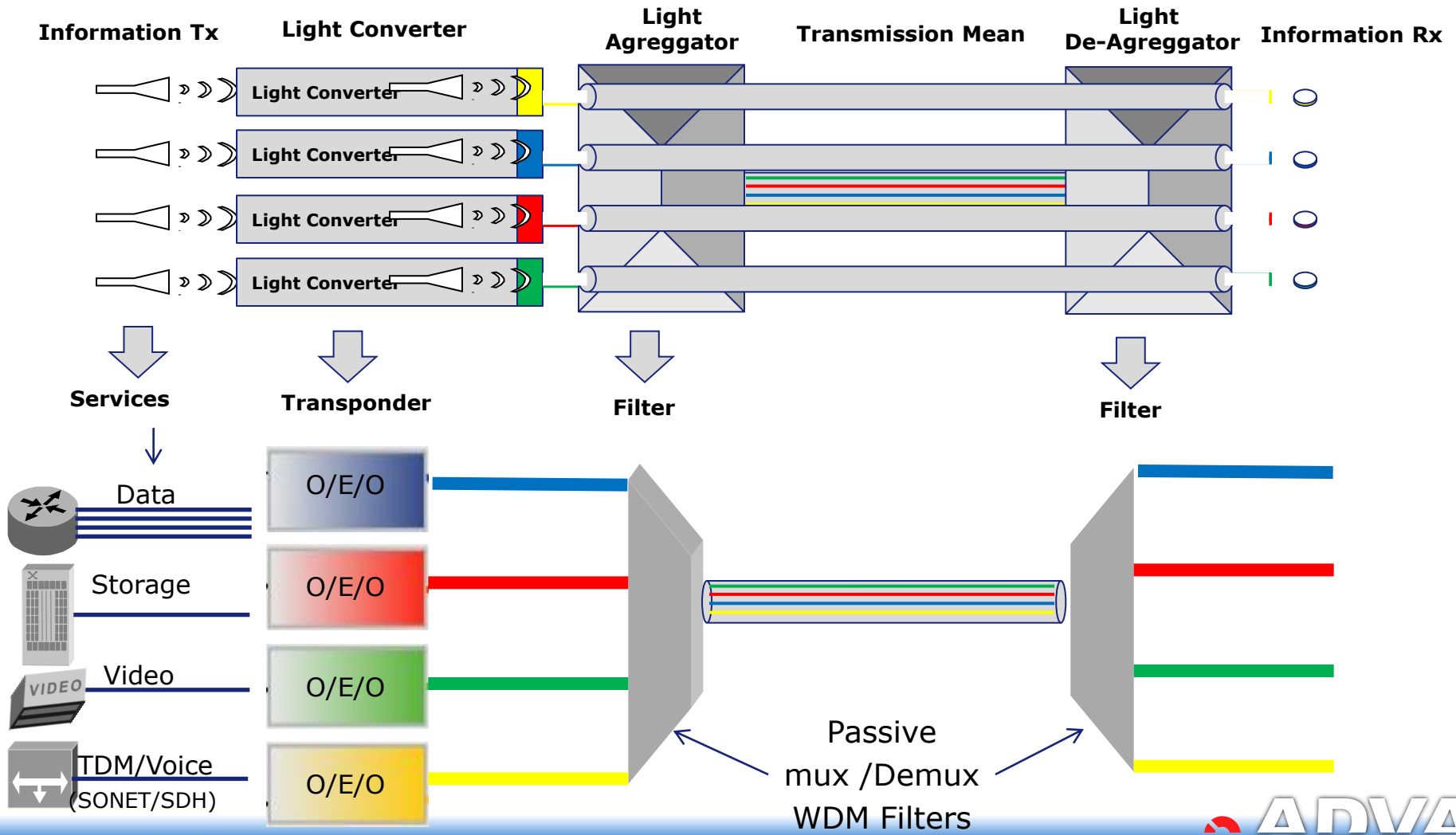
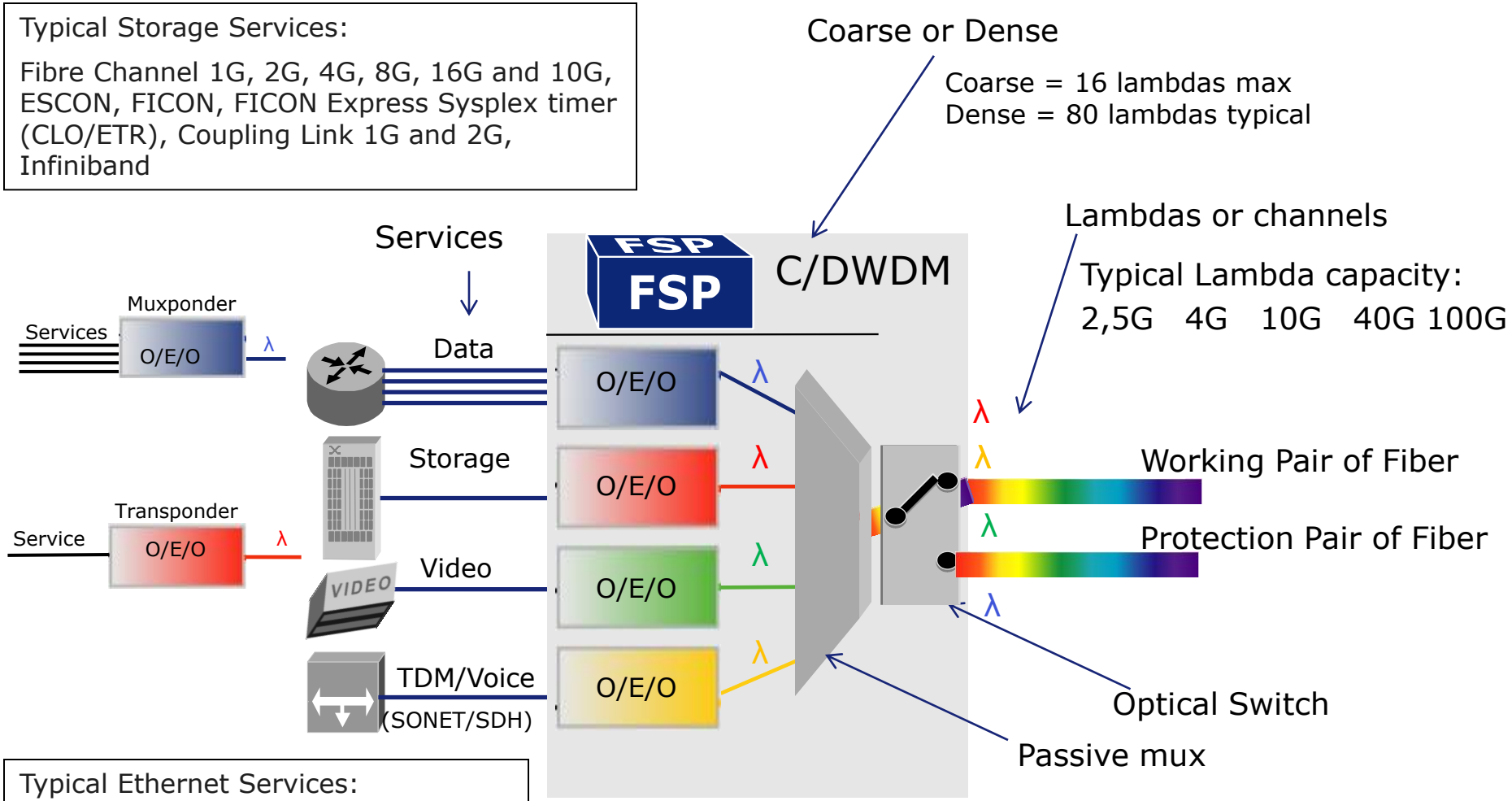


WDM – Wavelength Division Multiplex
Usual Names

Typical Storage Services:

Fibre Channel 1G, 2G, 4G, 8G, 16G and 10G, ESCON, FICON, FICON Express Sysplex timer (CLO/ETR), Coupling Link 1G and 2G, Infiniband



Typical Ethernet Services:

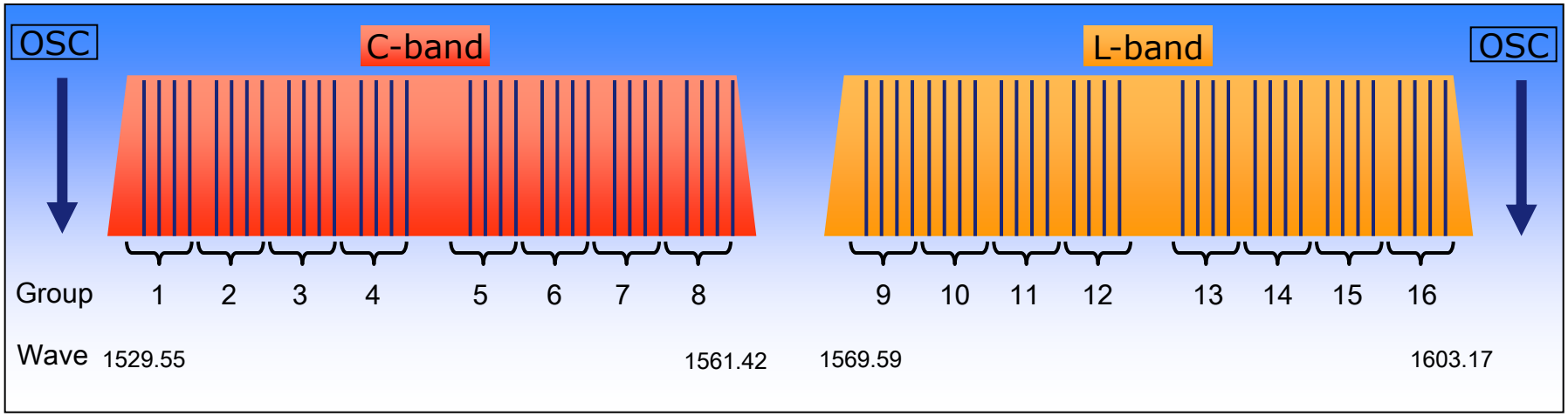
Fast Ethernet, Gigabit Ethernet,

10 Gigabit Ethernet LAN and WAN

Typical TDM Services:

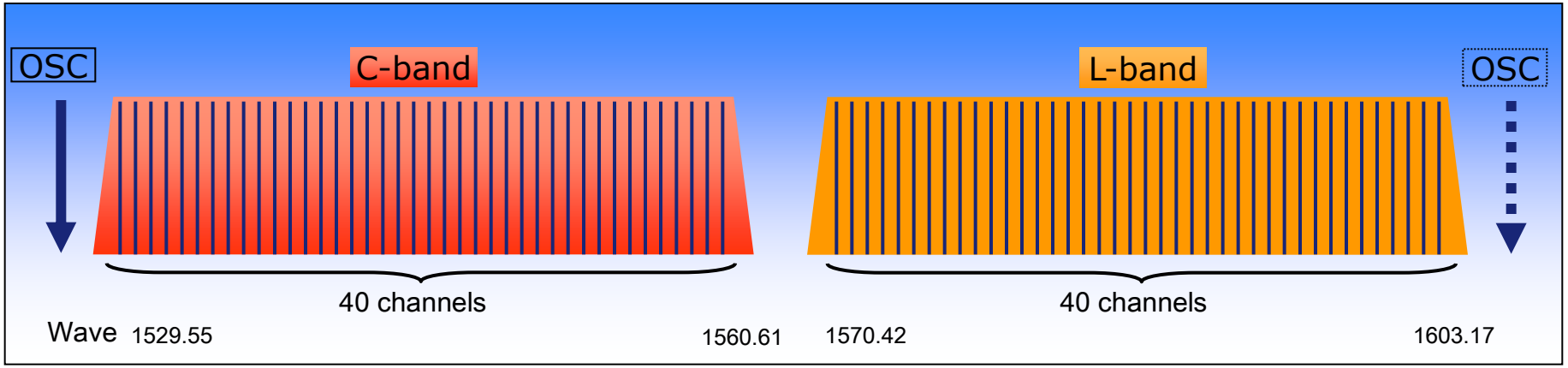
STM-1, STM-4, STM-16, STM-64

Wavelength Grids
64 Grid, C- and L-Band



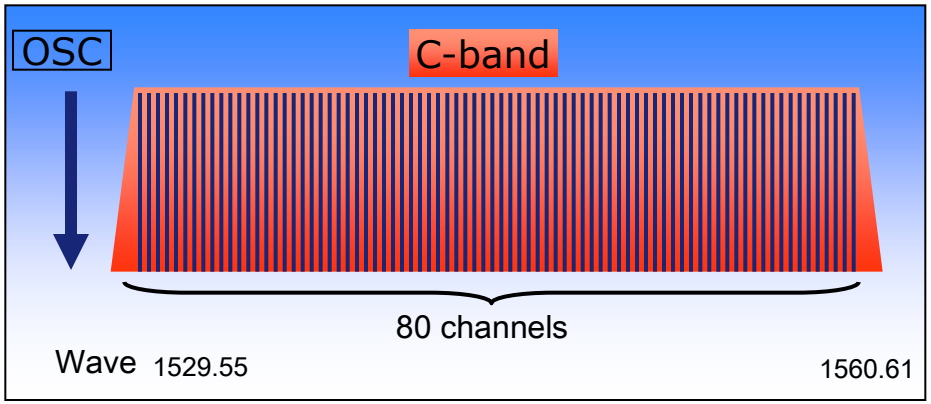
- 64 ITU-T G.694.1 compliant channels
- 100GHz channel spacing with guard band concept

Wavelength Grids
80 Grid, C- and L-Band



- 80 ITU-T G.694.1 compliant channels
- 100GHz channel spacing with no guard bands
- Optimized for massive point to point connectivity

Wavelength Grids
80 Grid, C-Band



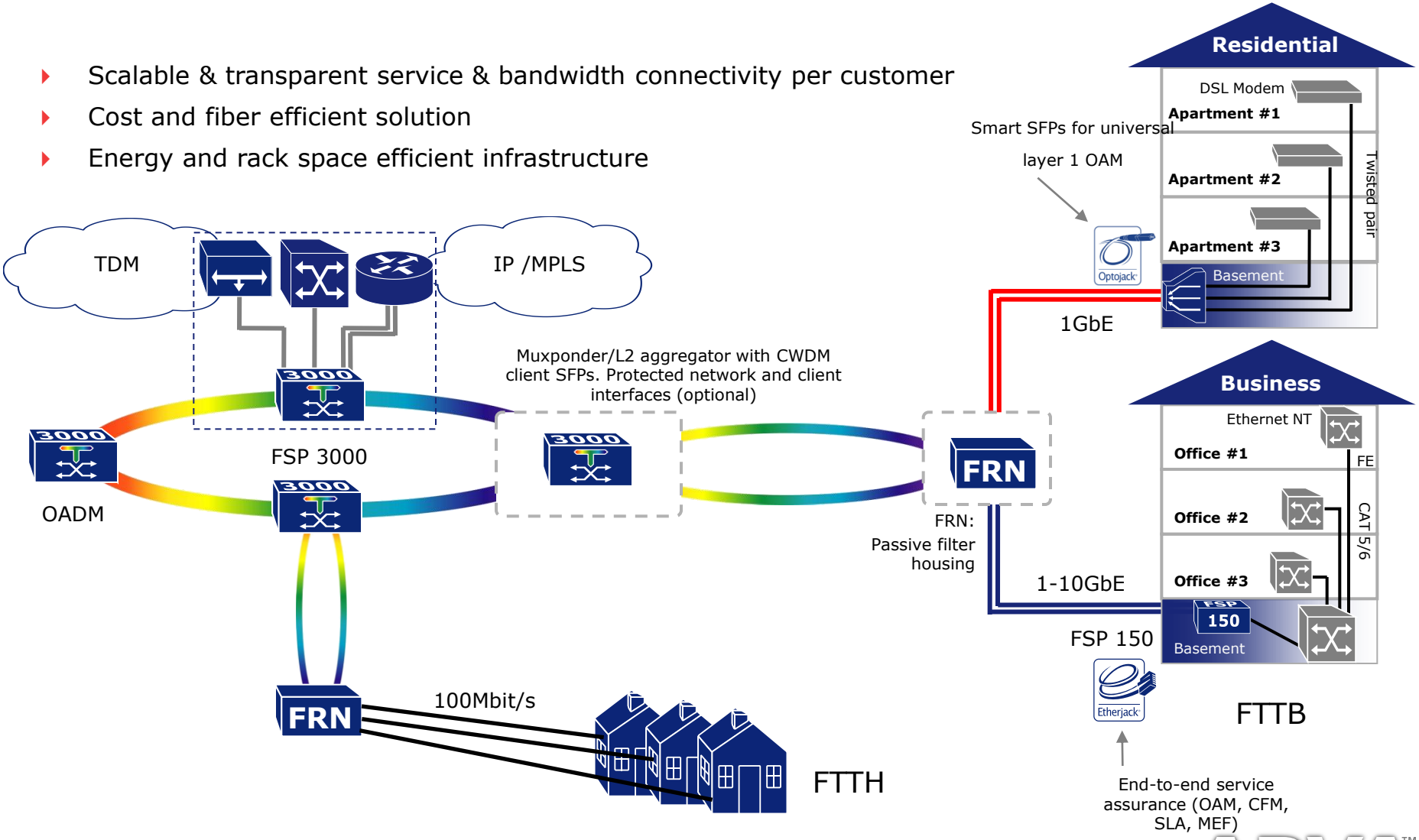
- 80 ITU-T G.694.1 compliant channels
- 50GHz channel spacing with no guard bands

WDM-PON Solution Overview

WDM-PON

Business and Residential applications

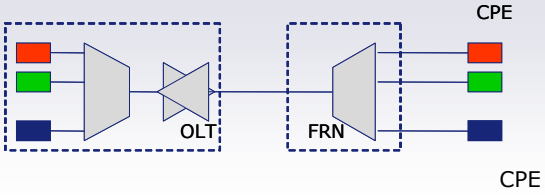
- Scalable & transparent service & bandwidth connectivity per customer
- Cost and fiber efficient solution
- Energy and rack space efficient infrastructure



WDM-PON
Access and Backhaul

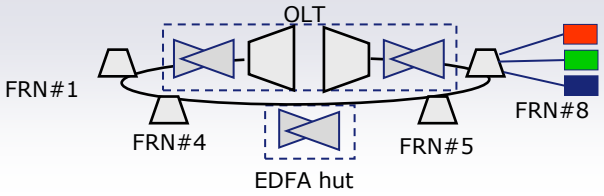
Avoids active equipment in LX and cabinet
„Unlimited" bandwidth per building

Eliminates active equipment and sites in access and backhaul networks



Point-to-point/tree:

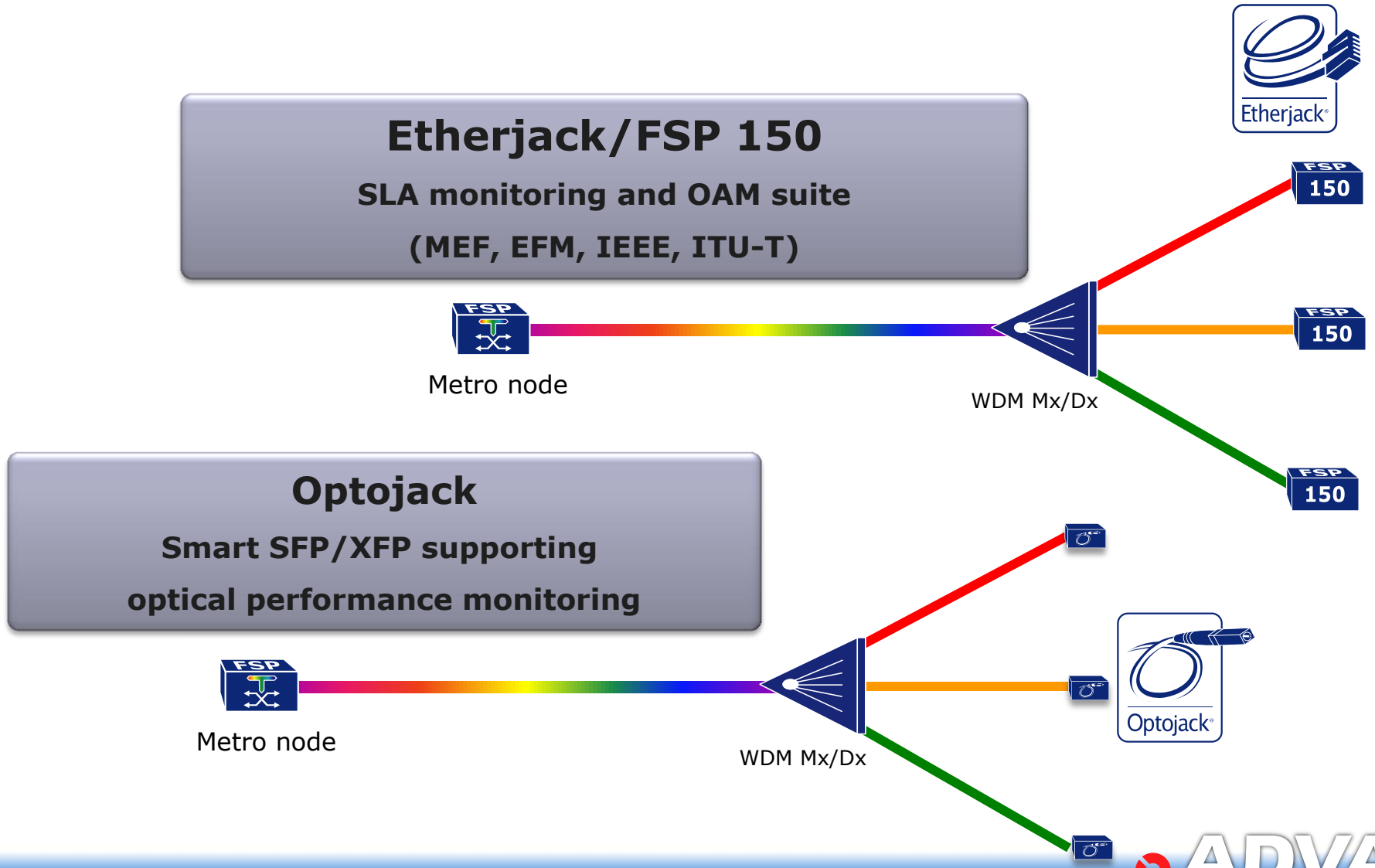
- WDM MUX/DEMUX based
- Lowest loss/highest reach
- Optional OLT/FRN amplification (DWDM)



Add/drop ring:

- WDM add/drop filter based
- Redundant connection to FRNs in drop points
- Optional ampl./regen. (DWDM/CWDM)

Operational Advantages
Flexible demarcation options



WDM-PON

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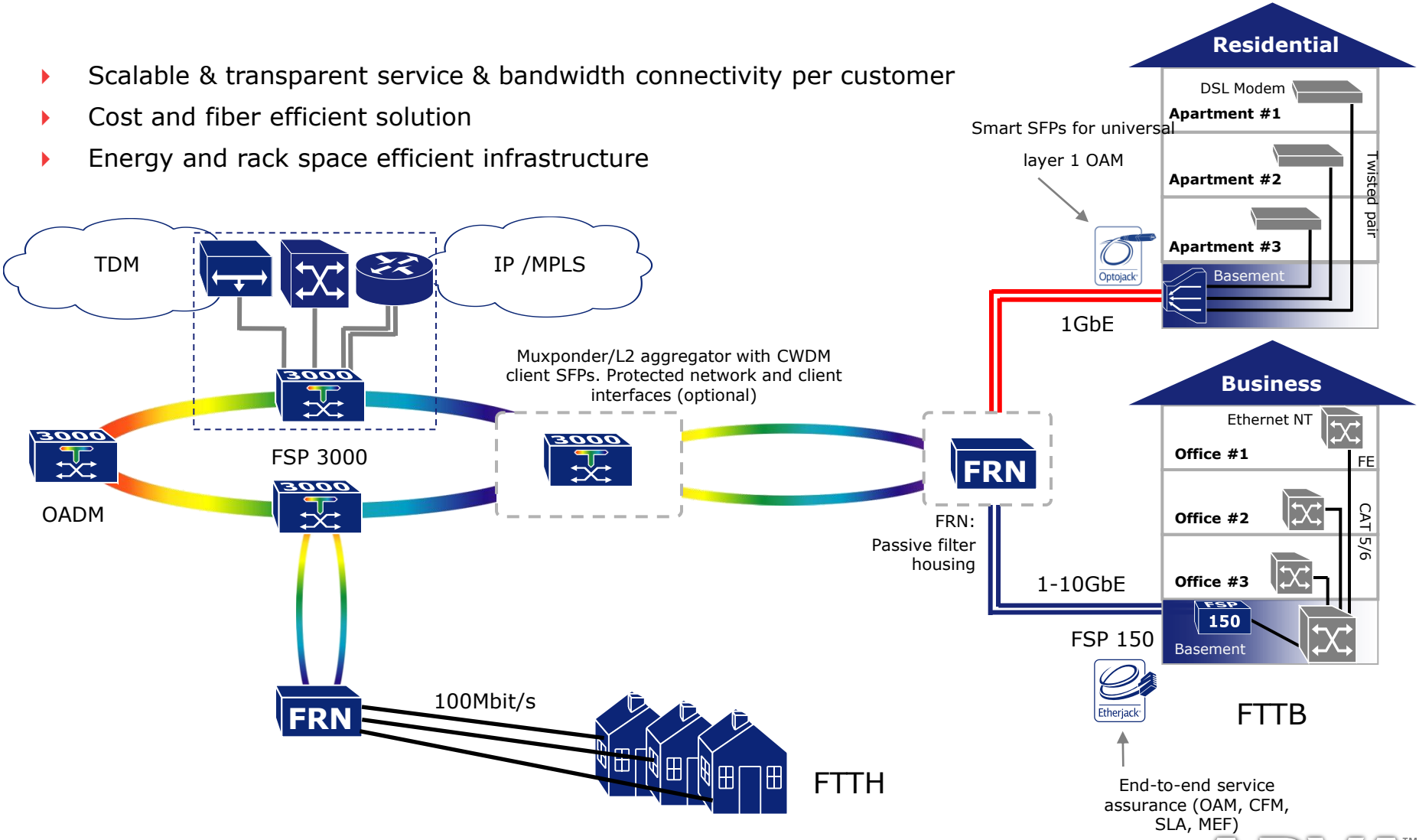


Solution Center

Central Office

Local eXchange

Cabinet/OSP

CP

Cell-Tower

Residential

Enterprise

FSP 150

FSP 150

Optojack

3rd party

FSP

PCA card

Some configs passive

Some configs passive

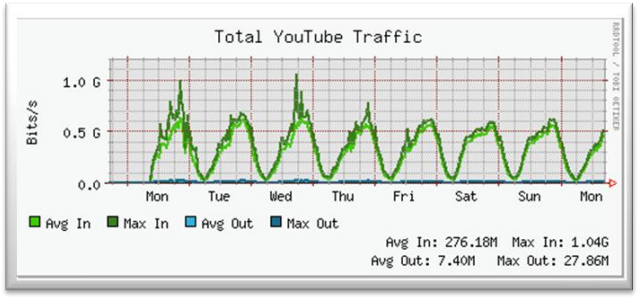
- More bandwidth – less active equipment
- More customers – fewer network sites
- Lower OPEX and power consumption

ADVA™ Optical Networking

AGILE CORE and Beyond

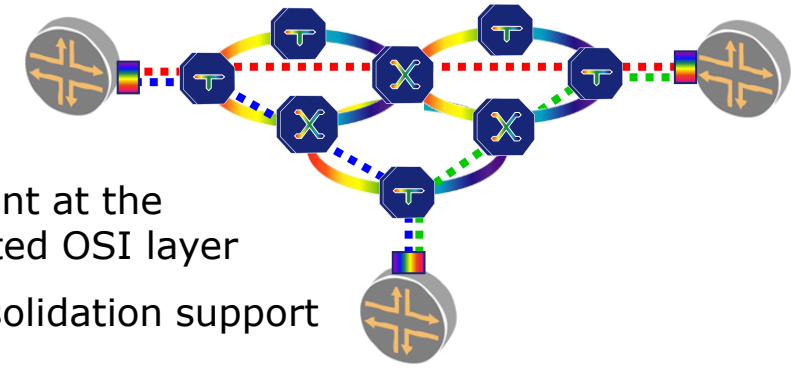
Agile Core Network
Market Trends and Requirements

Rapid bandwidth demand increase



Unpredictable traffic patterns

Increasing peak-to-average bandwidth demand



Agile Core Network

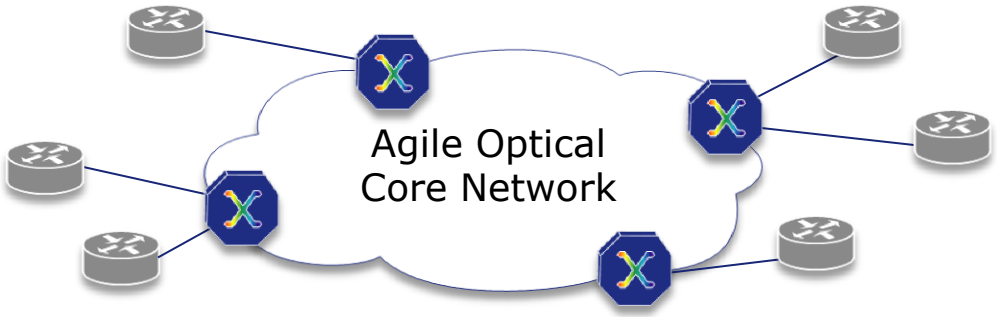
- Flexible traffic management at the lowest possible / best suited OSI layer
- Data Center and PoP consolidation support
- Multi-layer awareness

The Agile Optical Core provides more capacity, reach and flexibility;

Network resources can be allocated on demand.

Photonic Layer Challenges

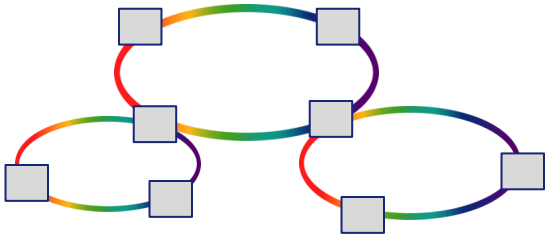
- Flexible network resource allocation requires higher performance and increased tolerance to optical fiber impairments
- Dynamic allocation of network resources requires contentionless access to wavelengths and switch capacity available in the network
- Reacting to bandwidth demand originating from the IP/MPLS layer requires control plane interaction and service management



The optical network becomes a cloud providing capacity on-demand

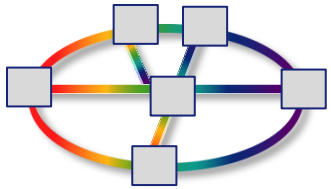
Traditional Transport Network
x
Traditional Data Network

- Transport Network



- Ring Topology
- E and W direction
- Fast Switch Protection
- 2 routes switch protection
- Dedicated Traffic Route
- Static Bandwith
- Great Traffic Capacity

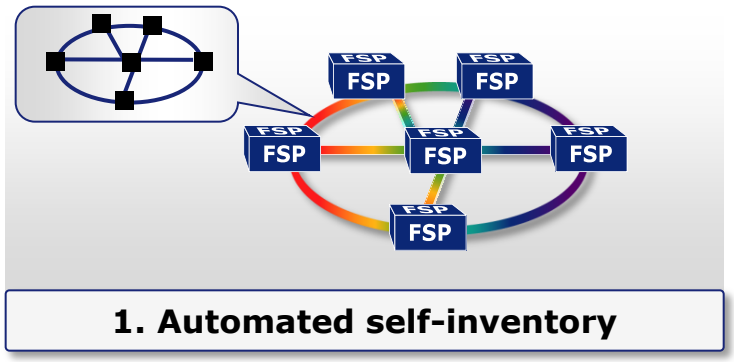
- Data Network



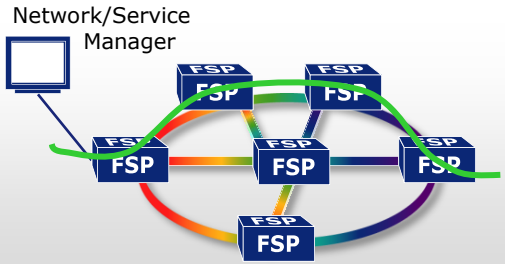
- Mesh topology
- Any to Any direction
- Diversity of route protection
- Slow switch protection
- Traffic Route diversity
- Dinamic Bandwith
- Limited Traffic Capacity

Goal – Mix of the two worlds (Transport and Data)

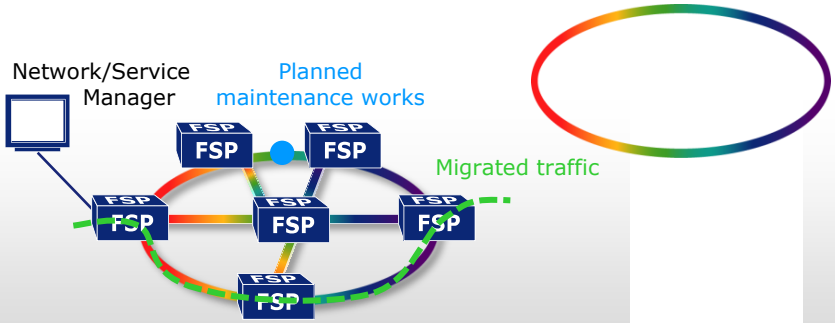
GMPLS-based control plane



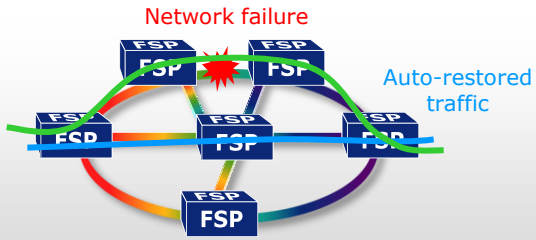
1. Automated self-inventory



2. Automated connection management



3. Efficient operations

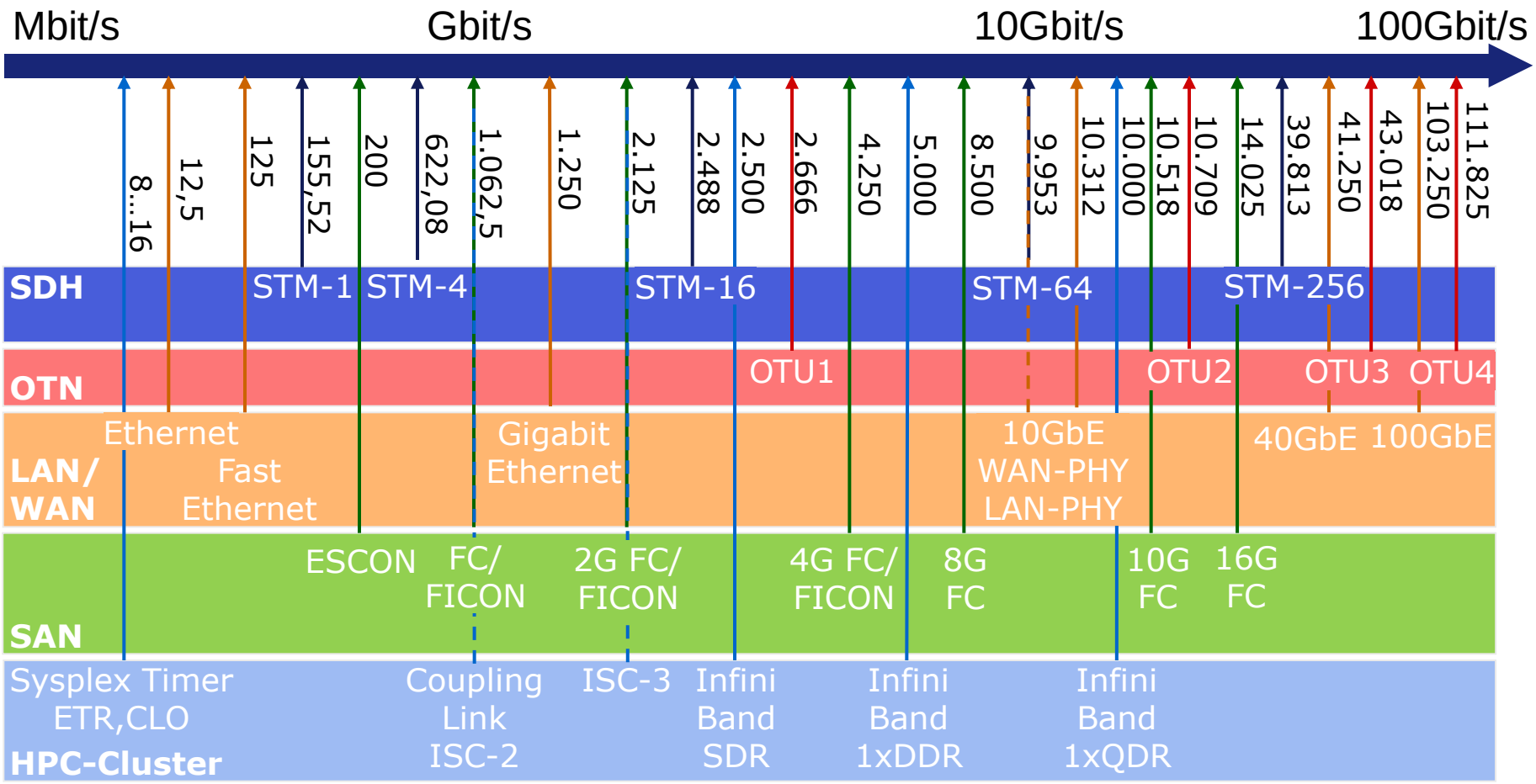


4. Self-healing network

Operational automation decreases costs by mechanizing manual and repetitive tasks associated with service management

Multiservice Application

Overview - Native Service Offerings



Thank You

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