Turkcell Superonline Strategy about optical / broadband infrastructure

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Network Transport Planning

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SUPERONLINE

- **TSOL Overview**

- **Road to 100G-Optical Renovation**

- **Optical Network Design Vision**

- **Conclusion**

Turkcell Superonline

%100 Turkcell Group Company

Innovative Telecom Operator With Its Own Infrastructure

WE TRANSFORM THE SILK ROAD INTO THE FIBER ROAD

TURKCELL GROUP

TURKCELL EUROPE

life:) Everything is possible!

TURKCELL SUPERONLINE

BeST

TURKCELL TEKNOLOJİ

KUZEY KIBRIS TURKCELL

GLOBALTOWER

TURKCELL

FINTUR HOLDINGS B.V.

TURKCELL GLOBAL BİLGİ

inteltek

INTERNATIONAL TELCO BUSINESSES

COMMUNICATION & TECHNOLOGY

TURKCELL TURKEY & BETTING

TURKCELL SUPERONLINE

Okinawa, Japan

WHOLESALE

Carrier of Carriers

CORPORATE

Total Telecom Solutions
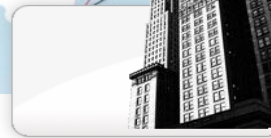
RESIDENTIAL

Home Entertainment & Communication

TURKCELL
SUPERONLINE

Transforming Silk Road to "Fiber Road"
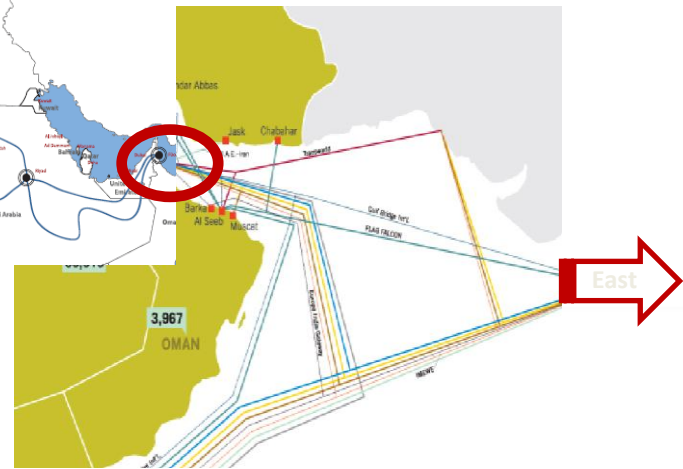
○ **Corporation with 60+ Operators for Data & Voice Services**

One of the Fastest Growing Operator of Europe

''Turkcell Superonline has continued its rise in the "fiber-to-the-home" league. Turkey ranks one notch above last year at 7th on the list of fiber internet penetration among G20 countries.''

Fiber To The Home Council (FTTH Council), February 2012

''Turkcell Superonline, with more than 70.000 numbers of new fiber internet subscribers in the last 6 months of 2011 became the 3rd place of Europe.''
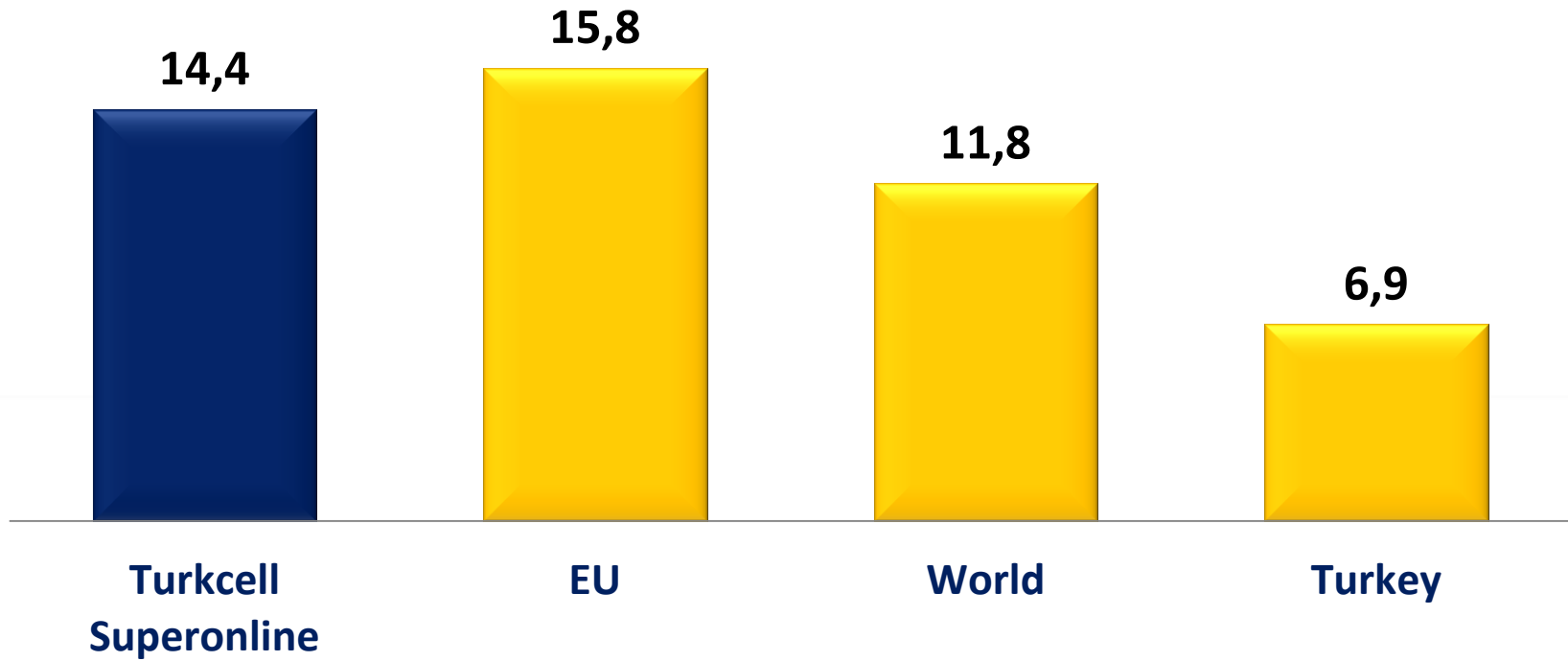
IDATE, June 2012

Amongst European countries

Ukraine

France

Turkey

Spain

Holland

Turkey

3

Fiber To The Home with Light Speed

Average Download Speed

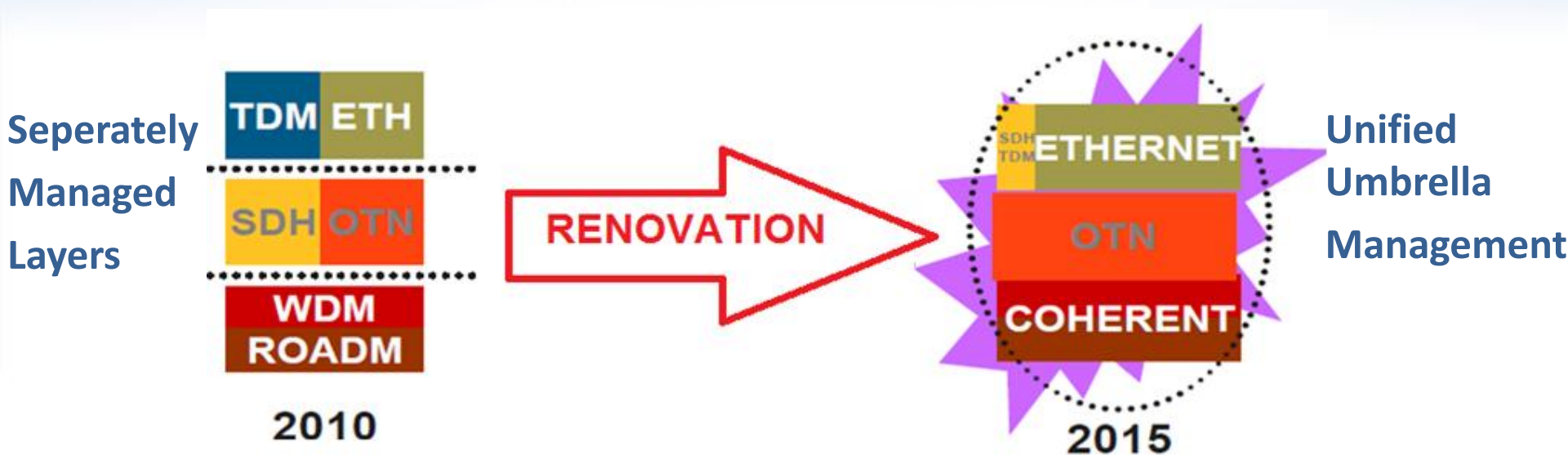| Turkcell Superonline	EU	World	Turkey
14,4	15,8	11,8	6,9

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- **Keep cost per bit lower**

- **Make it flexible**

- **Make it simple to run, simple to expand**

- **Make it robust to simultaneous failures**

- **Make it green**

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The Optical **Renovation**

Seperately Managed Layers

TDM ETH
SDH OTN
WDM ROADM

2010

RENOVATION

ETHERNET
OTN
COHERENT

2015

Unified Umbrella Management

- **Switching to coherent technology(DCMless) is a once-a-decade jump that refresh network architectures**
- **Multi-layer control plane**
- **100G will be today's 10G**
- **OTN transport-switching layer**

Greenfield deployments will heat up optical equipment market

The Multi-Layer Agile Network

Packet

OTN

Optic

CONTROL PLANE MANAGEMENT
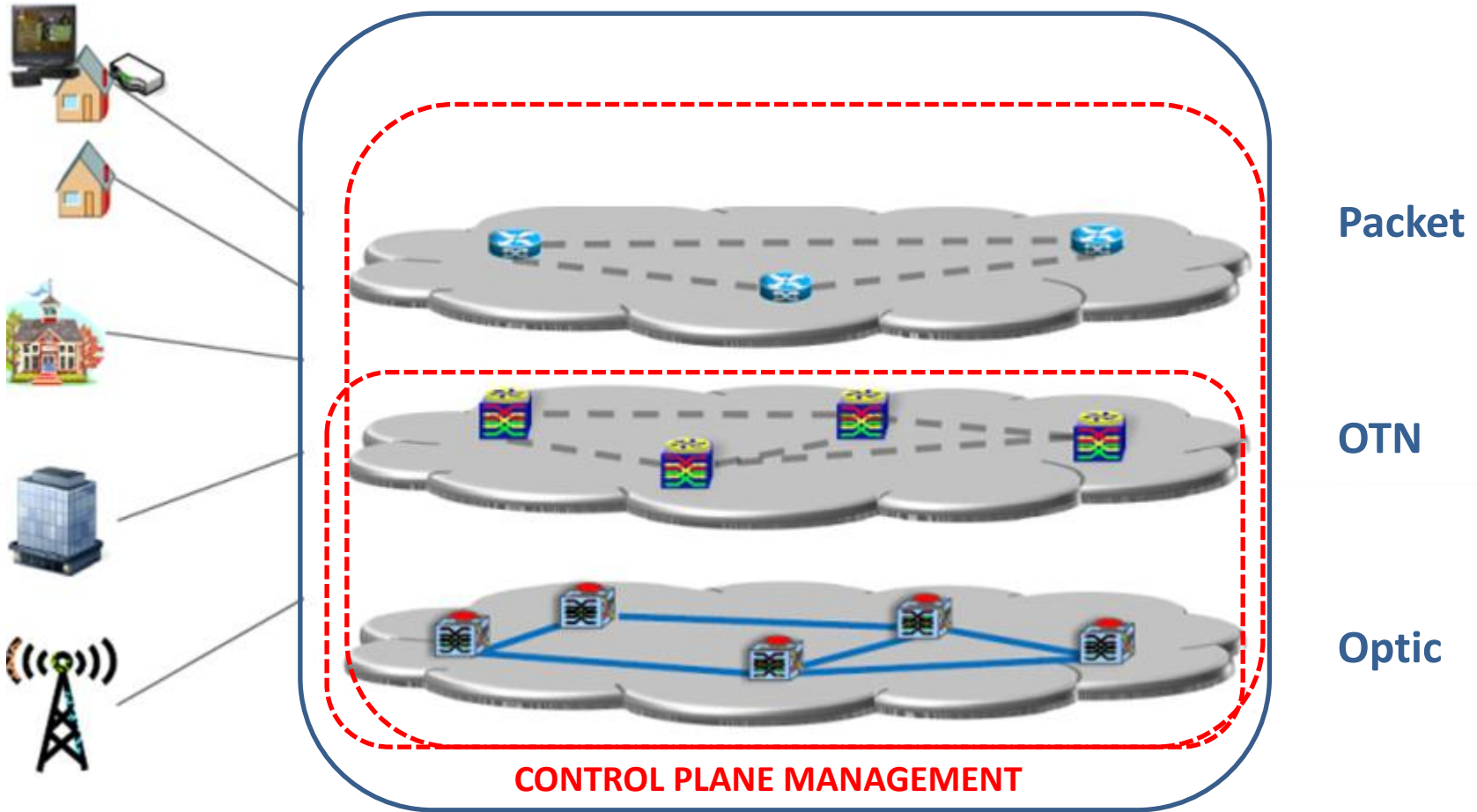
Control planes on each layer combines multiple layers

- **Flexgrid, Tunable multi-degree ROADMs**

- **100G&above(Superchannels)**

- **DCMless**

- **Full photonic mesh**

- **Control-plane based ASON protection enabled**

- **Point&Click provisioning**

- **Automatic power level adjustment by OSA functionality**

Packet

OTN

Optic

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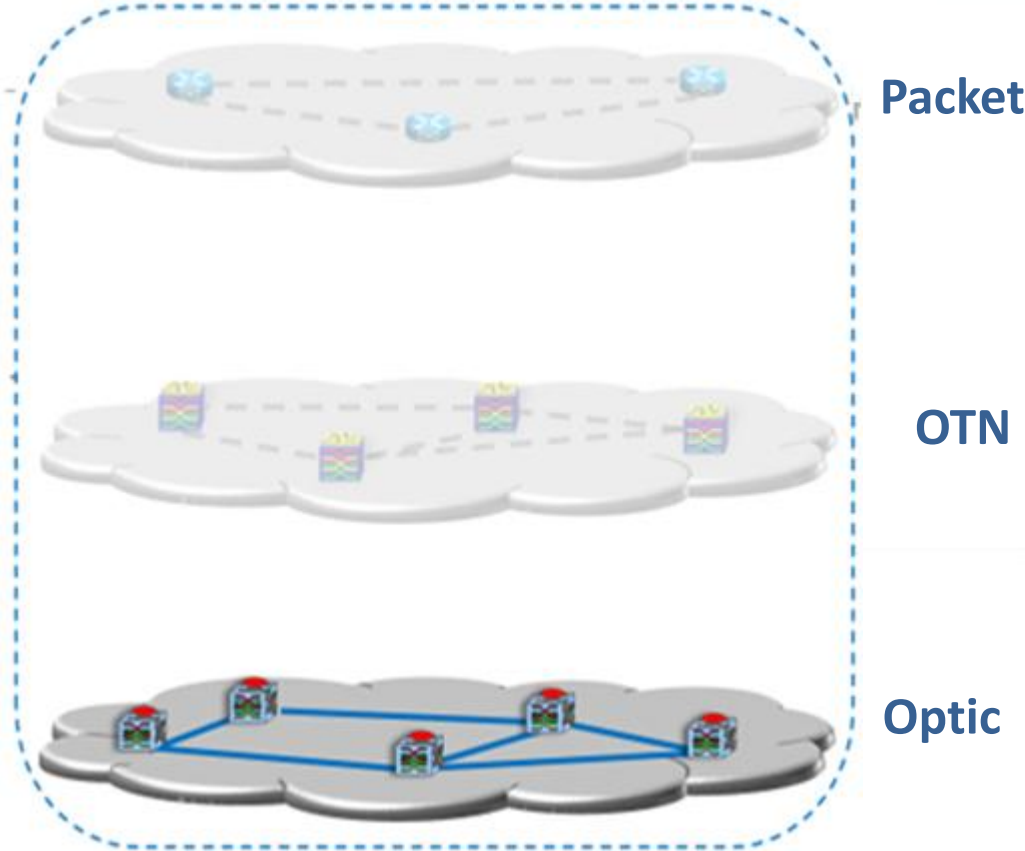
Scalability

- **WDM spectral efficiency**
- **Enhanced optical performance**
- **Support traffic booms**

New Generation Services

- **On demand video-tv**
- **Cloud computing**
- **Online Gaming**
- **Decrease latency for HD services**

Rapid Service Rollout

- **Rapidly turn on sub 100G services**
- **Slow rebuilt activity on network**
- **Less patching for client connections**

Capex and Opex Savings
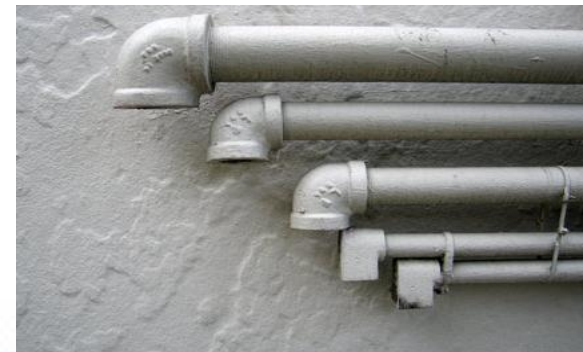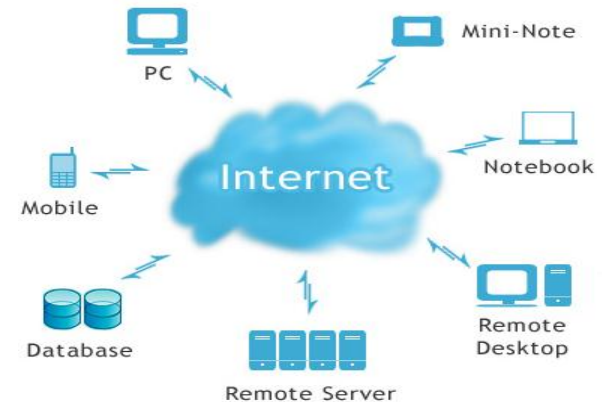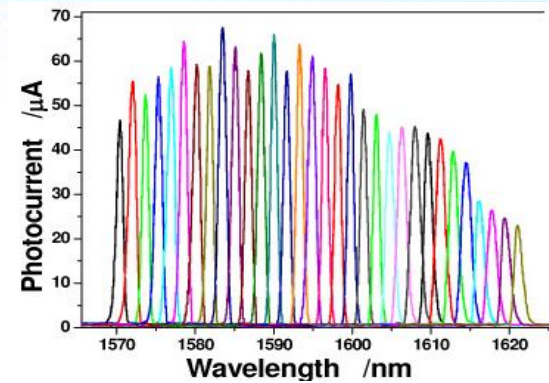
- **CAPEX: Based on a higher spectrum efficiency, 1*10G capacity is considerably less expensive in a 100G Wavelength**

- **The field trials shows us that due to the long reach 100G coherent technology, less regeneration needed comparing with existing 10G technology.**

- **OPEX : Moving towards 100G allows savings on,**

  Footprint: 1 card 3 slots(will reduce to 2 slots) 100G versus 1 card 1 slot 10G
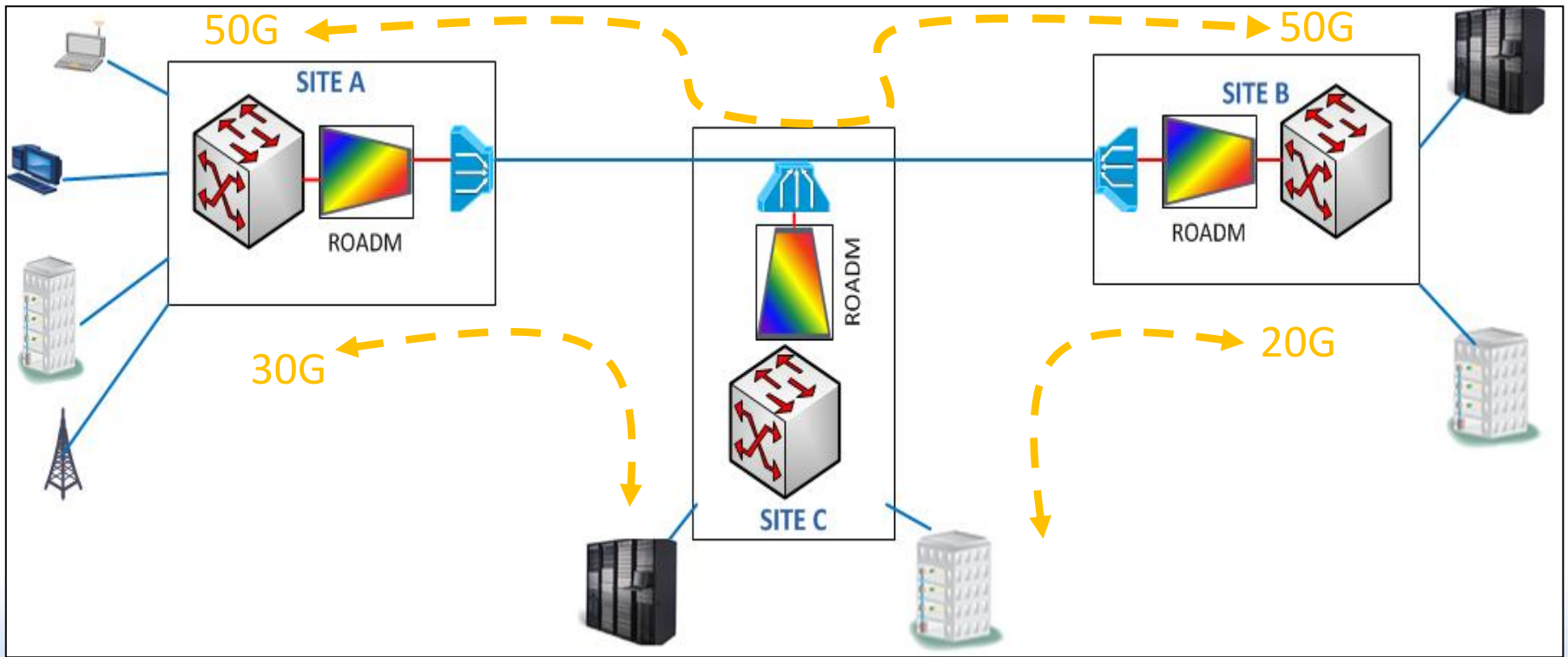
  Power consumption: ~40%

- **High Capacity OTN XC matrix**
- **Mix of rate&format support**
- **Multiplexing of several services on the same WDM-channel (ODUk?)**
- **Service flexibility, fast provisioning**
- **Eleminate multi-level cards**

Packet

OTN
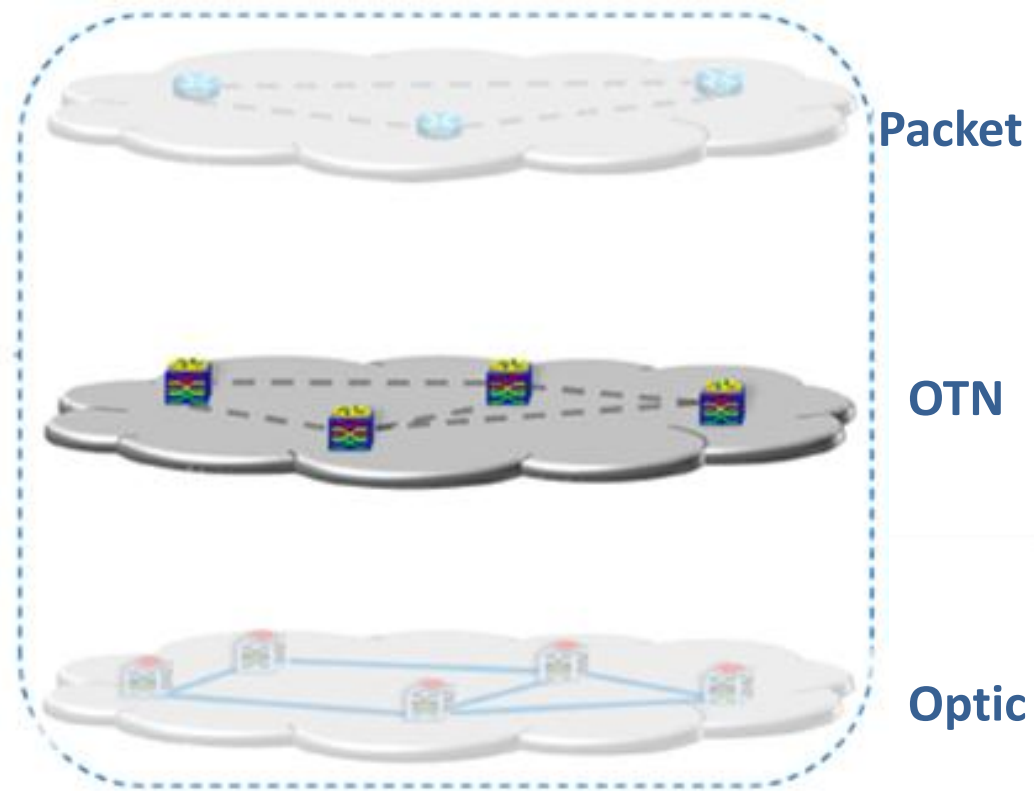
Optic

- **X times 1.25G provides capacity tuning with high utilization**
- **In-service resizability**

Outline

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- **Scalability**

- **Flexibility-Granularity**

- **Operations**

- **Costs**

- **Ready to Future**

Option 1: Adapt the infrastucture to 40Gbit lamdas

- Use Muxponder 4x10Gbit and consequent reuse of released channels(λ) on the existing links

- New amplifier, new additional external pump

- Redesign grid channel distribution

- New 40Gbit subrack, regeneration on each 40Gbit lambda

- Guard Band for delivering 10Gbit and 40Gbit (If Coherent)

- Higher cost of Muxponder 4 x 10Gbit

- High operational risk/cost & customer impact

- Short term solution

- Result of business case: *Redesign the network!!!*

Option 2: Adapt the infrastucture to 100 Gbit coherent lamdas

- Same issues as 40Gbit solution

- Guard Band for delivering 10Gbit and 100Gbit coherent

- Need DCM for delivering both 10Gbit and 100Gbit

- Performance degradation on 100Gbit signals due to DCM usage

- Need regeneration for 40/100Gbit channels for short reach

- Result of business case: *Redesign the network !!!*

Option 3: New Network

- A **Greenfield** Network 80λ@100Gbit Coherent + DCM FREE

Optical Network Structure
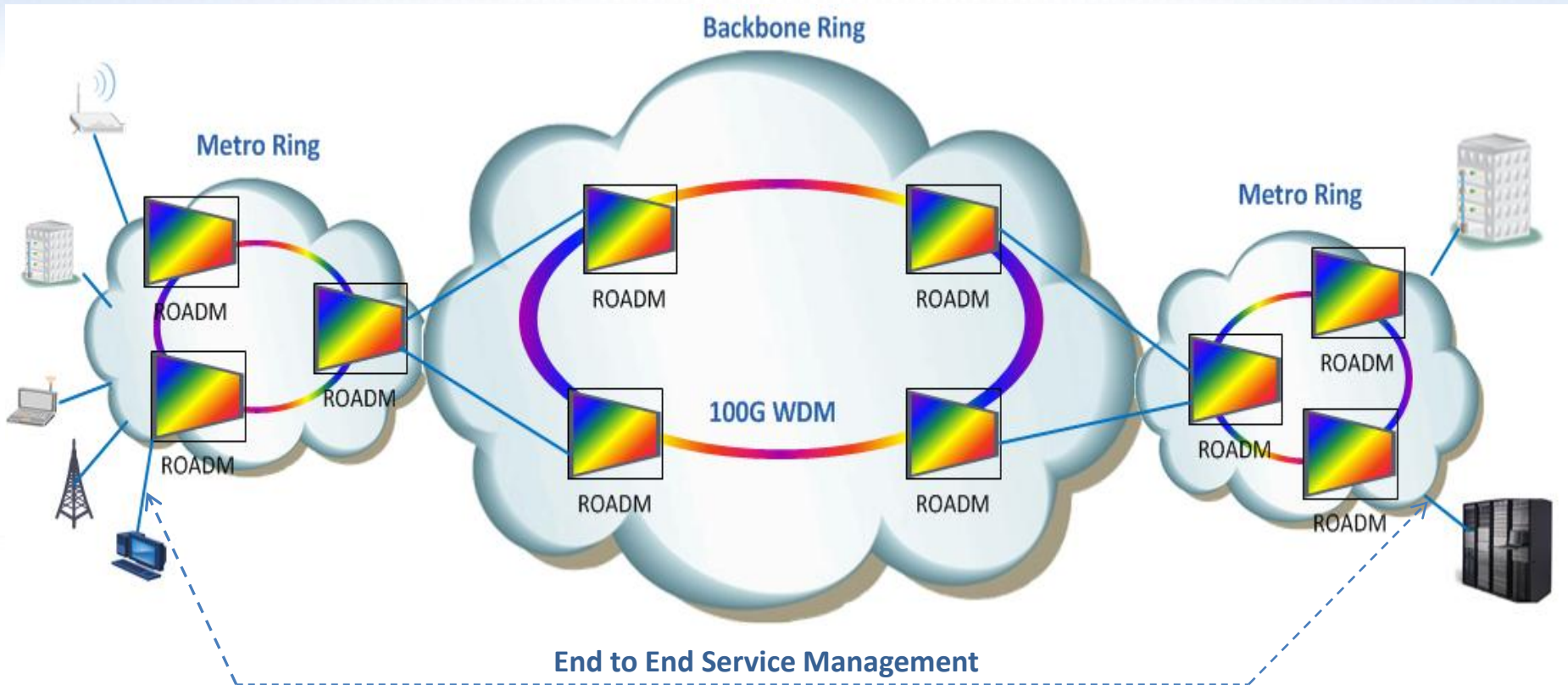
- **100G Optical Backbone**
- **OTN equipments and service grooming**
- **Control Plane & Automatically Switched Optical Network**

Challenge 1

- Existing network has a lot of live service
- During migration the service must not be interrupted

Challenge 2

- Needed a lot of on-site migration installation work and maintenance windows

Challenge 3

- Having a wdm section which is not ASON enabled , this section had to be taken into account as a non-ASON cloud

Challenge 4

- Metro and Backbone seperation: A model had to be defined to operate different domains and manage inter-domain services

Challenge 5

- Two different NMS, seperate operations and monitoring

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The new network will …

- Enable us to fullfill the high bandwidth demand of our customers

- Permit us to answer to the market request of next generation services such as cloud computing and smart device connectivity

- Low cost per bit, so supports sales feasibility

- Optimize optical path for IP backbone suitable also for direct Terarouter connection with 100Gbe client

- Enable possible integration with OTN platform for sub lambda grooming and efficient pipe filling

- Be ready for future traffic growth

- Enable us to provide low latency services

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Future....

- Demand for 10G will continue but will slow down

- Move to directly to 100G(don't see strong 40G demand)

- After 100G, most probably, the main step will be 1T (Market doesn't like 4's)

- Need terabit capacity for our IP layer soon

- Seamless integration of design,planning,inventory and network management tools with open interface for multi-vendor environment

- Combined integration on control plane of optical and packet layers in the network