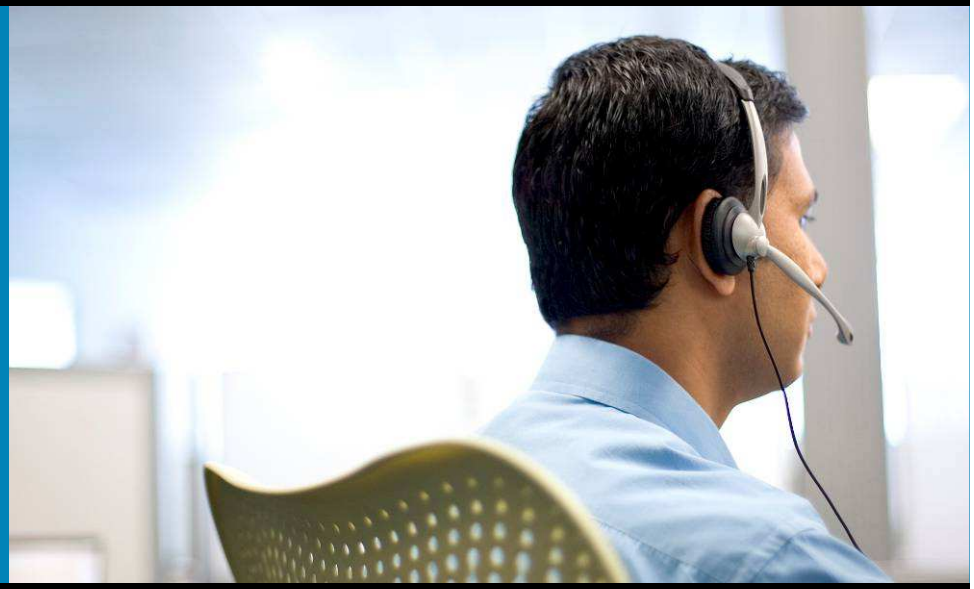
Reunión de Primavera 2008 CUDI



Soluciones Opticas

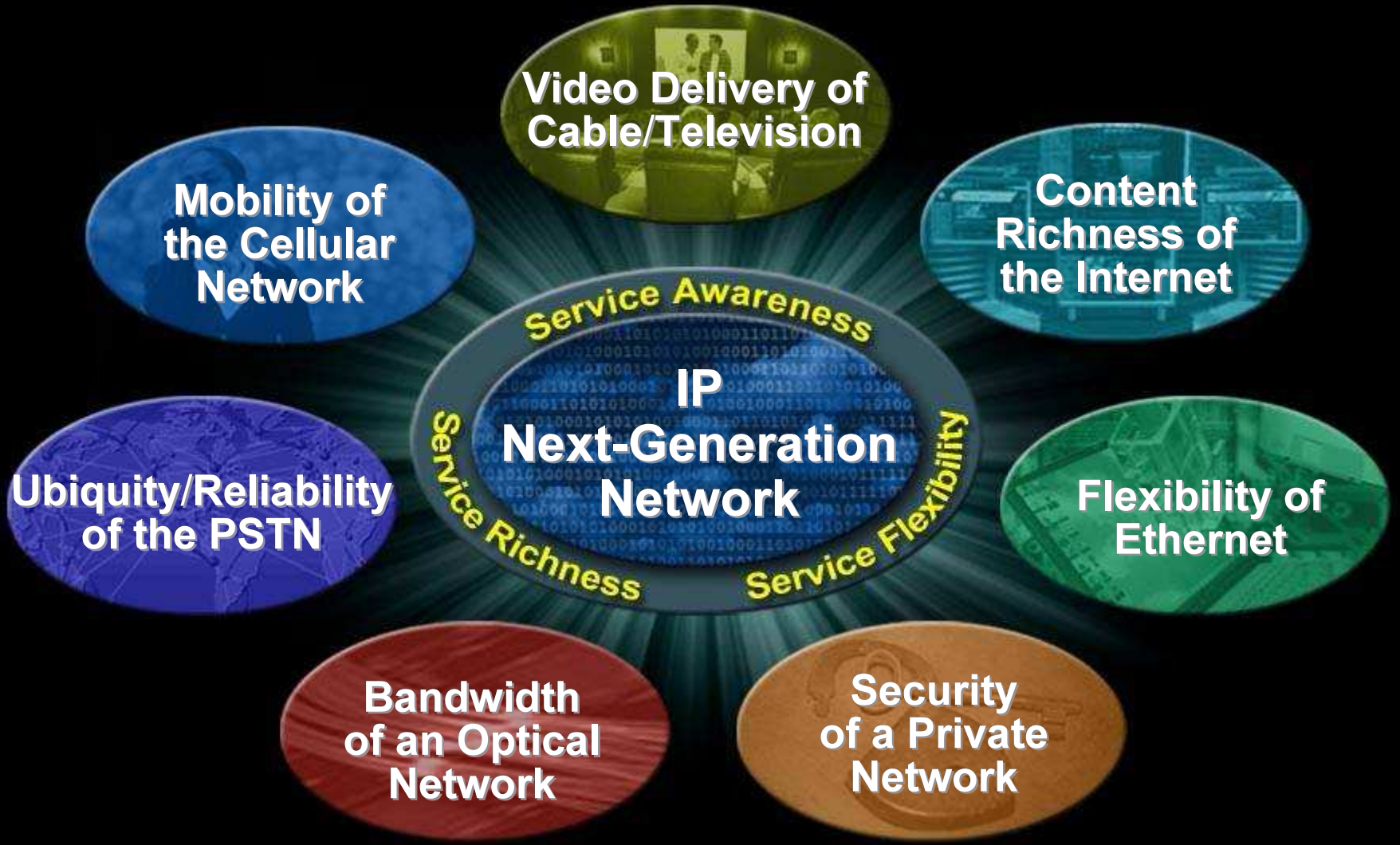
Abril 2008

Daniel Sánchez Hernández

daniesan@cisco.com

Systems Engineer

Characteristics of an Ideal Network
Fusing the Best of Today's Networks and More



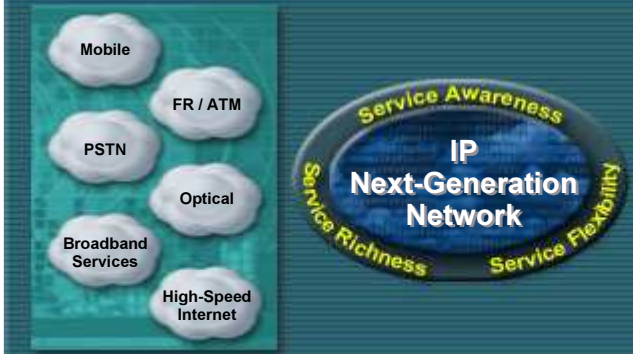
IP NGN Journey
Requires Multiple Layers of Convergence

Application Convergence

Integration of New Innovative IP D/V/V Services over Broadband

Service Convergence

Service Continuity across Access

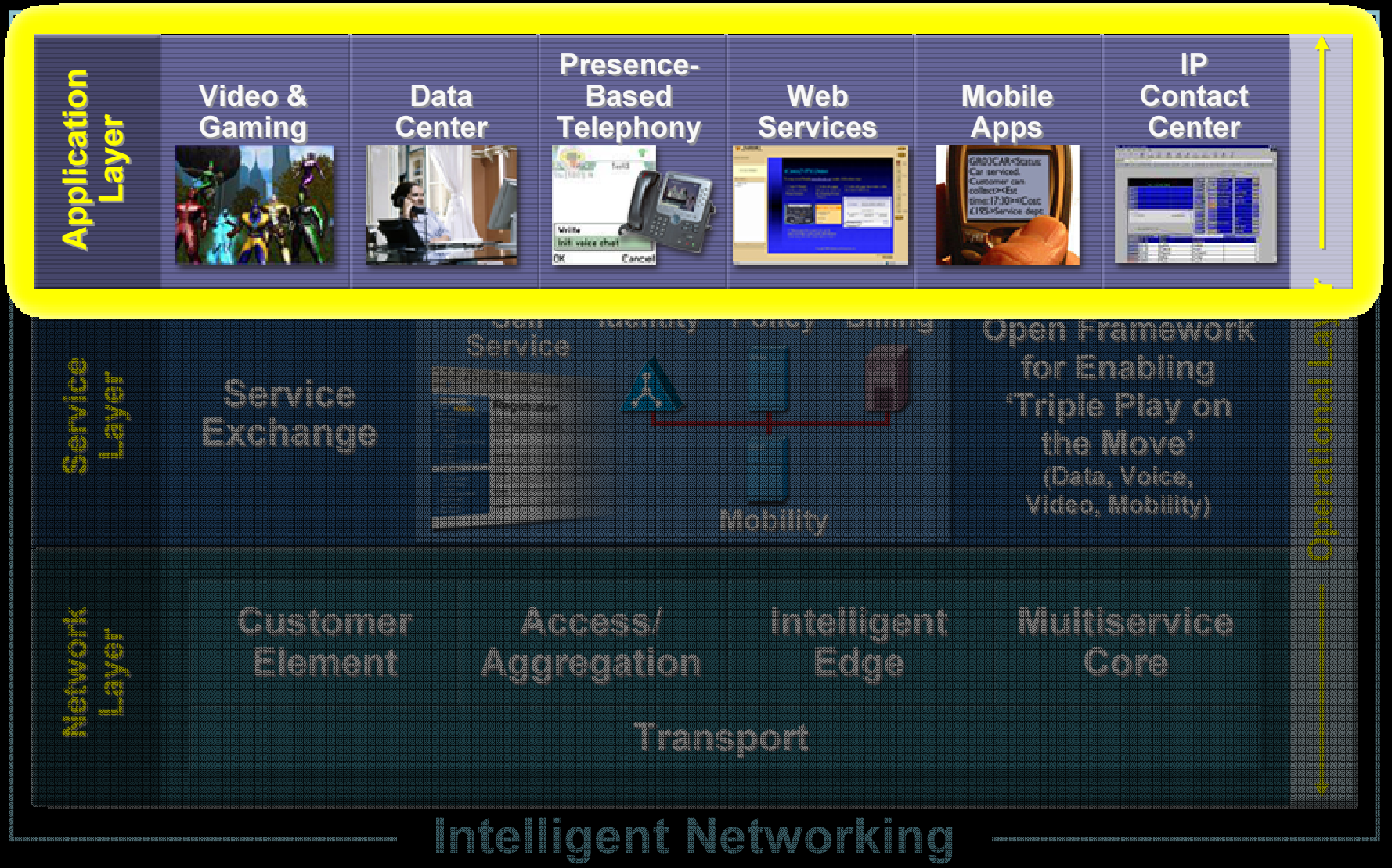


Network Convergence

Eliminate Layers in the Network

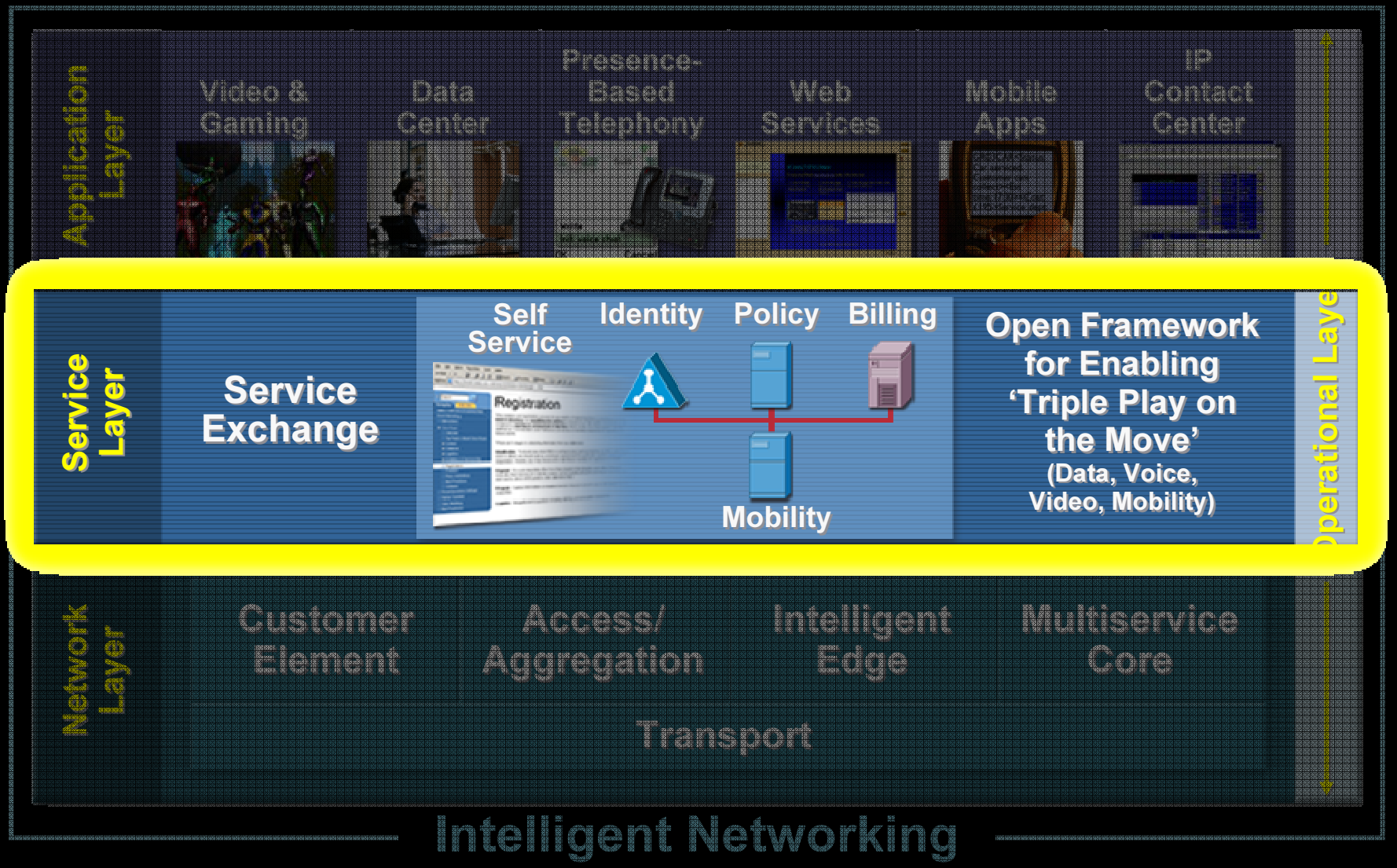
Highway to Value-Add, Personalized Tollway
IP NGN Architecture Analogy

Cisco IP NGN Architecture
Achieving a Whole Greater Than the Sum of the Parts

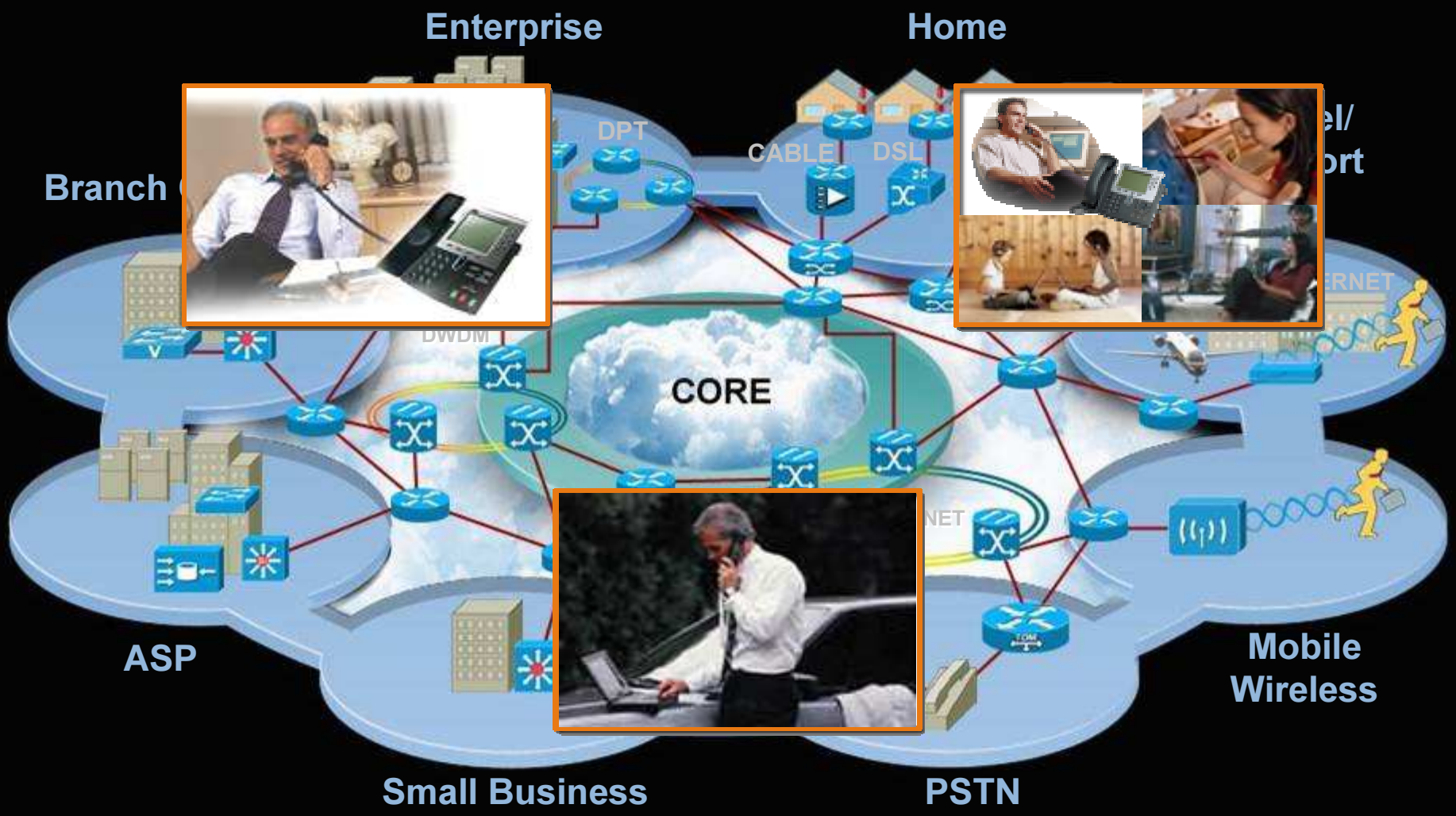


Device Functionality is Blurring...
For Consumers and Businesses: Any Service, Any Device

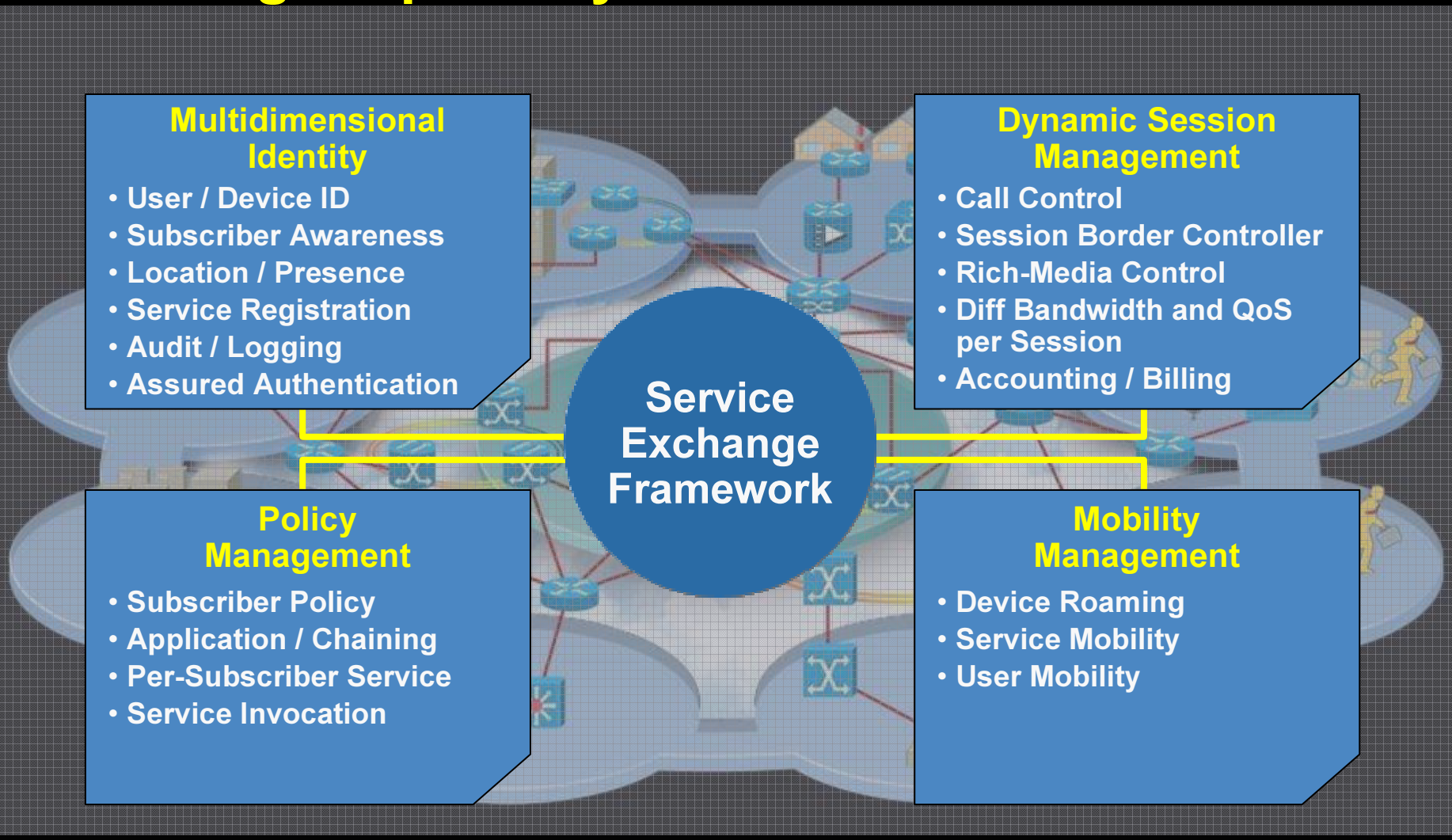
Service Convergence



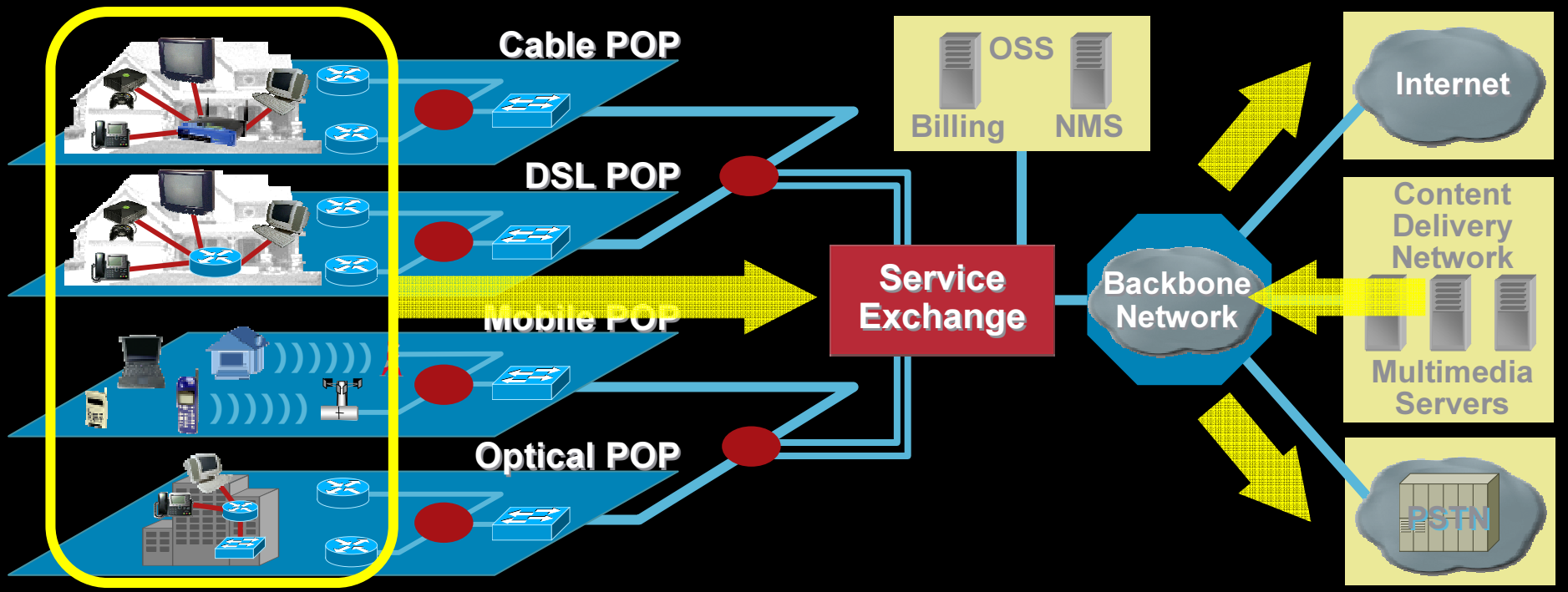
Triple Play on the Move
Providing Means for Service Continuity, Customer Stickiness



Service Exchange Framework
Making 'Triple Play on the Move' Real



Control: Turning an Uncontrolled Network… …Into a Controlled Network



Barriers to Harnessing More Profit and Subscriber Loyalty:

- Insufficient information yields an uncertain model
- Network congestion and contention for scarce bandwidth degrades subscriber experience, leading to increased churn

Service Exchange Framework Enables:

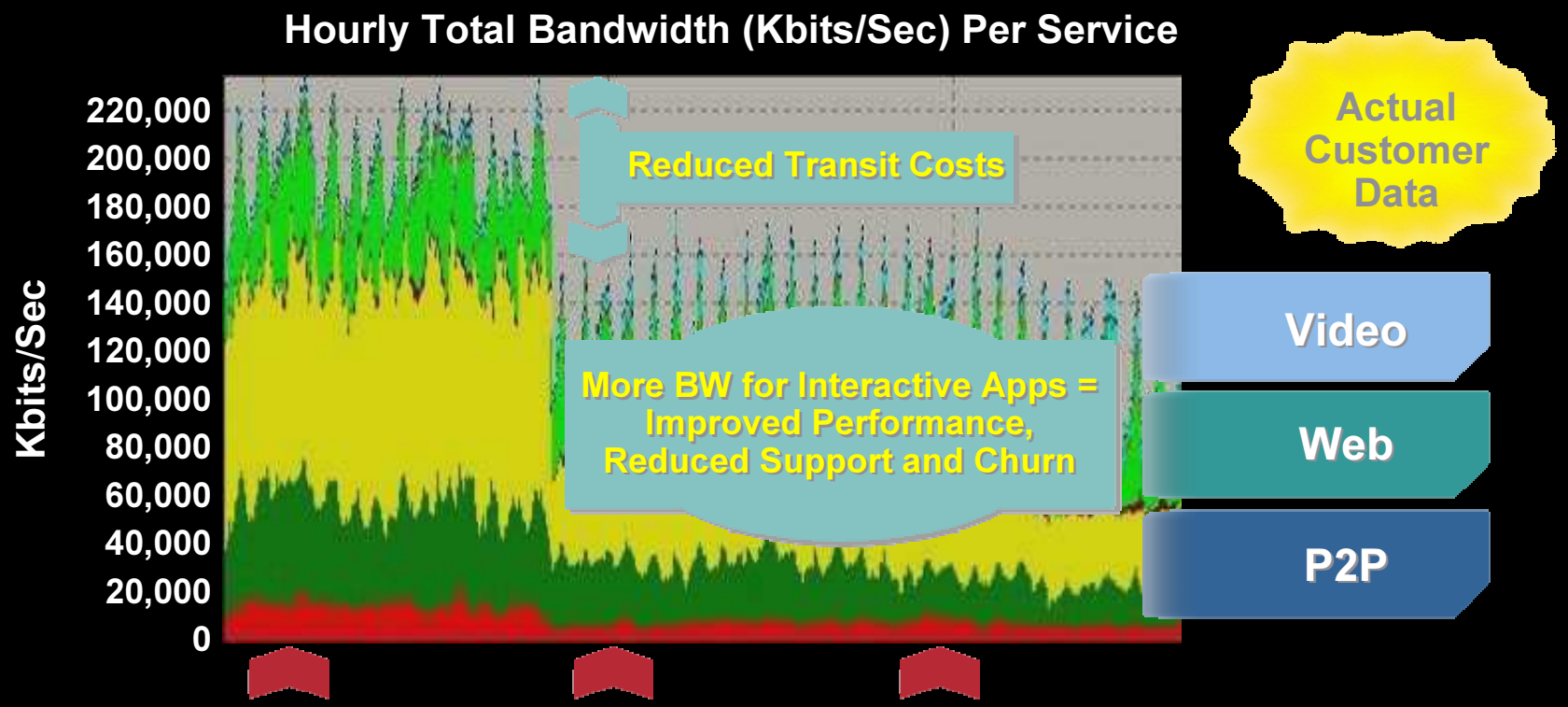
- Application and subscriber-level control
- Usage reporting and billing
- Programmability for any current/future customer need
- Mobility management

Services: Highway to Tollway Transition

Service Opportunities from Flat-Fee to Value-Based Revenue Model

Virtual WAN Manager	Bandwidth on Demand	Tiered Services	P2P Control	Access Control
VoIP	Content Aware Prepaid	Content Aware Postpaid	Parental Control	DDoS Protection
Intrusion Detection	SPAM Control	VoD	Digital Rights Management	Lawful Inspection

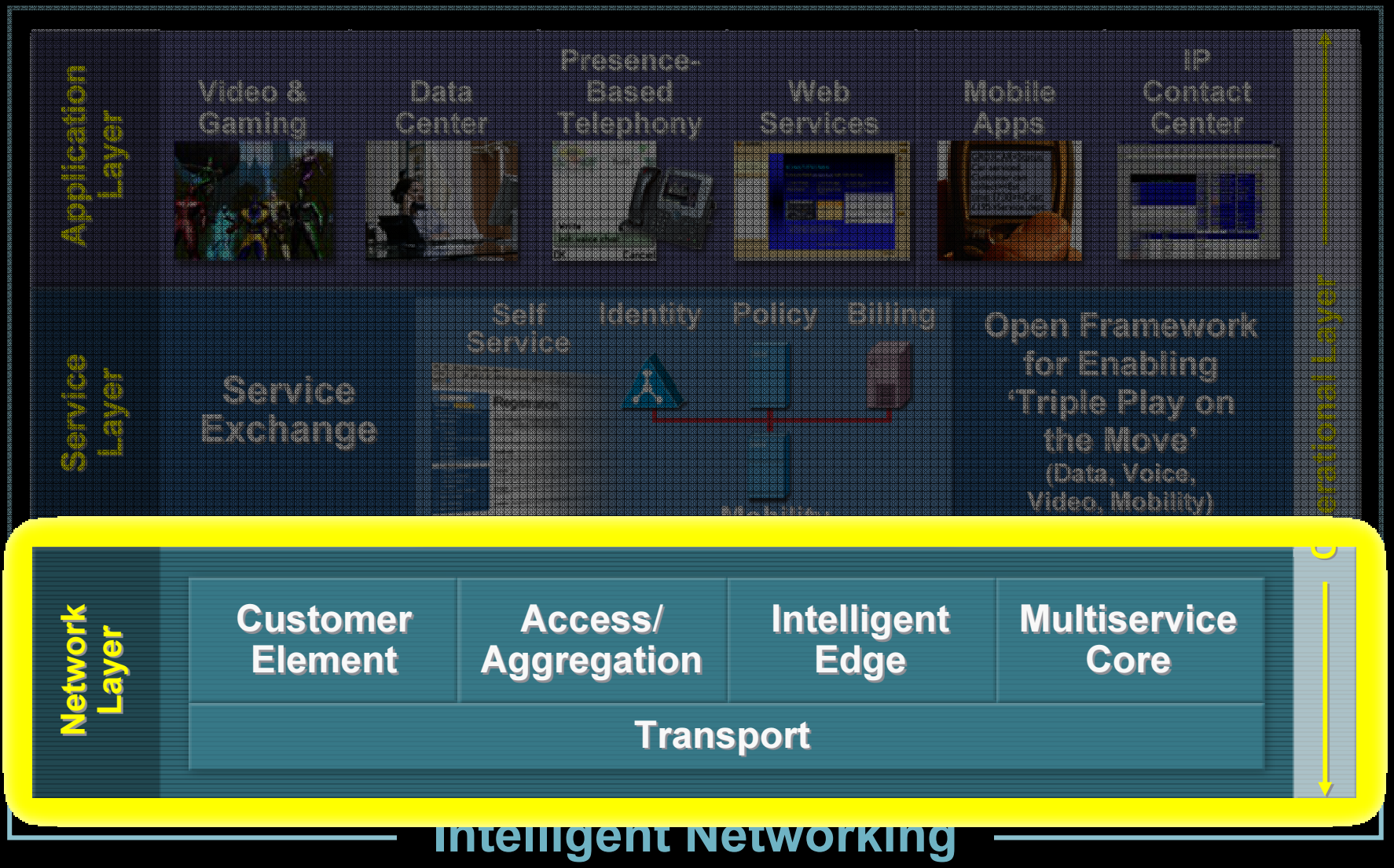
Application Traffic Optimization:
Apply Network Resources Where They are Most Needed



Reduction of peer-to-peer traffic delivers:

- Savings on network OPEX and CAPEX
- Complaints regarding level of service was reduced to zero!
- Improved performance and more bandwidth for interactive, billable apps

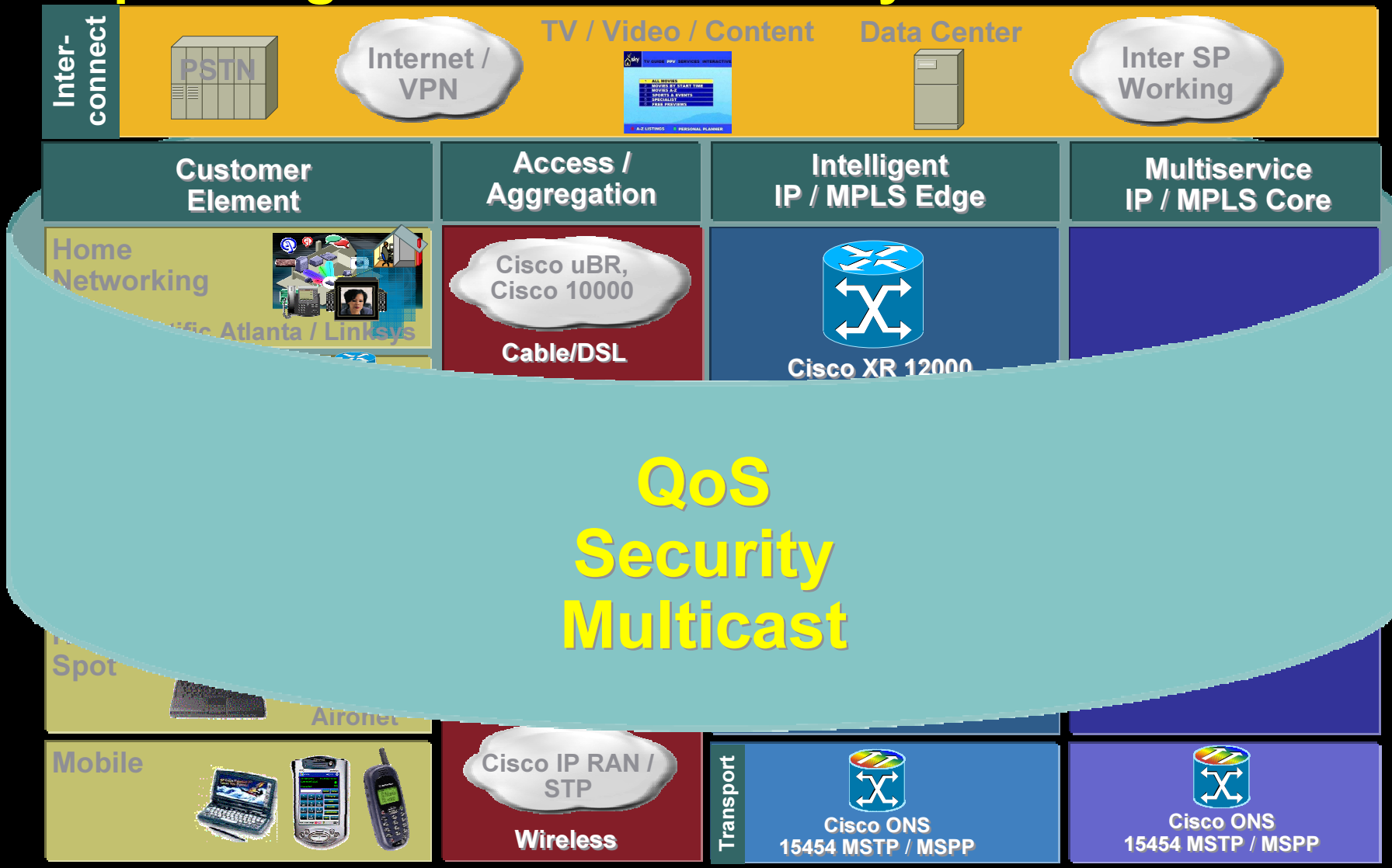
Network Convergence



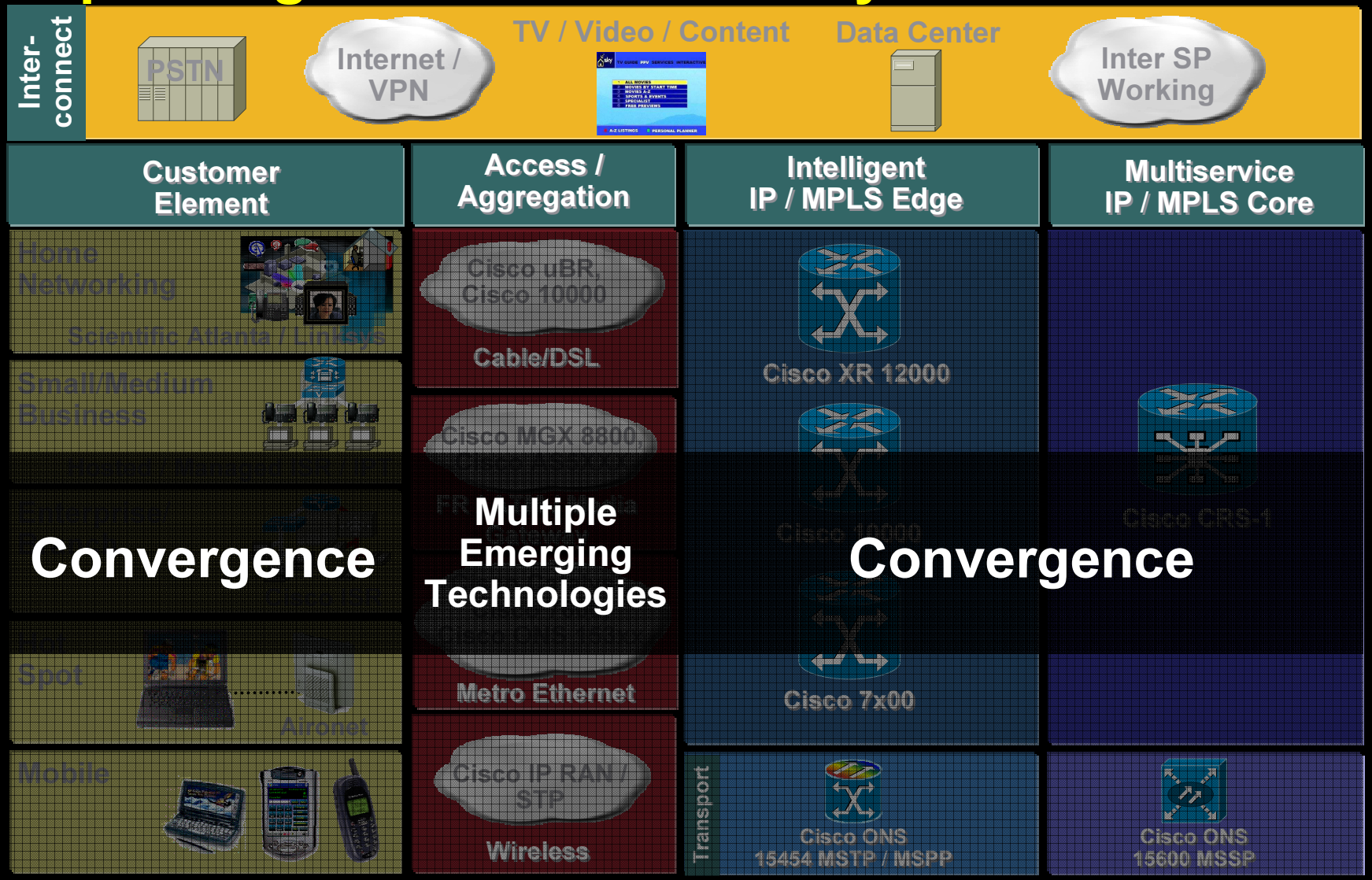
Cisco Technology Strategy

Products → Systems → Solutions

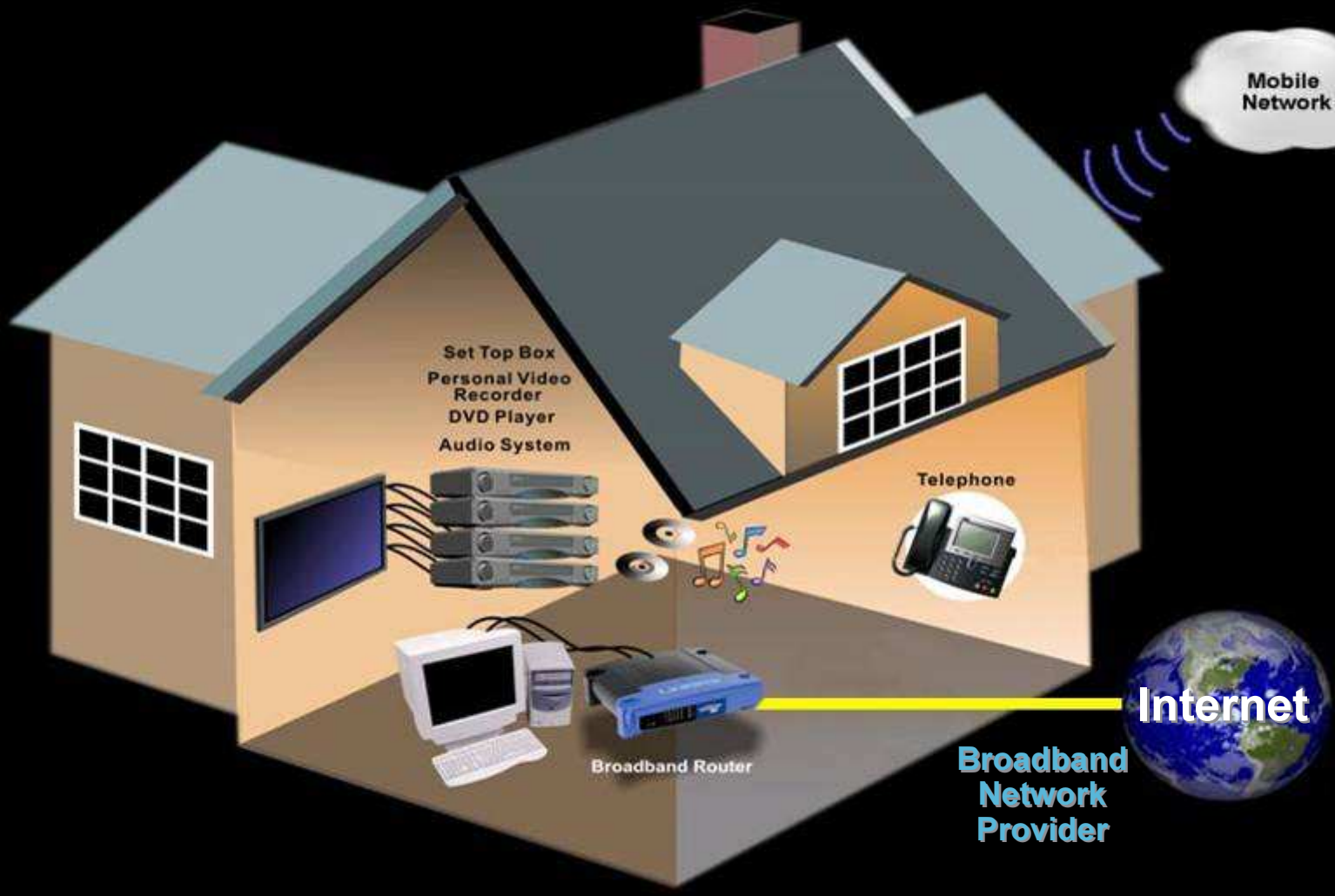
Cisco IP NGN Technology
Spanning Secure Network Layer



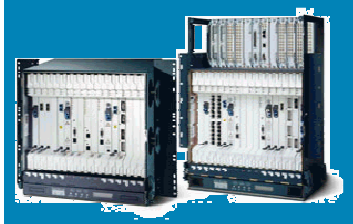
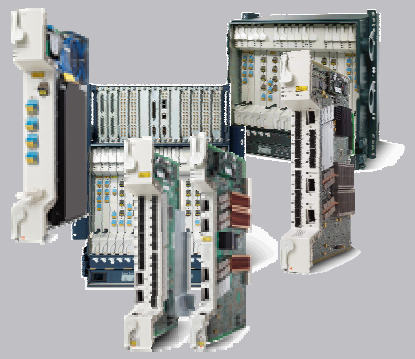
Cisco IP NGN Technology
Spanning Secure Network Layer



Customer Element
Evolution of the Home Network: Separate to Converged

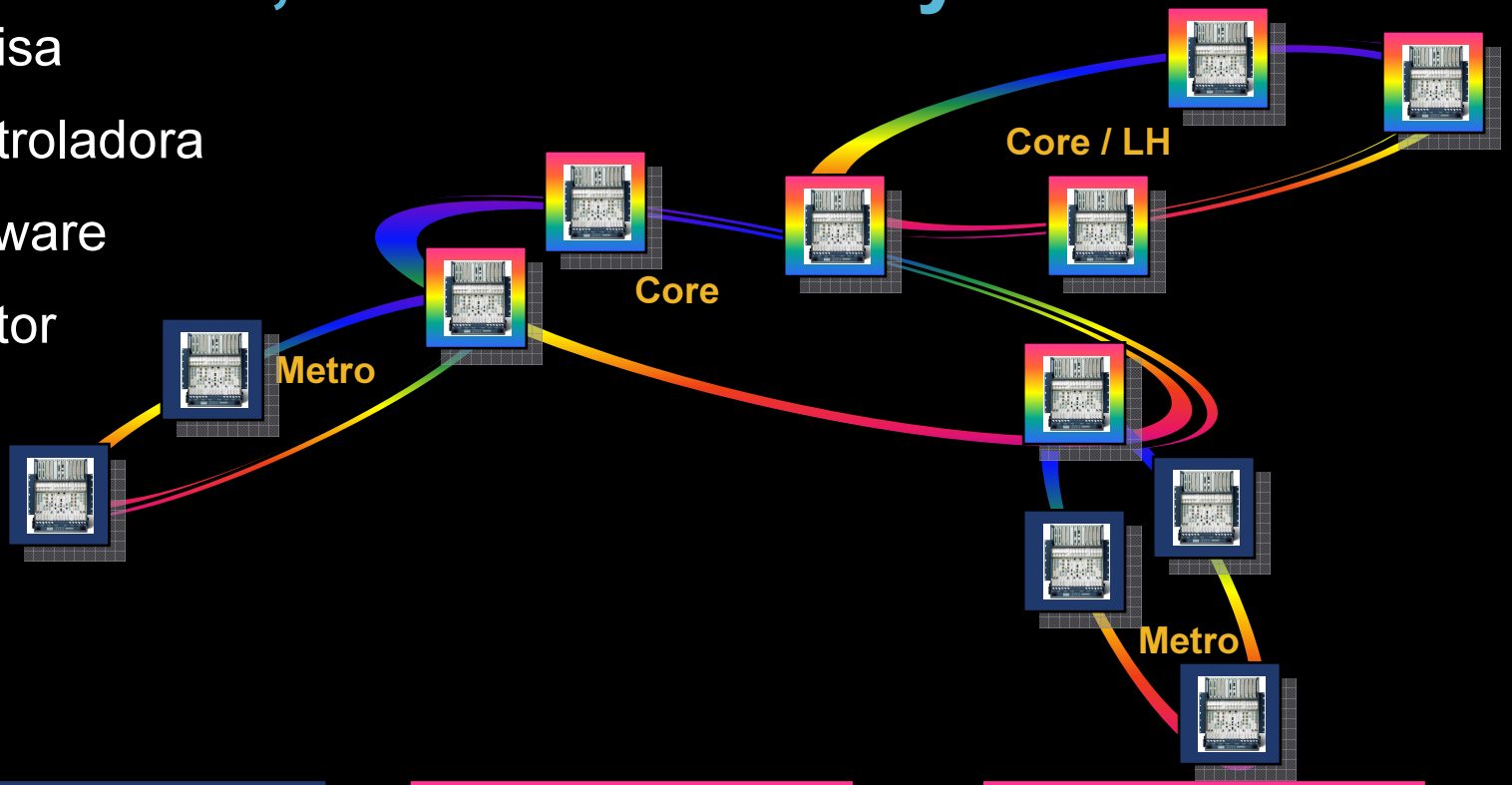


Where is ONS 15454 coming from?

Multiservice Provisioning Platform	Multiservice Transport Platform	Reconfigurable Add/Drop Multiplexer (ROADM)	IP over DWDM	Fully Flexible Mesh, Ethernet-Enabled DWDM
 Multiservice Provisioning Platform	 Multiservice Transport Platform			
1999	**2003**	**2004**	**2005**	**2007**
MSPP Introduction: SONET/SDH + Ethernet (EoS)	**Intelligent DWDM**: Consolidating MSPP and DWDM Functionality onto a Single Platform	**Degree-2 ROADM**: Industry-Leading ROADM Technology drives Flexibility into DWDM	**Efficient Core Transport**: Integrated Intelligent DWDM and Core Routing Solution	**Cisco IP NGN: Optical Vision** Operationalize, Packetize and Deliver Connected Life Experiences

ONS 15454 Repisa universal para SONET/SDH, Metro ROADM y ROADM LH

- Misma Repisa
- Misma Controladora
- Mismo Software
- Mismo Gestor



NG TDM+Data

ONS 15454 MSPP

Metro Regional DWDM

ONS 15454 MSTP

Long Haul DWDM

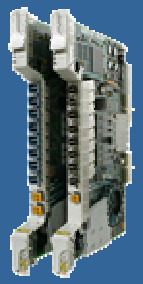
ONS 15454 MSTP

Aplicación Storage y Certificación

Interfaces de servicio

2.5G DataMuxponder

- 2 x GbE
- 2 x 1G FC/FICON
- 1 x 2G FC/FICON
- 8 x ESCON



10 DataMuxponder

- 8 x GbE
- 8 x 1G FC/FICON/ISC-1
- 4 x 2G FC/FICON/ISC-3
- 2 x 4G FC

2.5G MR Transponder

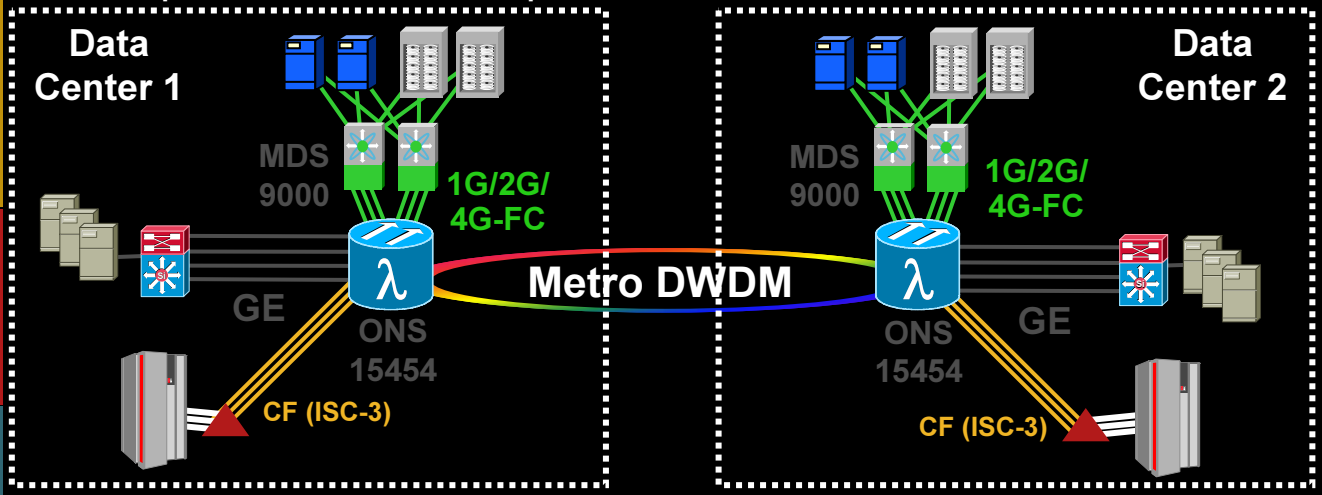
- 1 x GbE/FC/2GFC
- ETR/CLO

10G MR Transponder

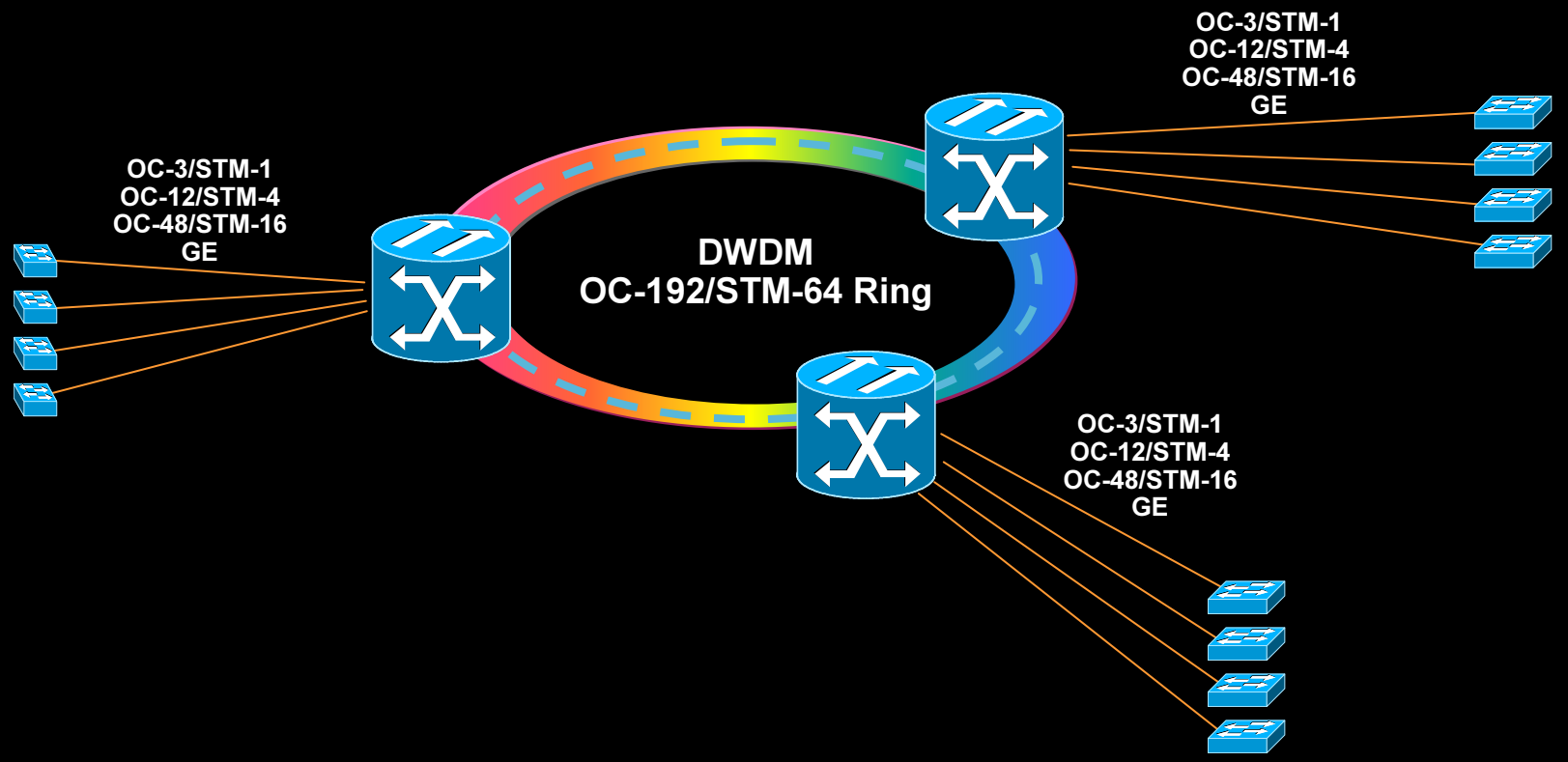
- 1 x 10GbE LAN PHY
- 1 x 10G FC

EMC² where information lives · hp invent · IBM · HITACHI DATA SYSTEMS · CISCO

- Incluido creditos buffer a buffer para largos DR/BC
- Monitoreo de performance en tiempo real de la carga util (8B10B)
- Ópticos enchufables permiten 850nm, 1310nm, 1550nm



ADM-On-A-Blade Network Application



Cisco ONS 15454 MSTP with ADM-On-A-Blade Card

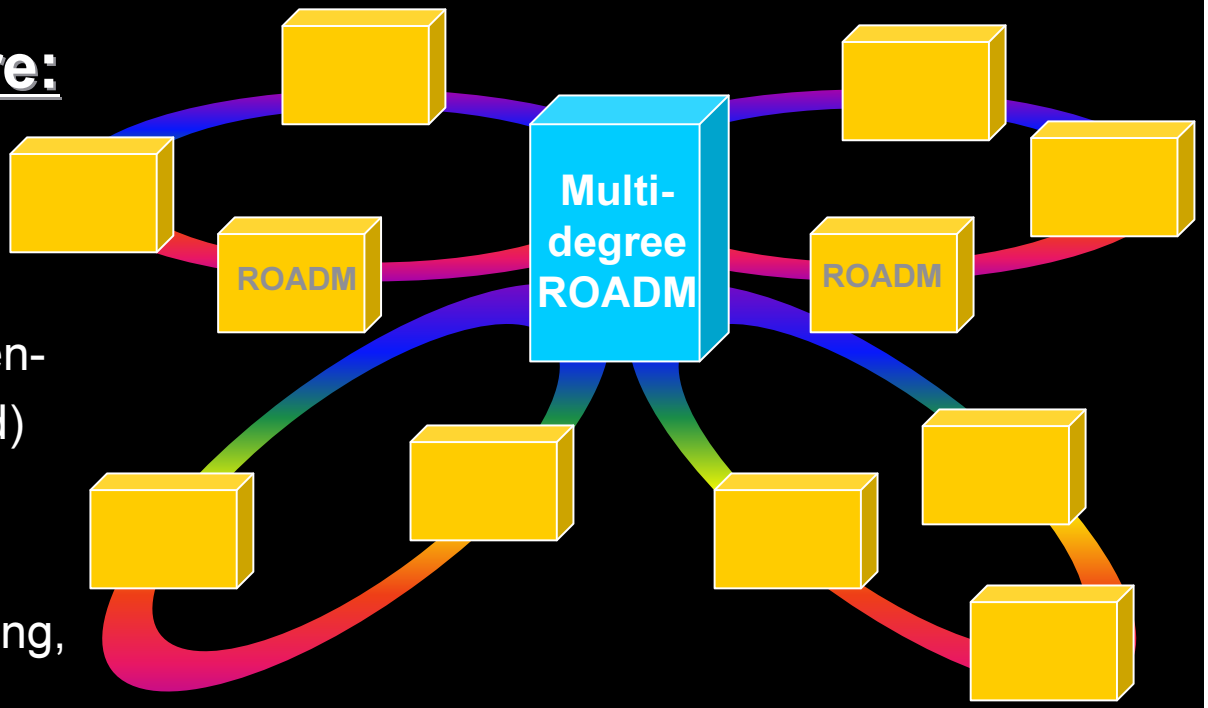
Leveraging the Intelligent WDM layer

Open WDM Architecture:

✓ **Transparent Transmission**
high-performance (EFEC, adv. mod.), Bit-rate Independent, 'Alien-Wavelength' (emerging standard)

✓ **Operationally Friendly**
G.709 OAMP, tunability, monitoring, GMPLS

✓ **Network planning flexibility**
ROADM, Planning tools



✓ IPoDWDM interoperability:

- State-of-the-art performance over MSTP
- Field tested 'Alien-Wavelength' over existing (3rd party) WDM Systems

Key Market Drivers for IP Over DWDM Convergence

Increase Service Flexibility
Faster service provisioning
New revenue generating services

Increase Reliability
Meet SLAs for customer loyalty

Manage Traffic Growth Efficiently
Video/Rich IP Media growth

Lower opex
Simplify network & management

Lower capex
Increase profitability & ROI

Today's Core Network Architecture

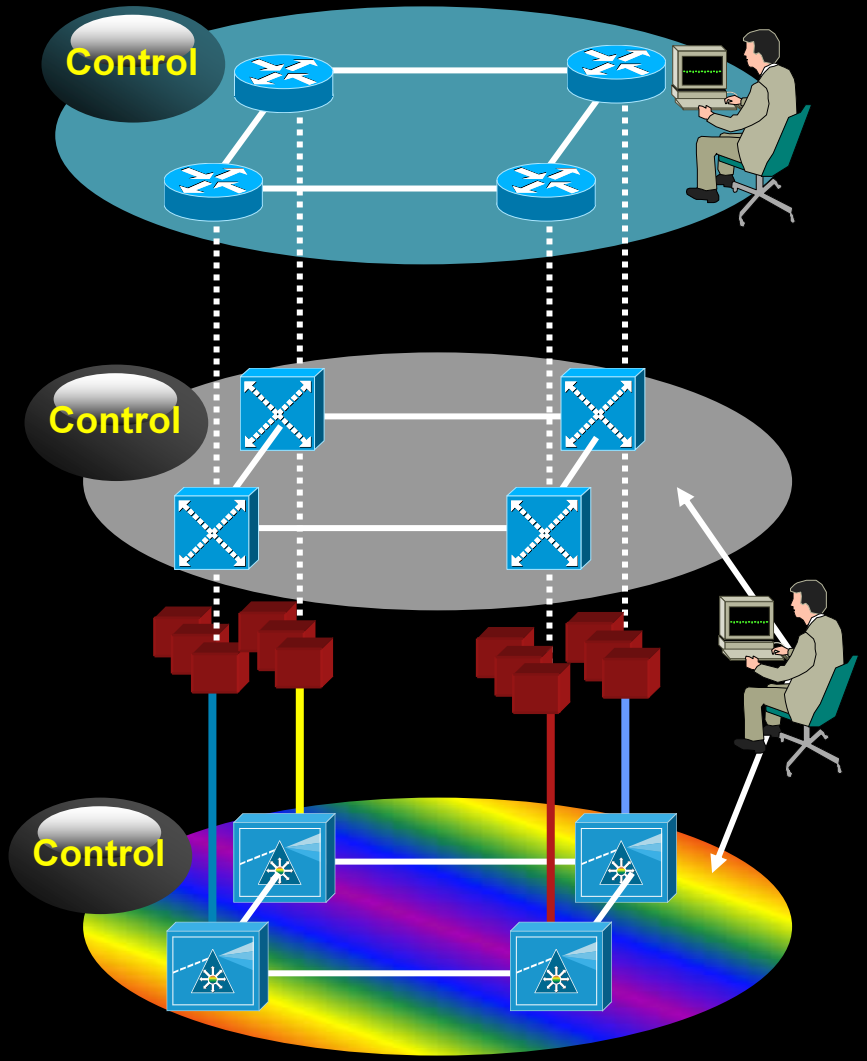
Distinct IP and DWDM Management Planes

Distinct IP and DWDM Control Planes

Expensive Electrical Cross Connects (OEO)

Multiple Transponders per Wavelength (OEO)

Truck Rolls for Reconfiguration



Routers
Aggregation of IP traffic to 10G
Fast restoration at Layer 3
Performance monitoring L2/L3

Cross Connects
Groom low speed circuits
Fast restoration at Layer 1
Performance monitoring L1

Transponders
Convert short reach to color

DWDM
Multiplexing λs onto fiber

Integration: Cisco IPoDWDM Strategy

Element Integration

Integrate transponder functionality onto routing platforms

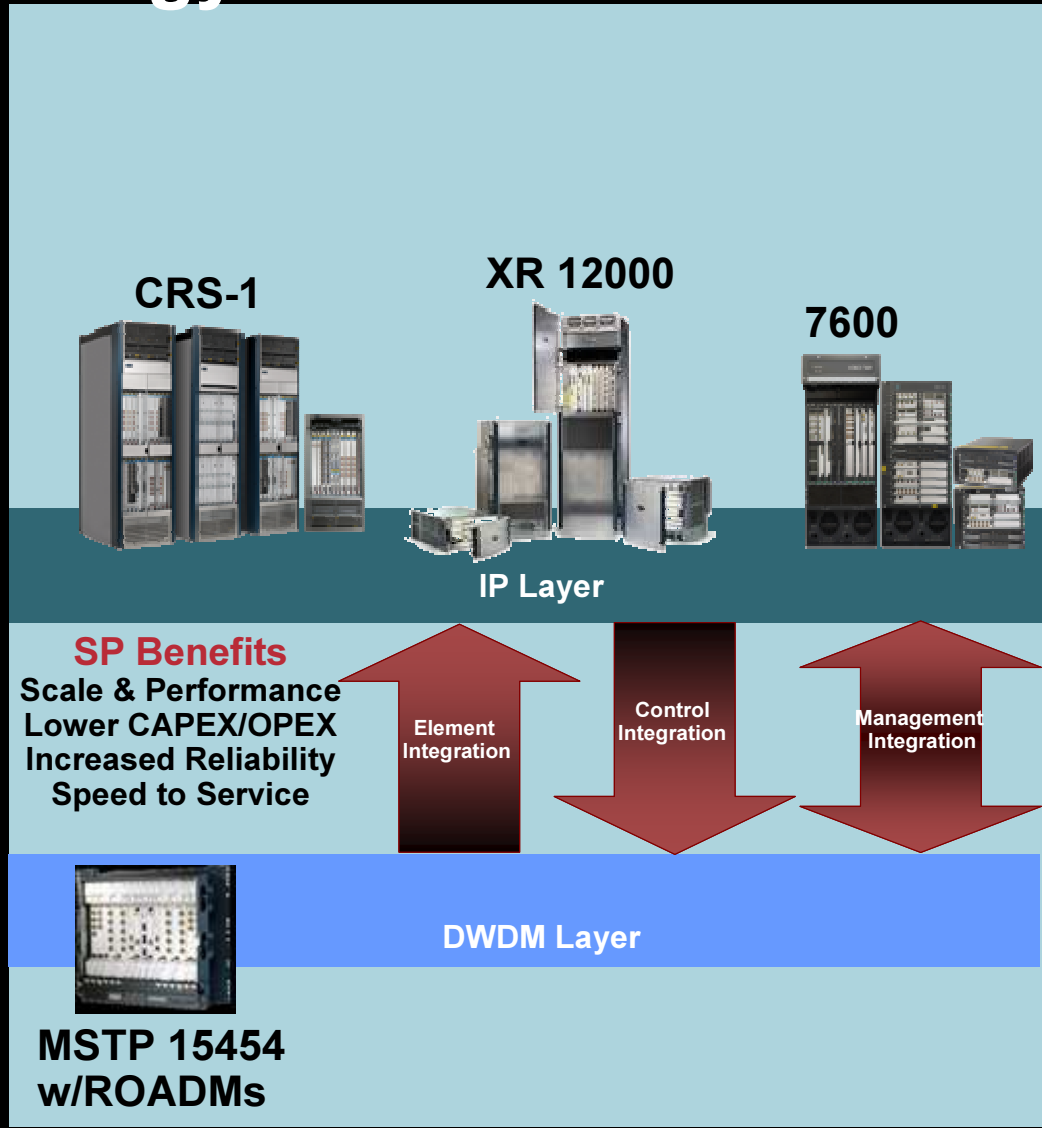
Integrating photonic switching into DWDM optical platforms

Control Integration

GMPLS for auto-provisioning of lambdas driven by IP control plane

Management Integration

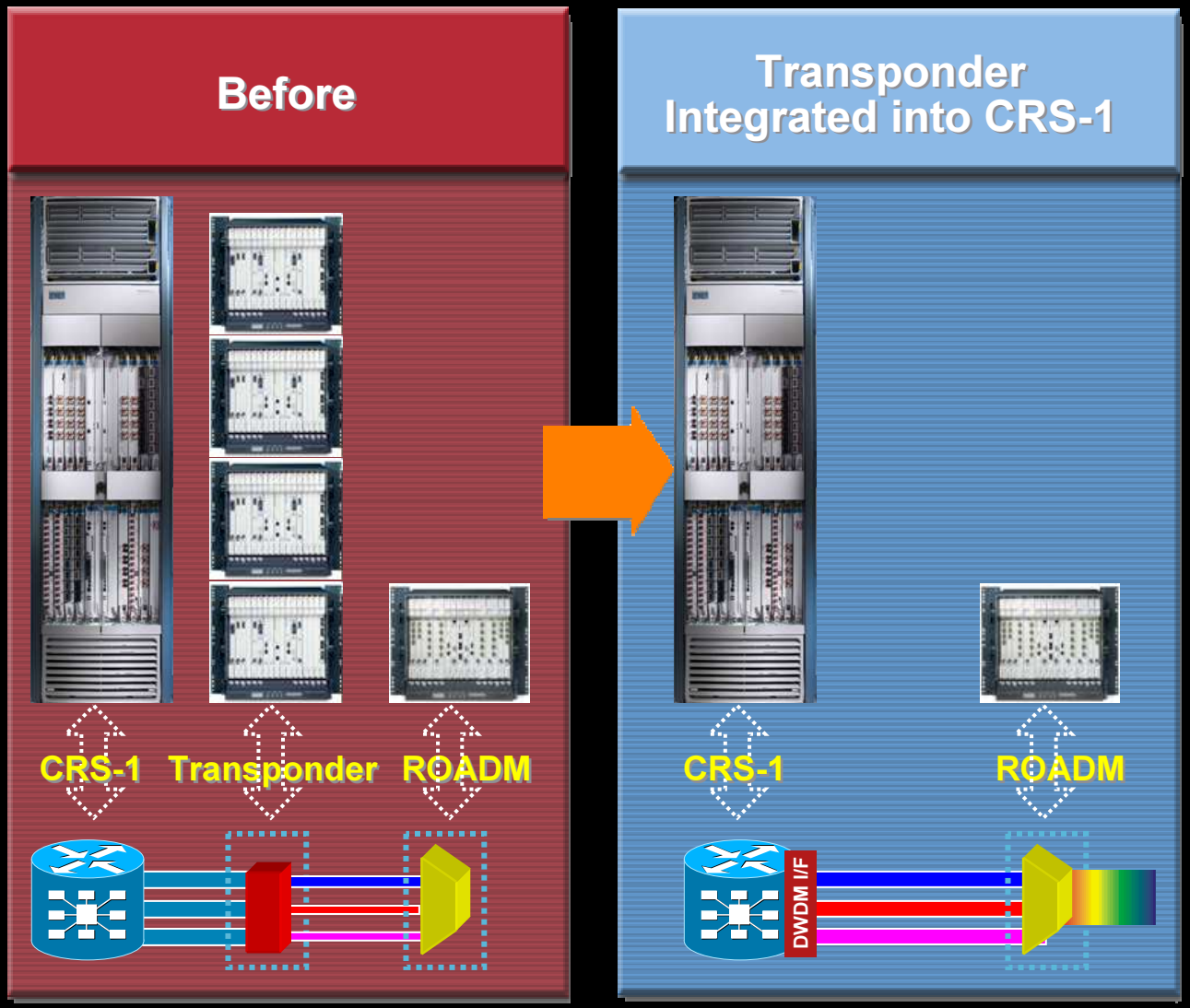
Separate or integrated management



What's New?
IPoDWDM on CRS-1

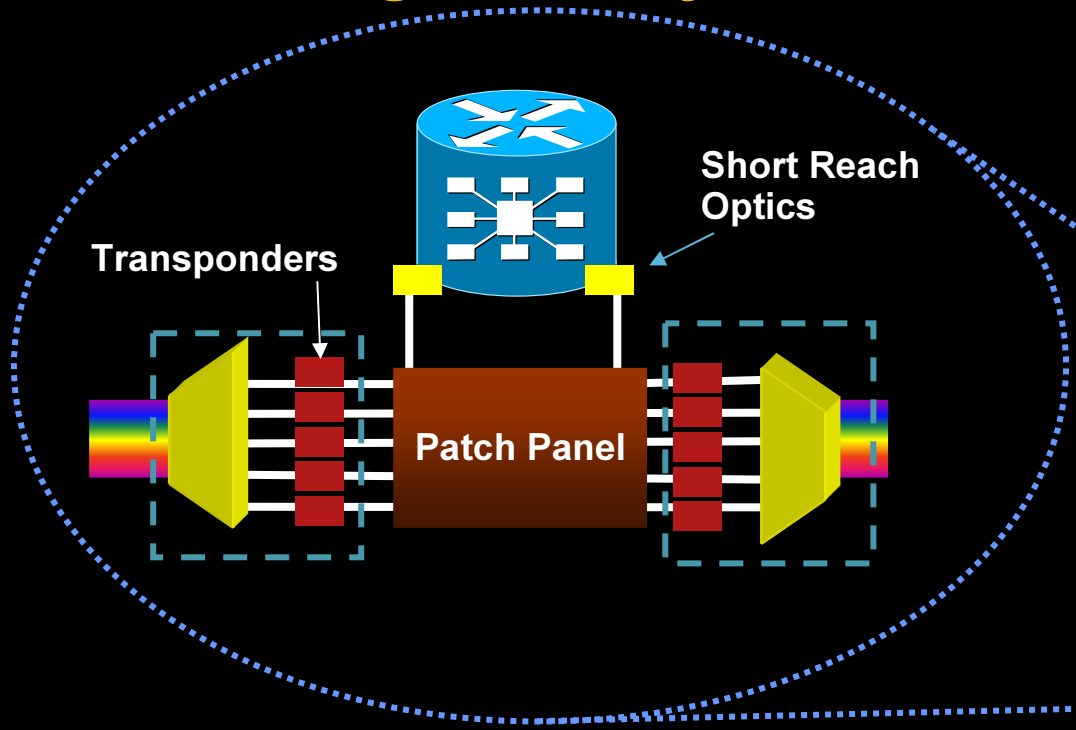
- Element Integration
  - Tunable 1 port 40G (OC-768/STM-256) WDMPOS; compatible with 10G DWDM systems
  - Tunable 4 port 10GE WDMPHY; SONET/SDH-like OAM&P at 10GE price points
  - Enhanced FEC - up to 1000km distance (500% increase)
  - Fully interoperable with 15454
  - Designed to interoperate with 3rd party DWDM
- Control Integration
  - Segmentation model for GMPLS (S-GMPLS)
- Management Integration
  - Cisco IP over DWDM design tools
  - SONET/SDH-like OAMP for perf monitoring
  - Open architecture for 3rd party interoperability

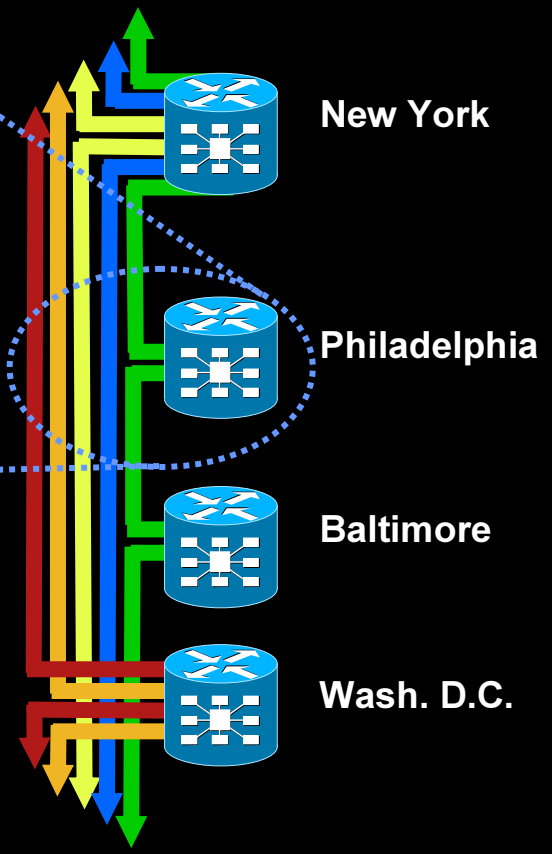
Benefits of IPoDWDM



- Increased Performance
  - 4x increase in throughput for *existing* 10G DWDM systems
- Lower CapEx
  - 50% optics reduction
  - 10GE price points
- Lower OpEx
  - Fewer shelves (Space, cooling, power, management)
- Enhanced resiliency
  - Fewer devices, fewer active components

IP and DWDM Networks
Challenges Today





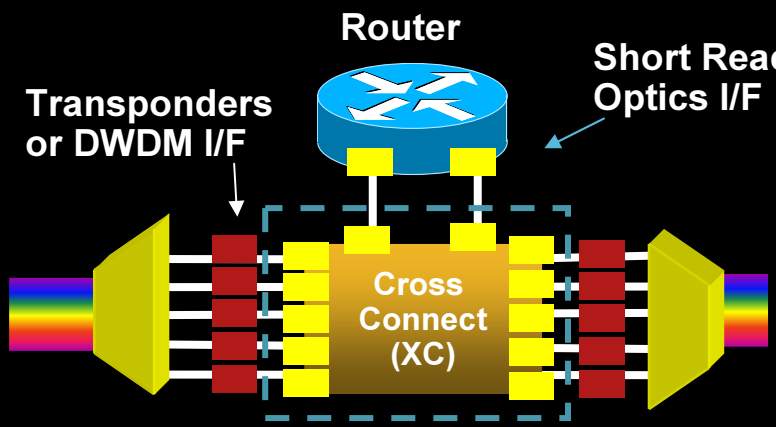
Patch Panel

- 10 transponders needed
- 2 short reach optics
- Every Lambda OEO
- Truck roll for add/drop reconfiguration

Approach Results Inflexible, High Cost System

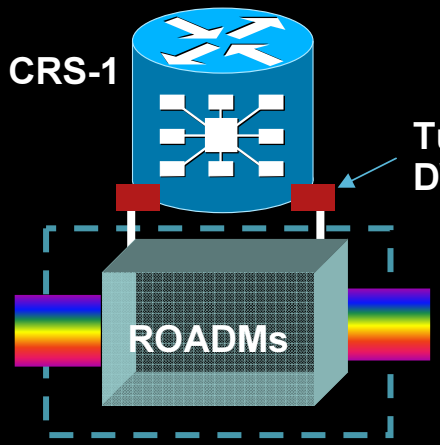
IP and DWDM Networks (cont.)
Growth Options

Competitors Solution



Invest in High Capacity SONET
- 10 transponders needed
- 4-14 Short Reach optics
- Every Lambda OEO
- Addt'l transponder & SR for each λ
- Expensive switch w/active electronics

Cisco's IPoDWDM Solution



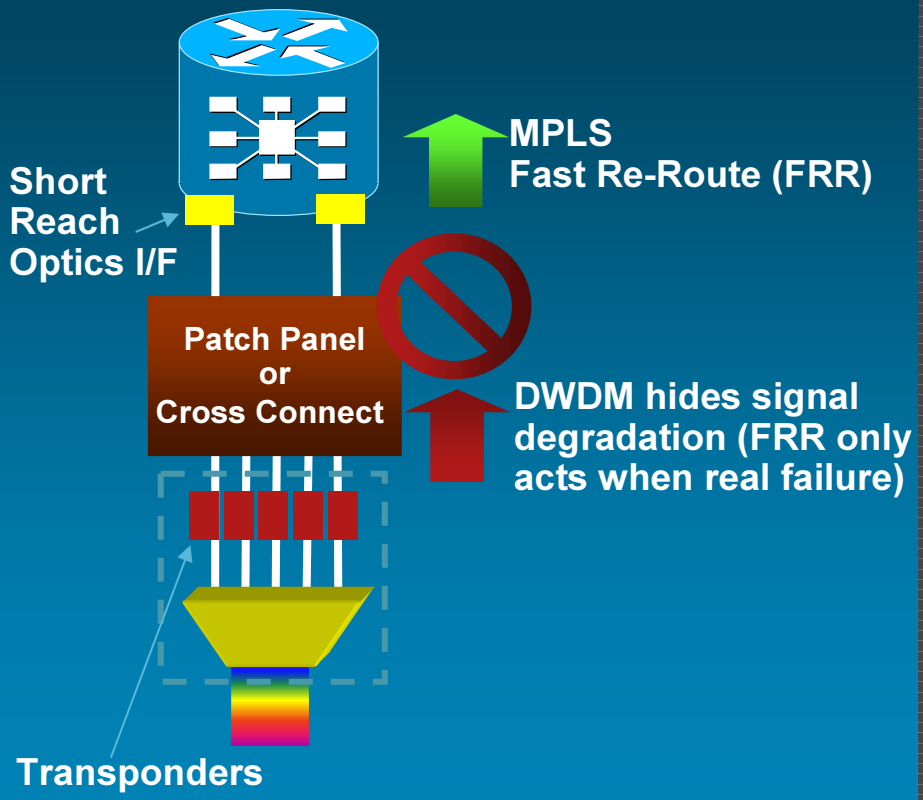
Invest in IPoDWDM
- 0 transponders needed
- 2 Tunable DWDM interfaces in router
- All pass-through traffic stays optical
- ROADM full provisioned, no truck rolls
- Expensive switch eliminated

Continue to Invest in XCs & Transponders

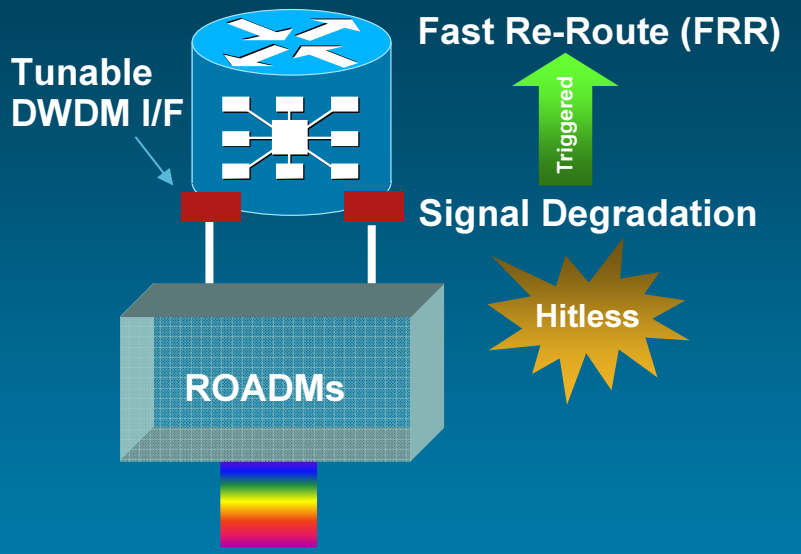
Eliminate Unnecessary OEO XC & Transponders

Increased Reliability
Hitless Switchover from Degrading Paths

Competitors Solution
Optical-Electrical-Optical (OEO)



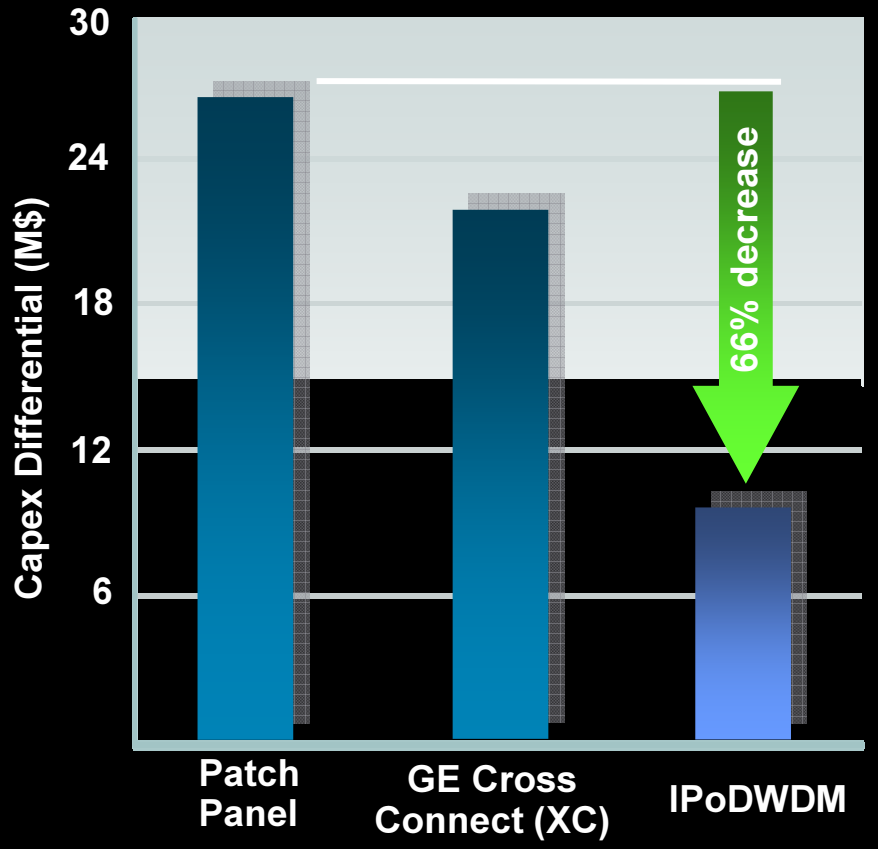
Cisco's IPoDWDM Solution



Element integration allows router visibility into transmission layer performance, enabling superior protection compared to transponder based networks

IP and DWDM Networks (cont.)
Capex Savings for Large EMEA PTT

- Up to 66% Capex differential savings w/IPoDWM:
  - 50% optics reduction
    - Eliminate transponders
    - Reduce short reach
  - Elimination of expensive cross connects
  - 10GE economics



Source: Cisco Estimates