



The Future of Bandwidth

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The Future of Bandwidth

E-Learning



3DTV / HDTV



Smart Phones



Tablets / eBooks



TelePresence

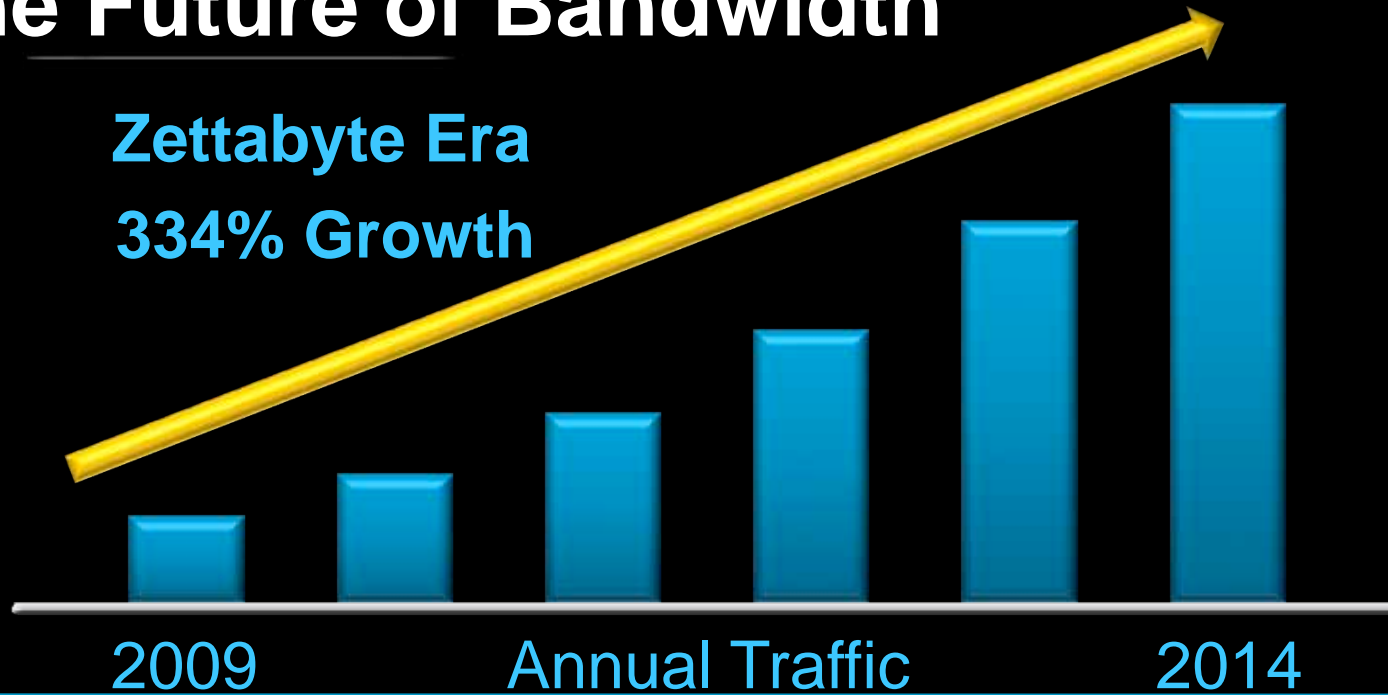


Tele-medicine



The Future of Bandwidth

Zettabyte Era
334% Growth

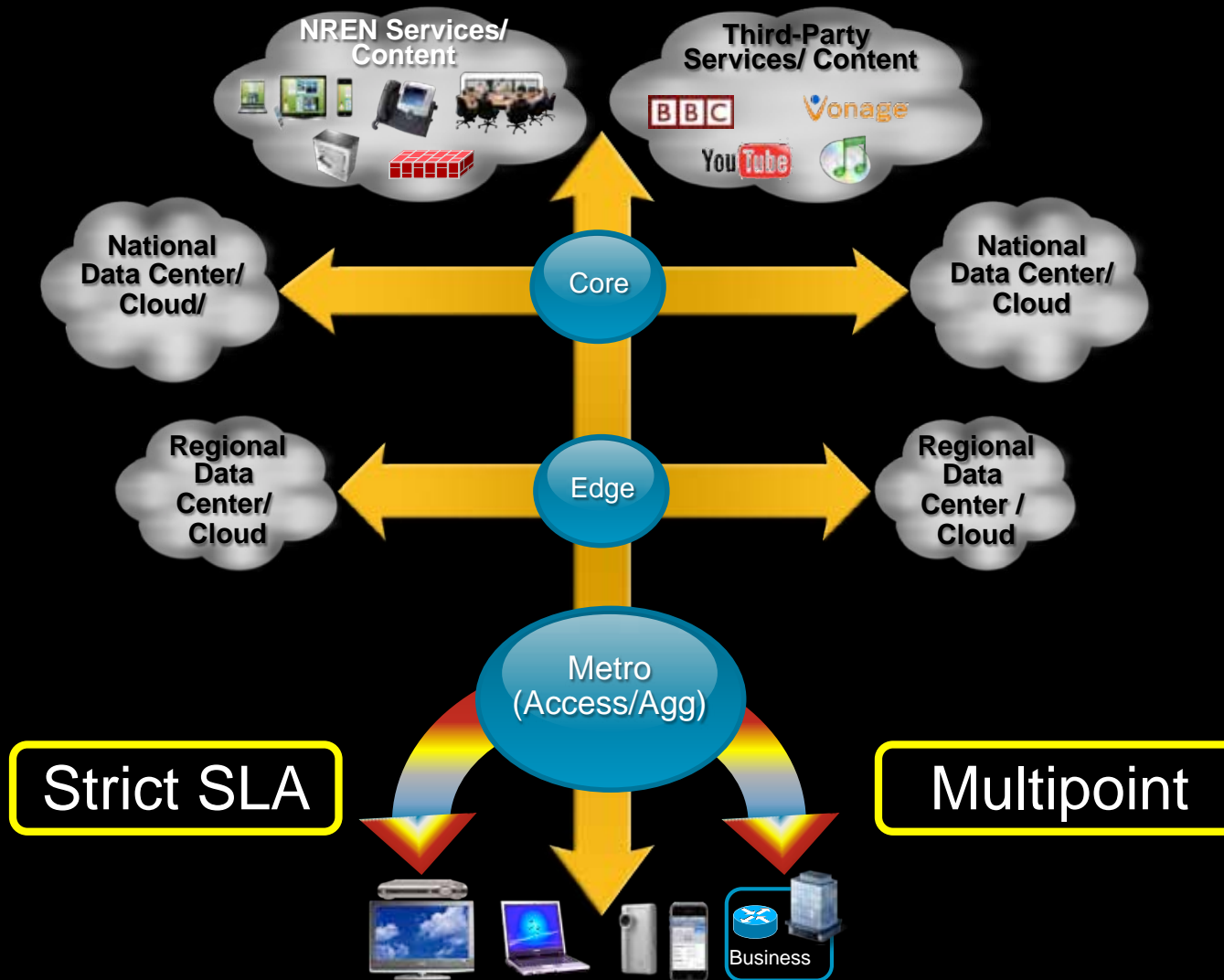


Dynamic Multipoint Services

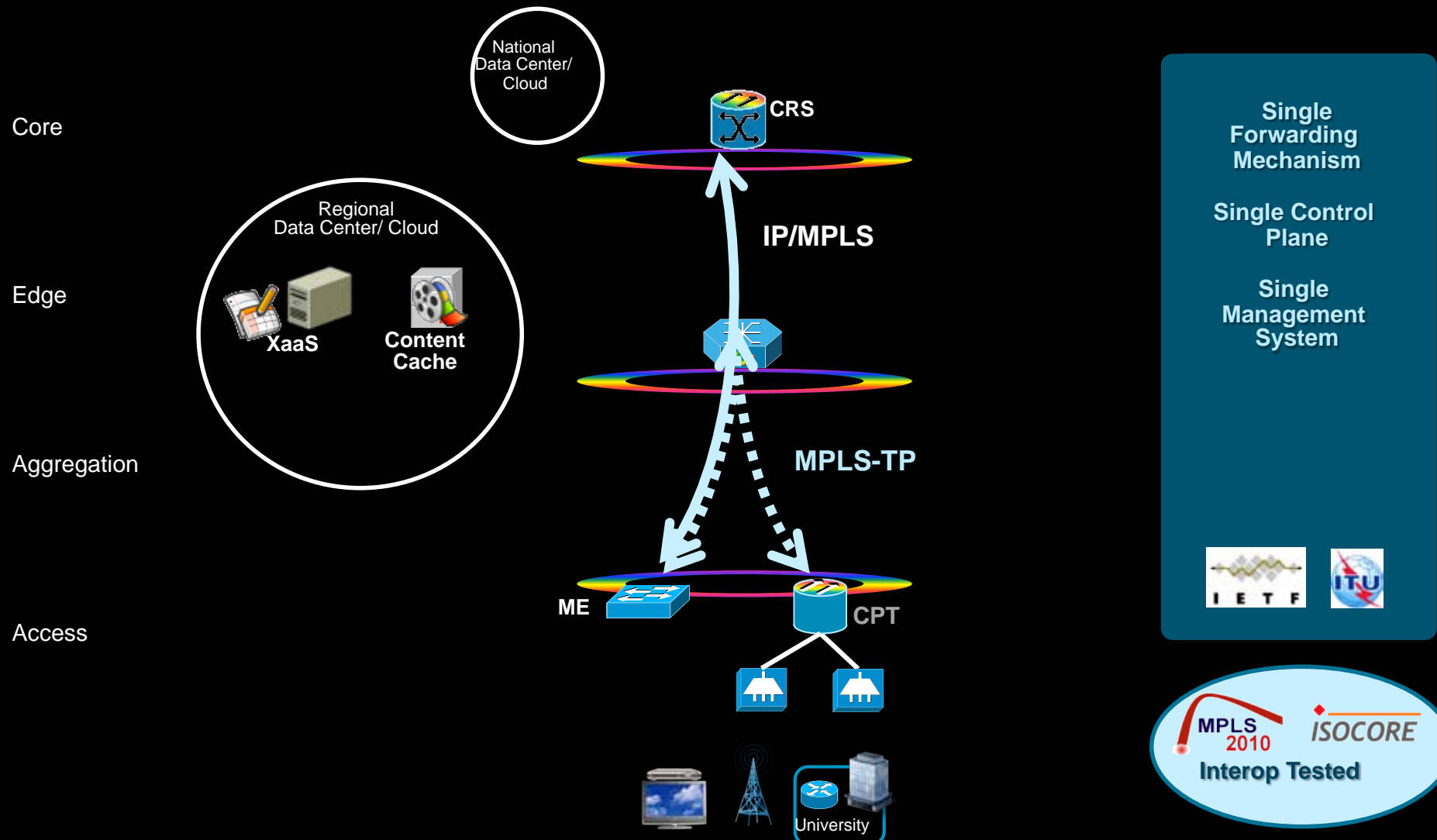


Explosive Traffic Growth + Rapid Services Evolution

Leads to Dramatic Shifts in Traffic Patterns

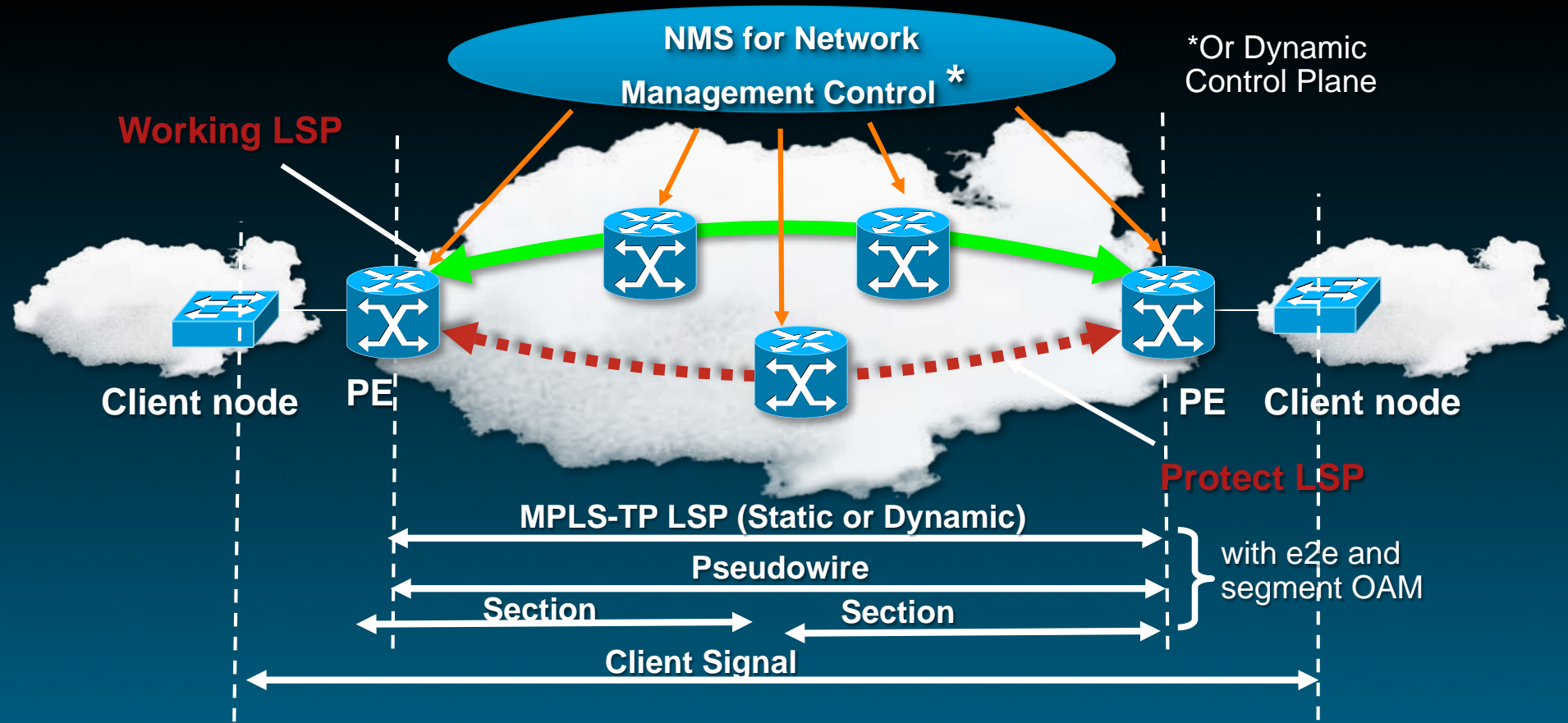


Reducing OpEx, CapEx via Simplification



Transport Trust + Packet Efficiency = 20% OpEx Savings

MPLS-TP Concept

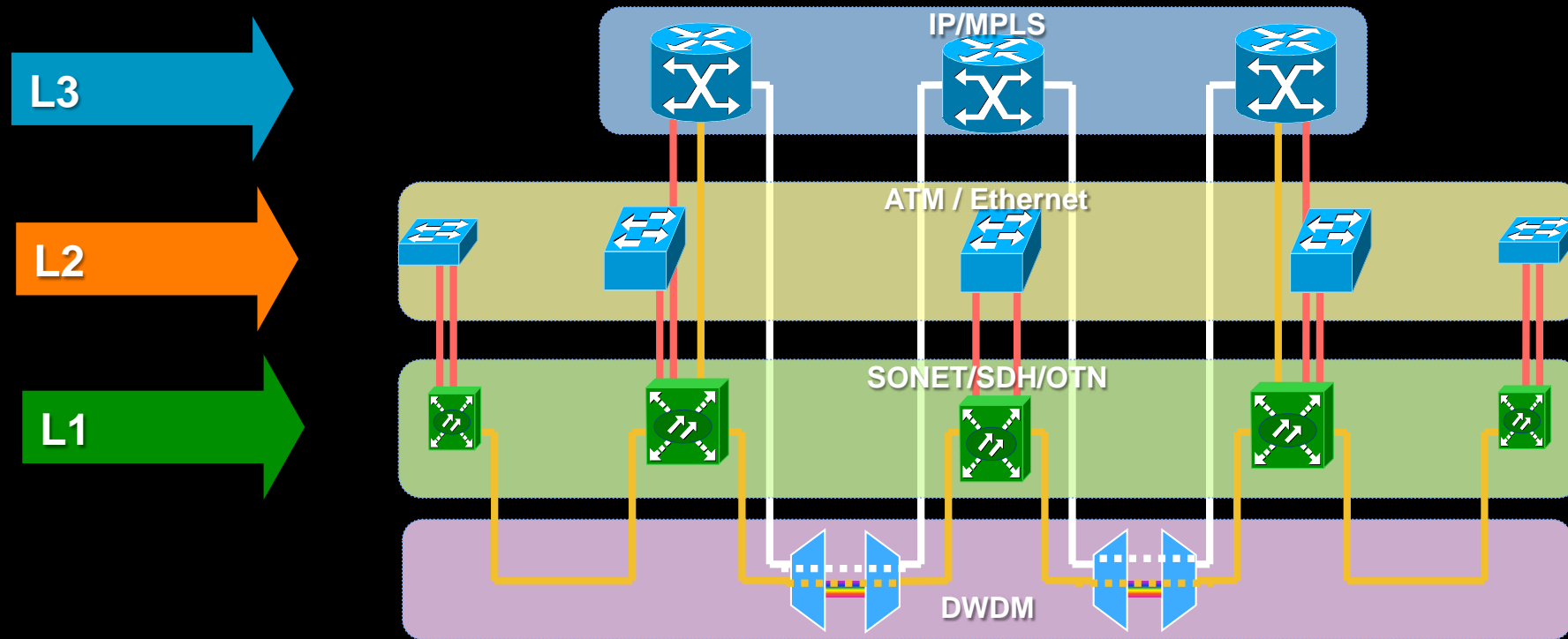


Connection Oriented, pre-determined working path and protect path
 Transport Tunnel 1:1 protection, switching triggered by in-band OAM,
 Options with NMS for static provisioning, or dynamic control plane for routing and signaling

Note: The cloud represents one MPLS-TP network, e.g., it may be in aggregation or access

Rethinking Core Transport

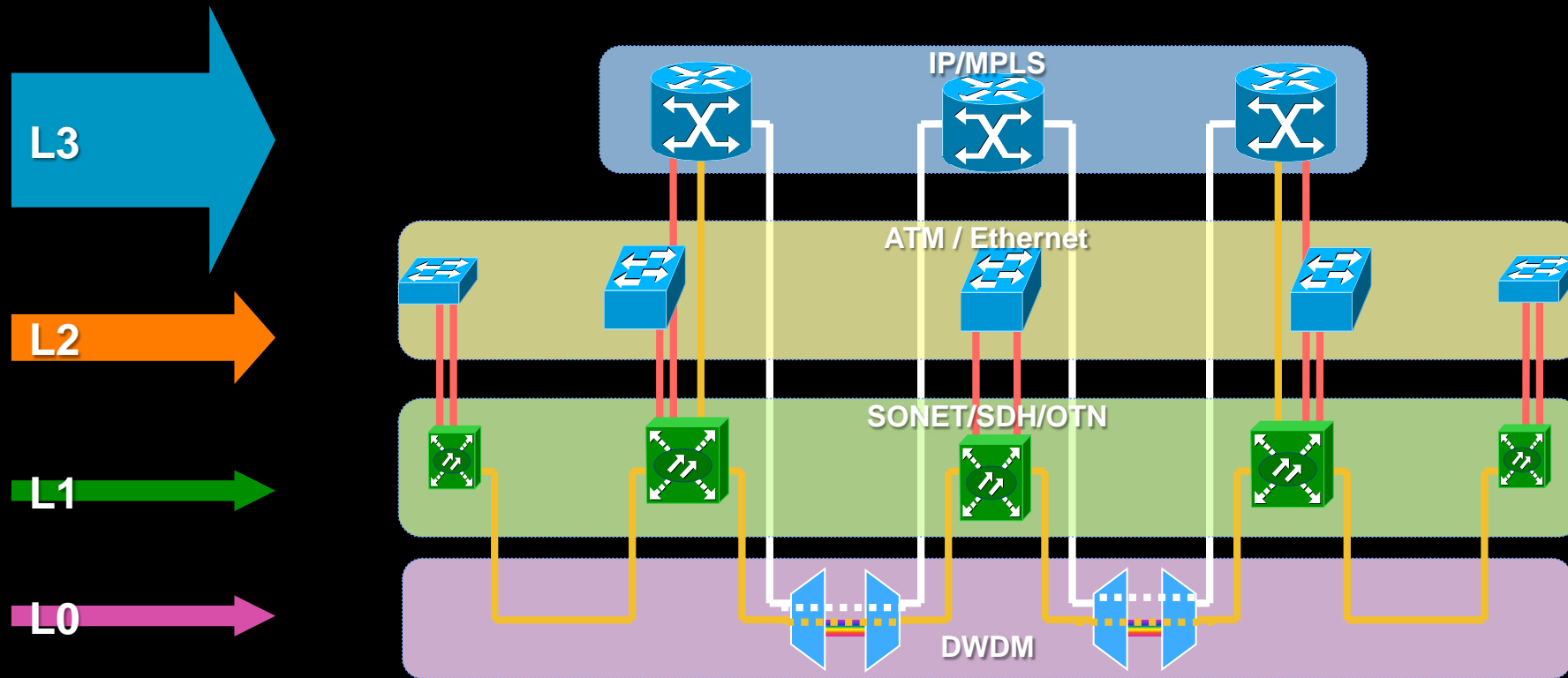
Old Transport is built around even traffic mix



- Supports all traffic
- But is not optimized for any traffic
- Complex to operate (necessary evil)

Rethinking Core Transport

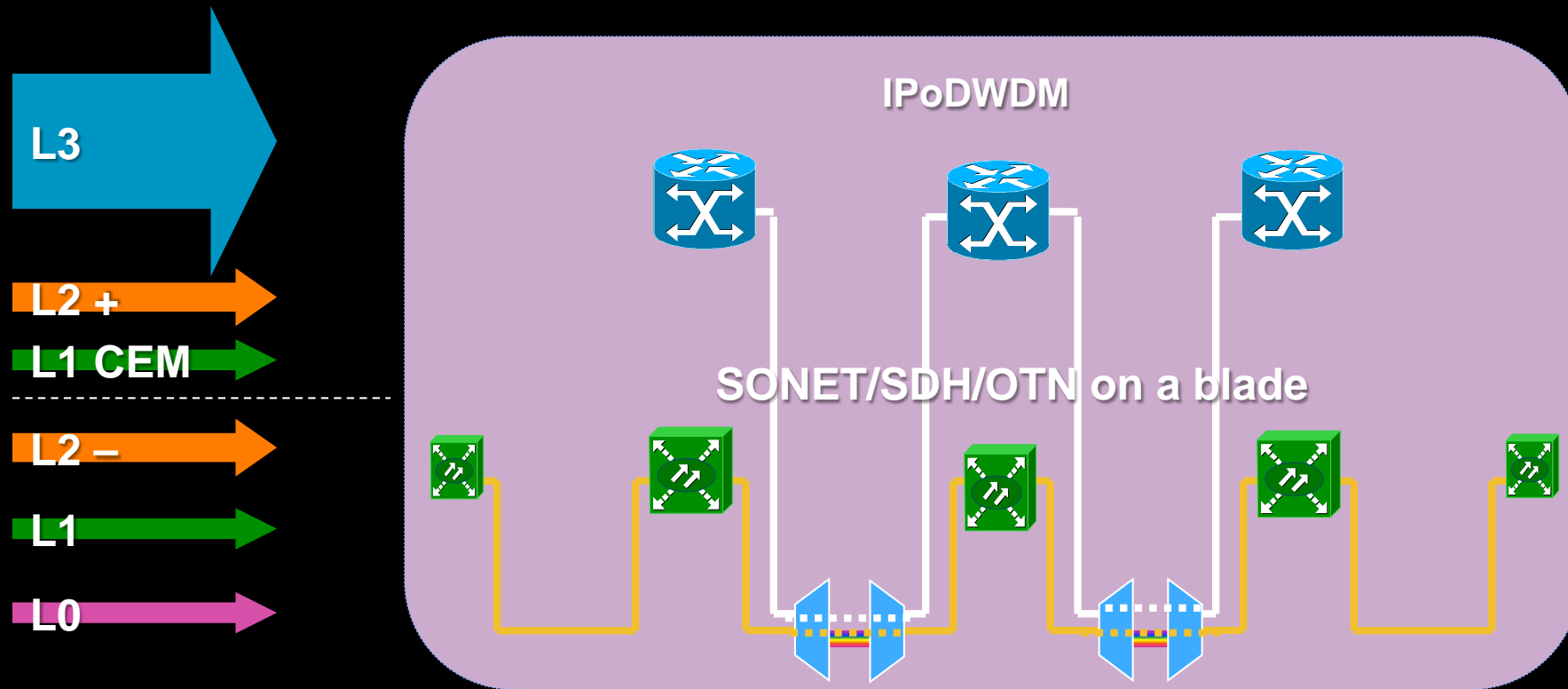
What if traffic mix starts changing?



- High OPEX unjustified
- CAPEX and power higher – spread over multiple technologies
- Sensitive to accurate forecast per service type

Rethinking Core Transport

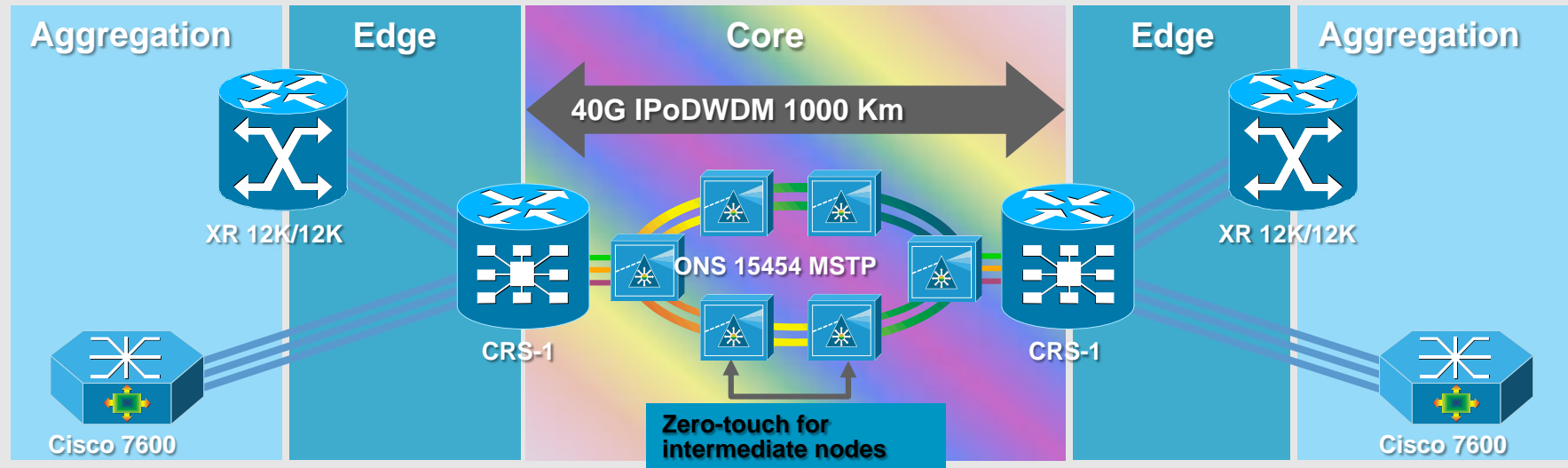
Need to optimize network architecture



- Still supports all traffic
- But is optimized for the high growth / high bandwidth traffic
- Keep the growing part easy to upgrade / maintain
- Lower power consumption due to higher interface efficiencies

Pioneered IPoDWDM Transport

Phase I: Introduced 2005



Increase Service Flexibility

- Faster service provisioning
- New revenue generating services



Manage Traffic Growth Efficiently

- Video / Rich IP Media growth



Increase Reliability

- Meet service level agreements (SLAs) for customer loyalty
- Fewer devices/active components

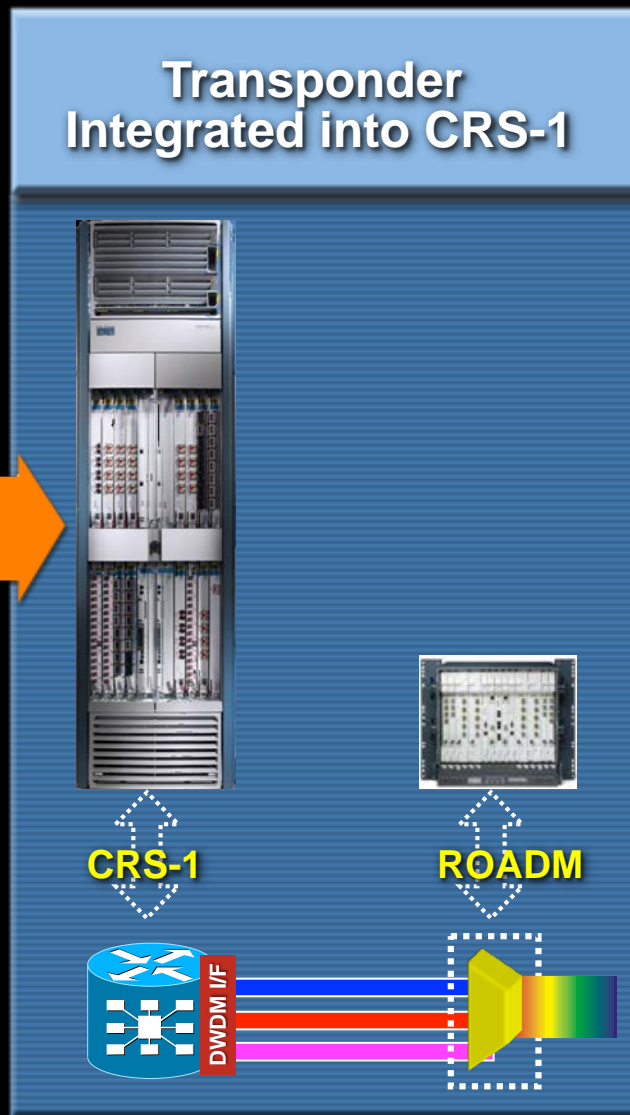
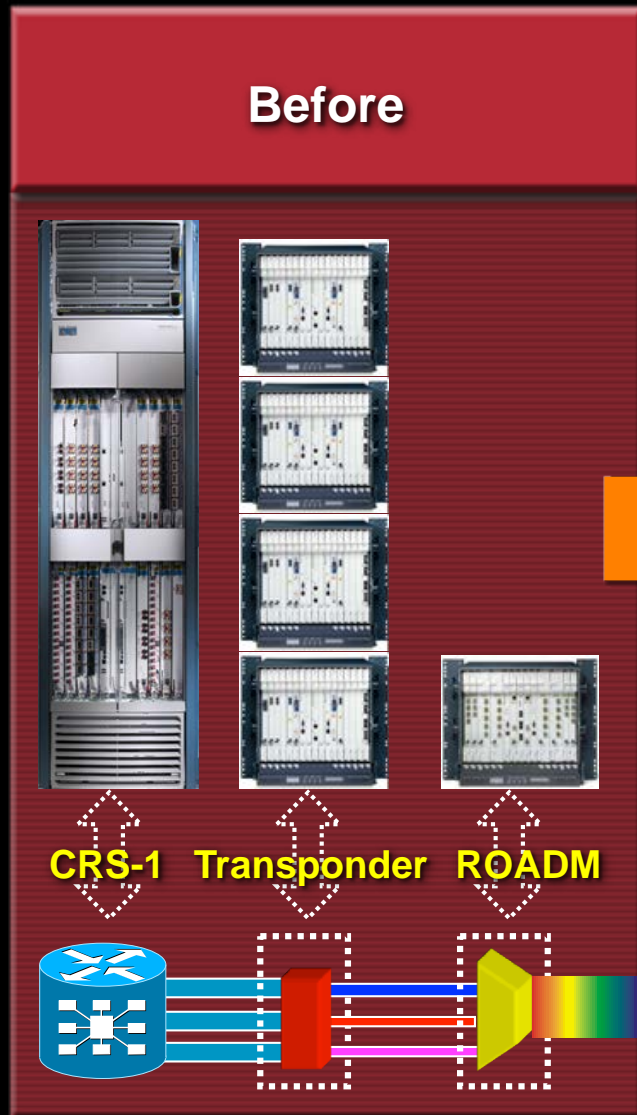


Lower Expenses

- Fewer truck rolls; fewer shelves (Space, cooling, power)
- 50% Optics reduction in the Core

What is IPoDWDM?

Phase I: Features



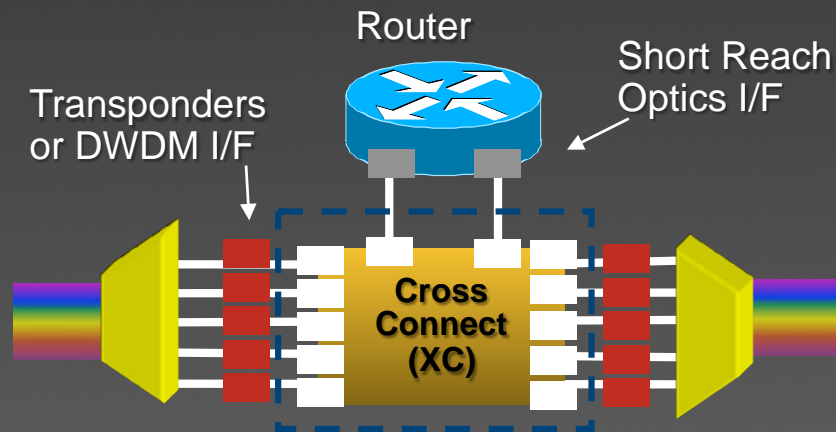
CRS-1 Interfaces
Introduced Dec 2005



What is IPoDWDM?

Growth Options

Old Solution

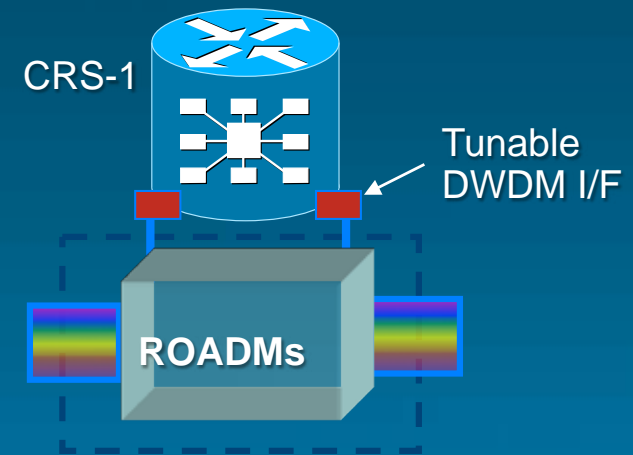


Invest in High Capacity SDH

- 10 transponders needed
- 4-14 Short Reach optics
- Every Lambda OEO
- Add' l transponder & SR for each λ
- Expensive switch w/active electronics

Continue to Invest in XCs & Transponders

Cisco's IPoDWDM Solution



Invest in IPoDWDM

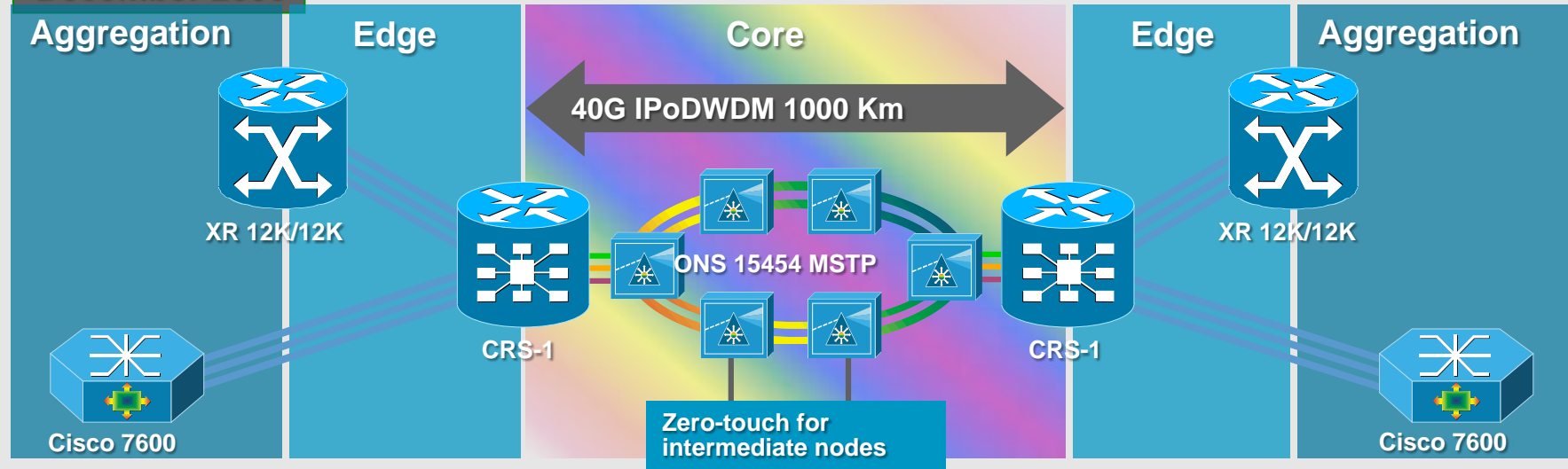
- 0 transponders needed
- 2 Tunable DWDM interfaces in router
- All pass-through traffic stays optical
- ROADM full provisioned, no truck rolls
- Expensive switch eliminated

Eliminate Unnecessary OEO XC & Transponders

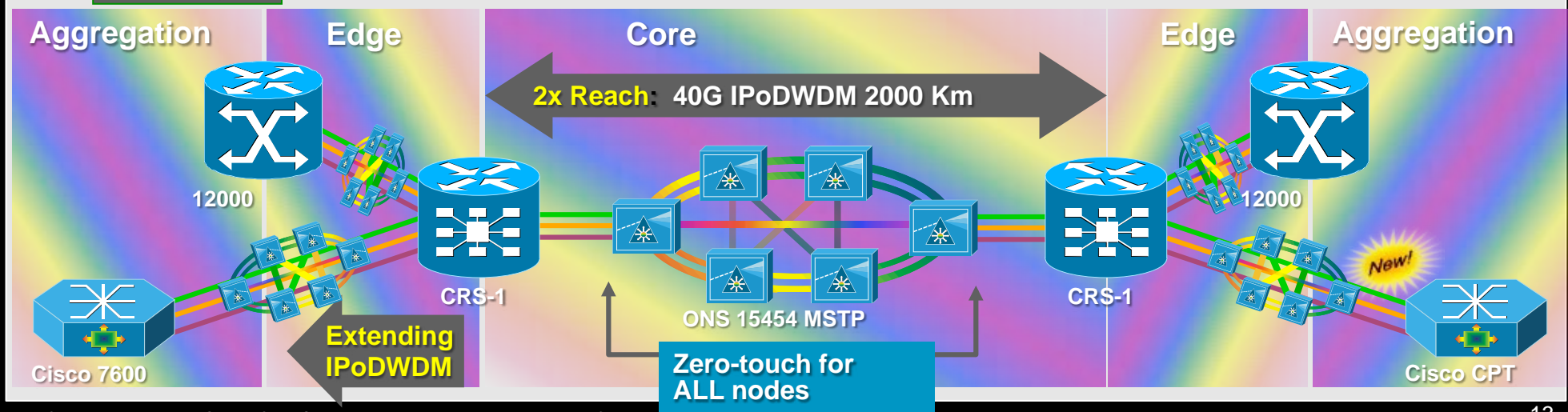
Introducing: IPoDWDM for the approaching Zettabyte Era

Doubling Reach, Extending beyond Core, Zero Touch

December 2005



Today



Some Questions for Network Planning

- What is your main traffic type?
- What are your traffic patterns?
- Is IP Multicast relevant?
- How important is operational simplicity? Control Planes, NMS/OSS?
- How important is sustainability?
- How does your expected traffic look like in 2015 or 2020?

Just in case...

- IP Centric
- IP Multicast
- IP based control plane
MPLS, MPLS/TP
- IPoDWDM
- Don't invest in anything you won't need (e.g. Transponders, unnecessary O-E-O)



CISCO