



Optical + Storage Networking Application

Cisco Systems Korea



welcome

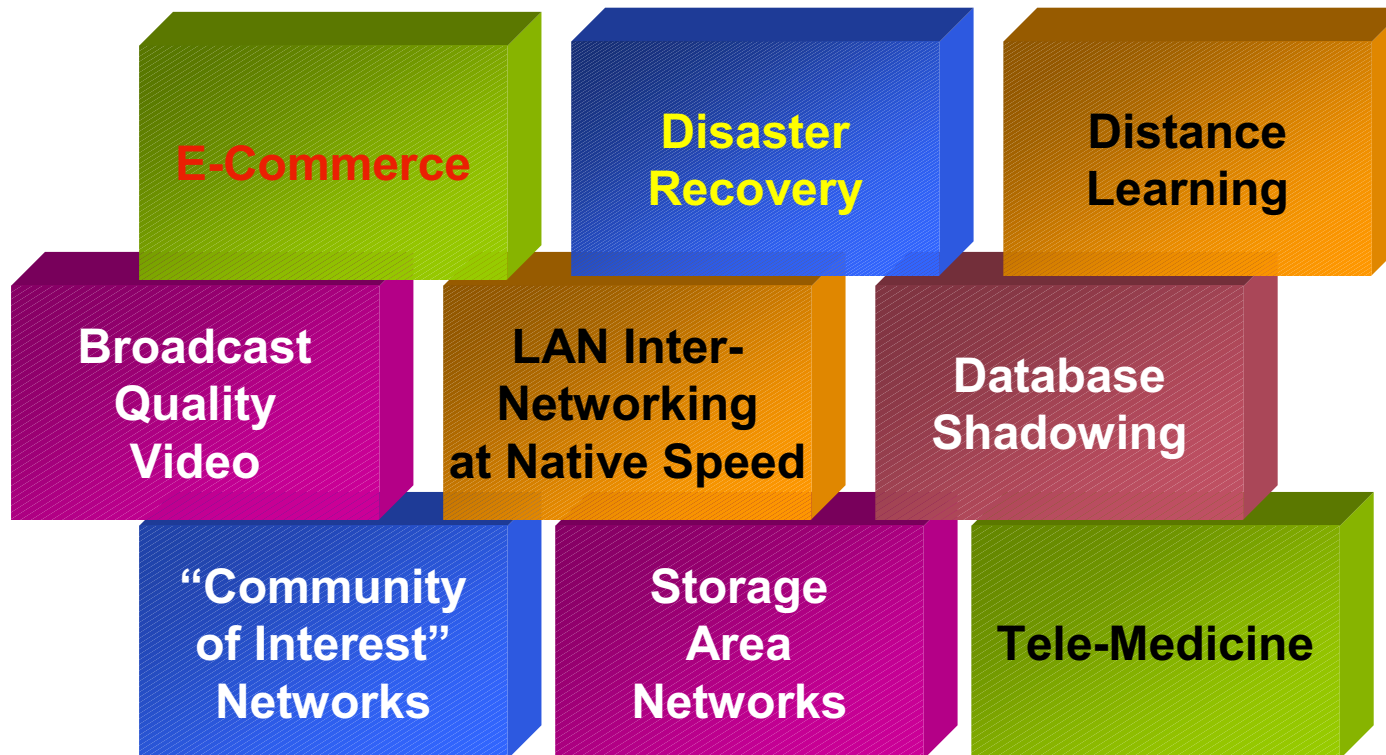


AGENDA

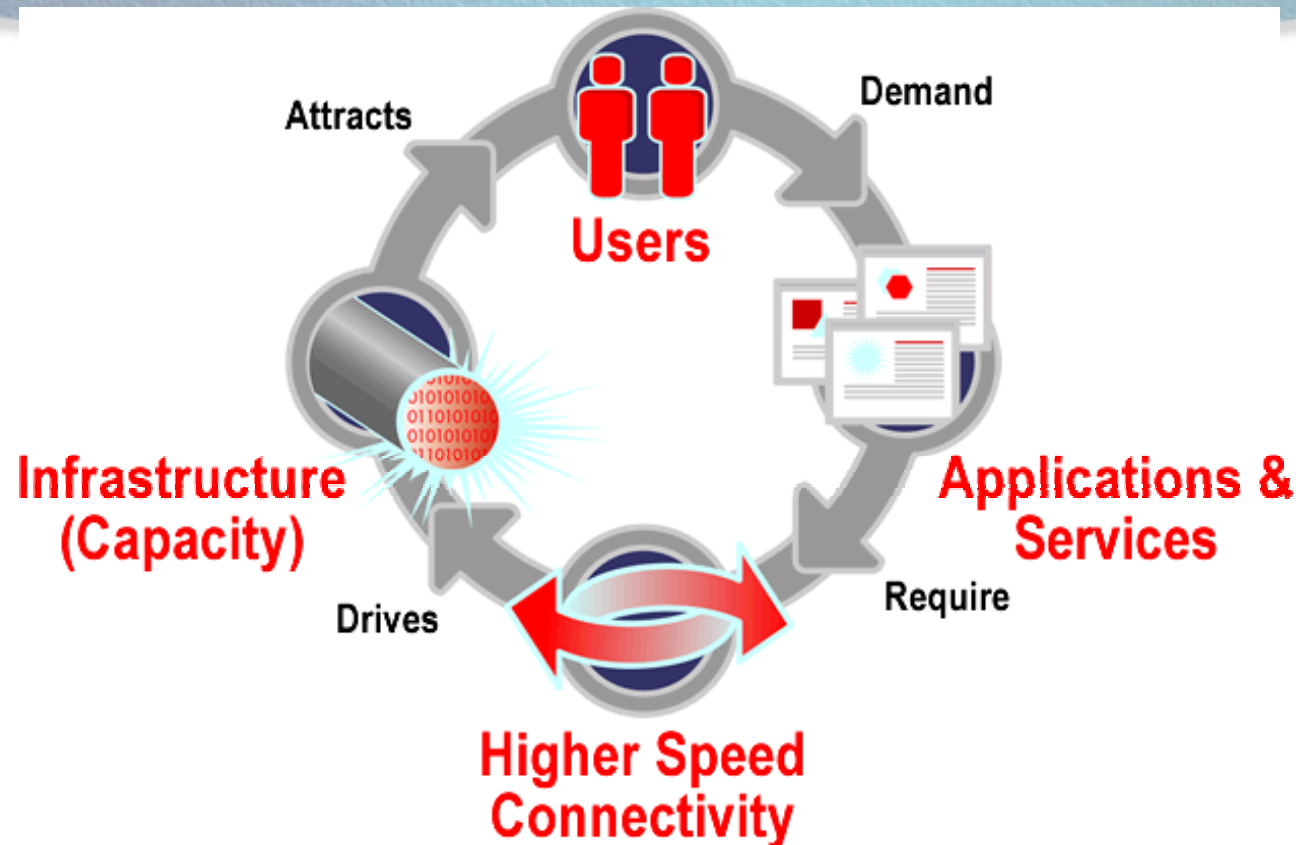
- **Storage Networking Strategy**
- **Storage Networking Solutions**
 - Business Continuance
 - Storage Consolidation
 - Content Distribution
 - Hostage Storage (SP)
- **Products for Optical + Storage Networking**



Emerging Applications



Dynamics of Bandwidth Demand



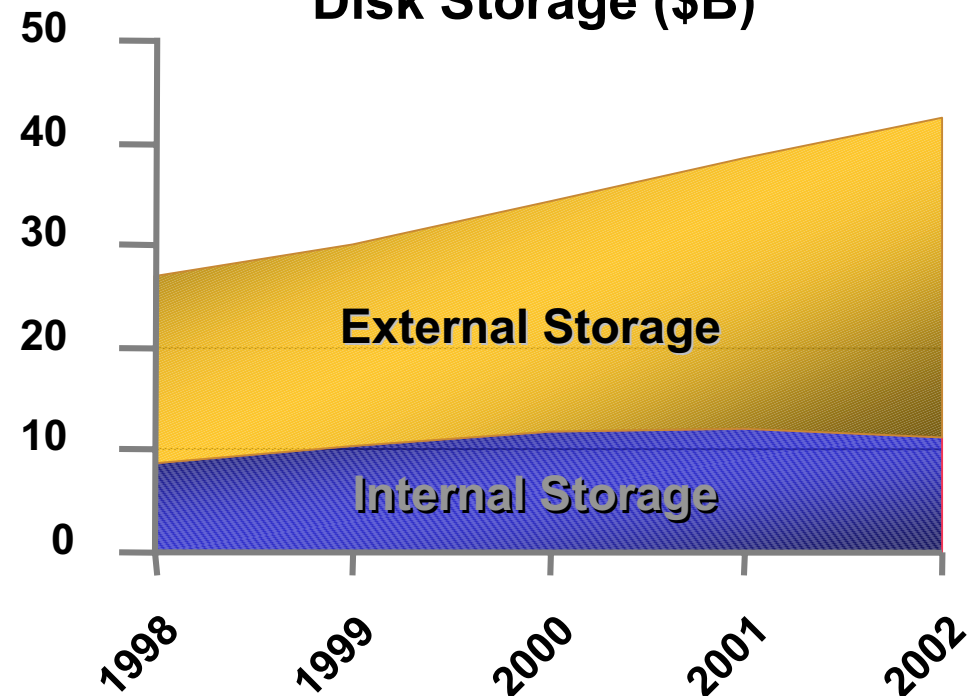
New frontiers of optical fiber and wireless command 50,000 times more communications potential than all the communications we use today – put together (Gilder)

Storage Networking Key Technology Drivers

Most Storage Will Be
Networked by 2005
(SAN or NAS)

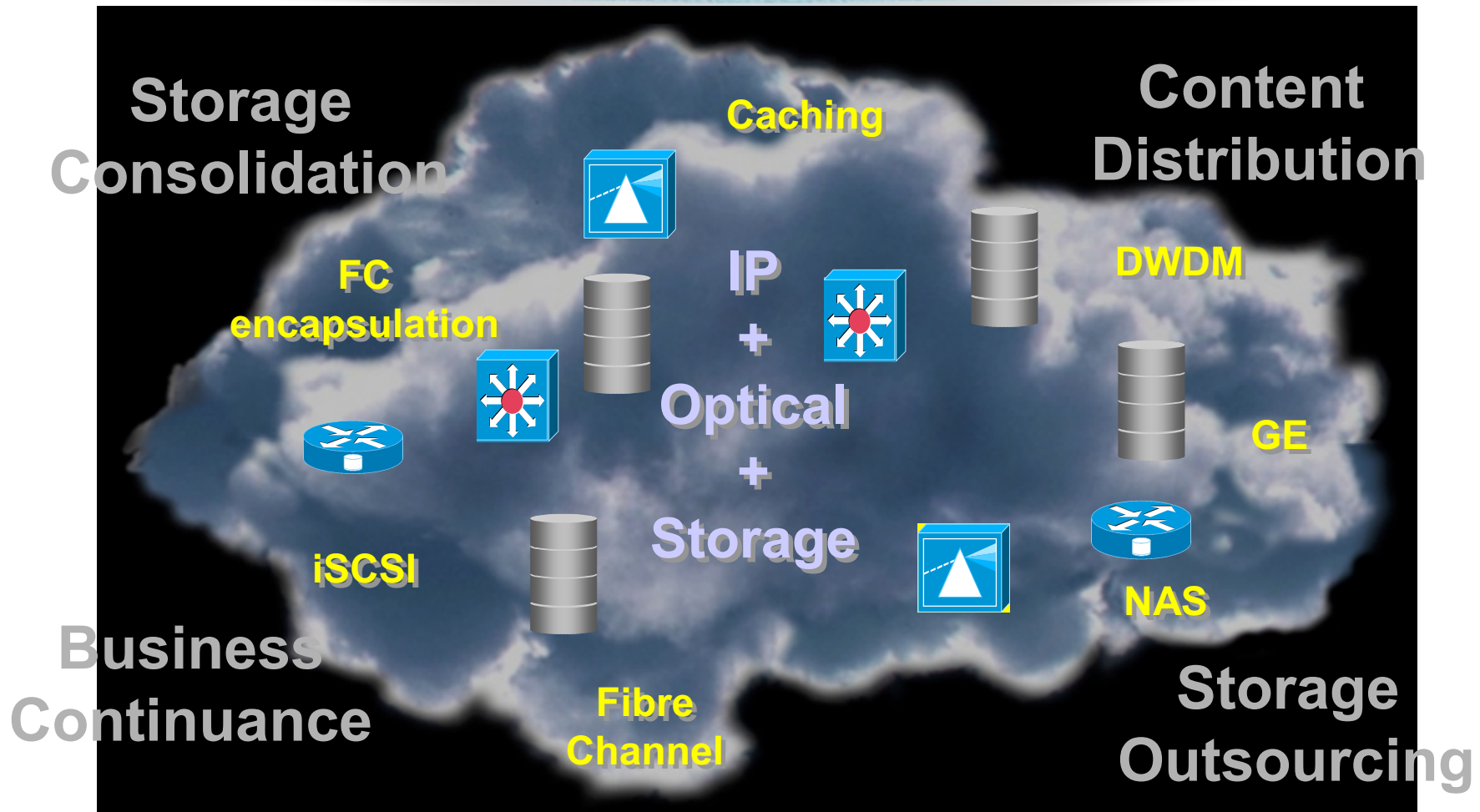
- Externalization of storage on the network
- Acceleration of higher bandwidth networking technologies (IP, Ethernet and Optical)

External vs. Internal
Disk Storage (\$B)



Source: International Data Corporation

Cisco Storage Networking (CSN) Goals

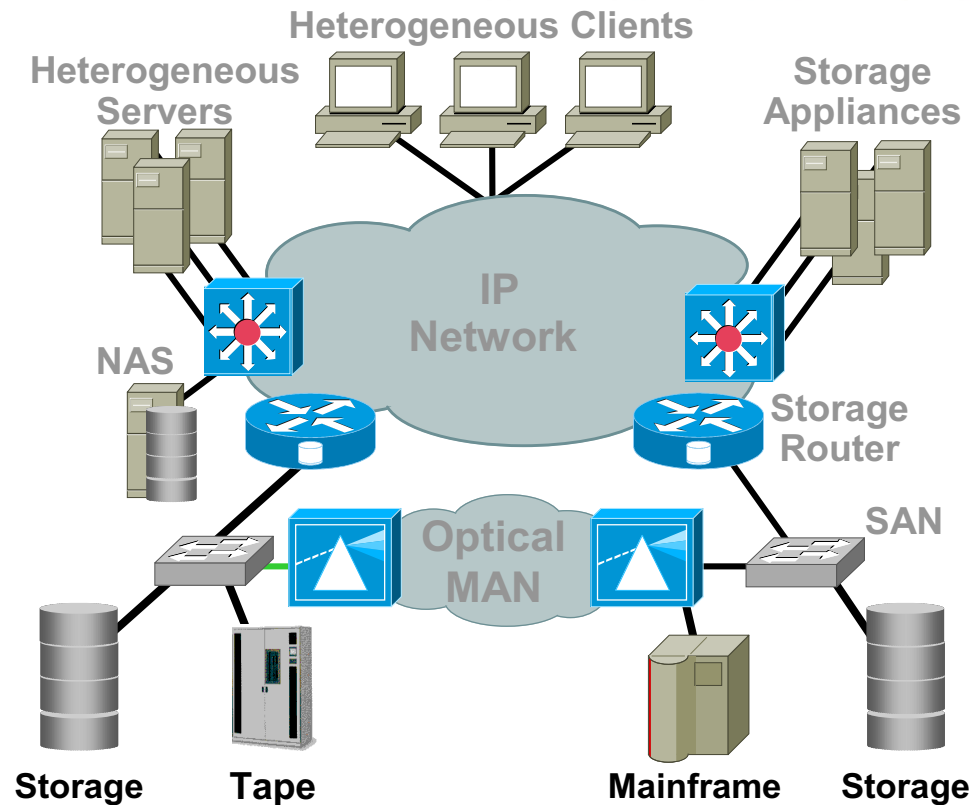


Develop leadership position in storage networking market through open standards-based technologies

Cisco Storage Networking - Strategy

- Drive open standards-based IP and optical technologies for accessing and distributing data
- **Partner with storage industry leaders to develop solutions and technologies**
- Reliable & cost efficient Metro Optical Solutions for disaster recovery and SAN extension
- Integrate storage networking applications with IP Fabric
- **Enable direct network access to storage/content (CDN) (web, images, audio, video)**

Networking + Storage + Partners

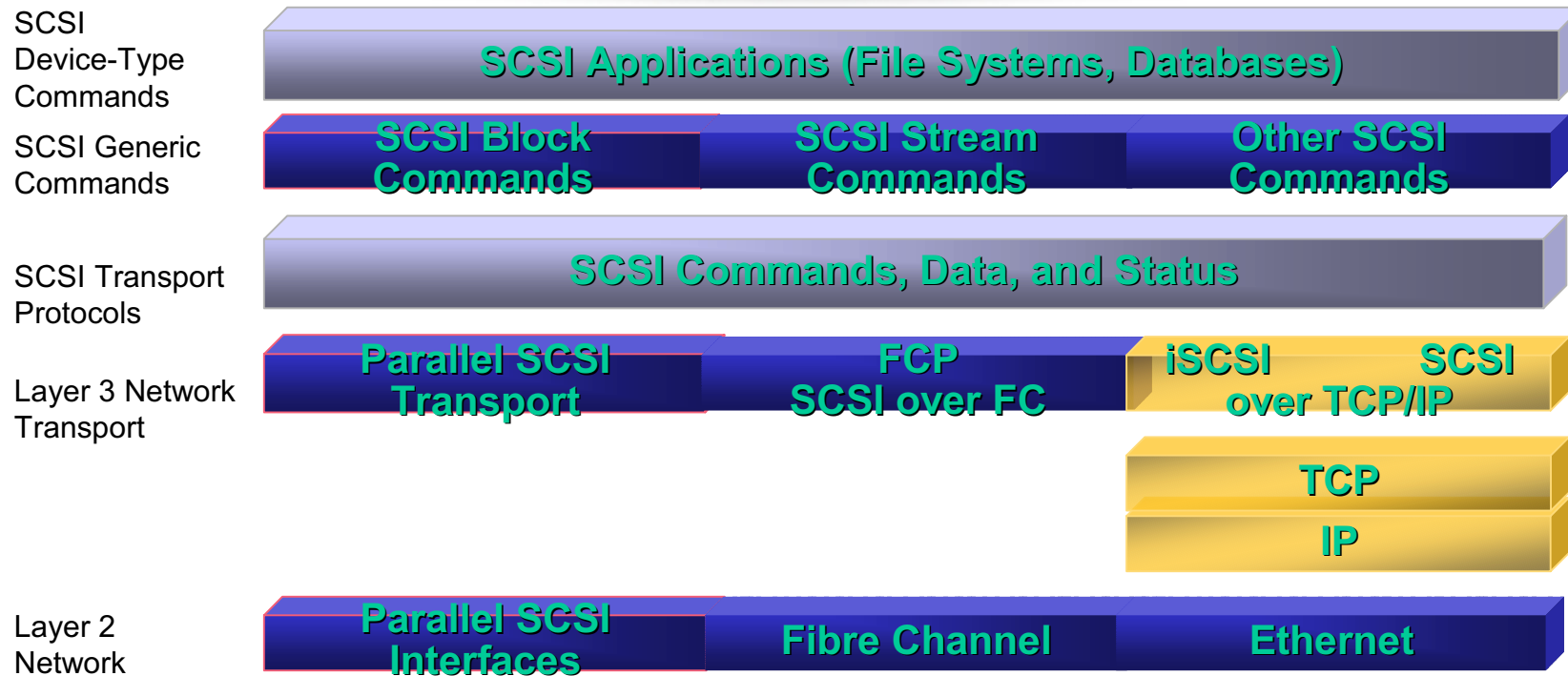


Network Storage Pool

Accelerate convergence of networking and storage technologies based on an open architecture

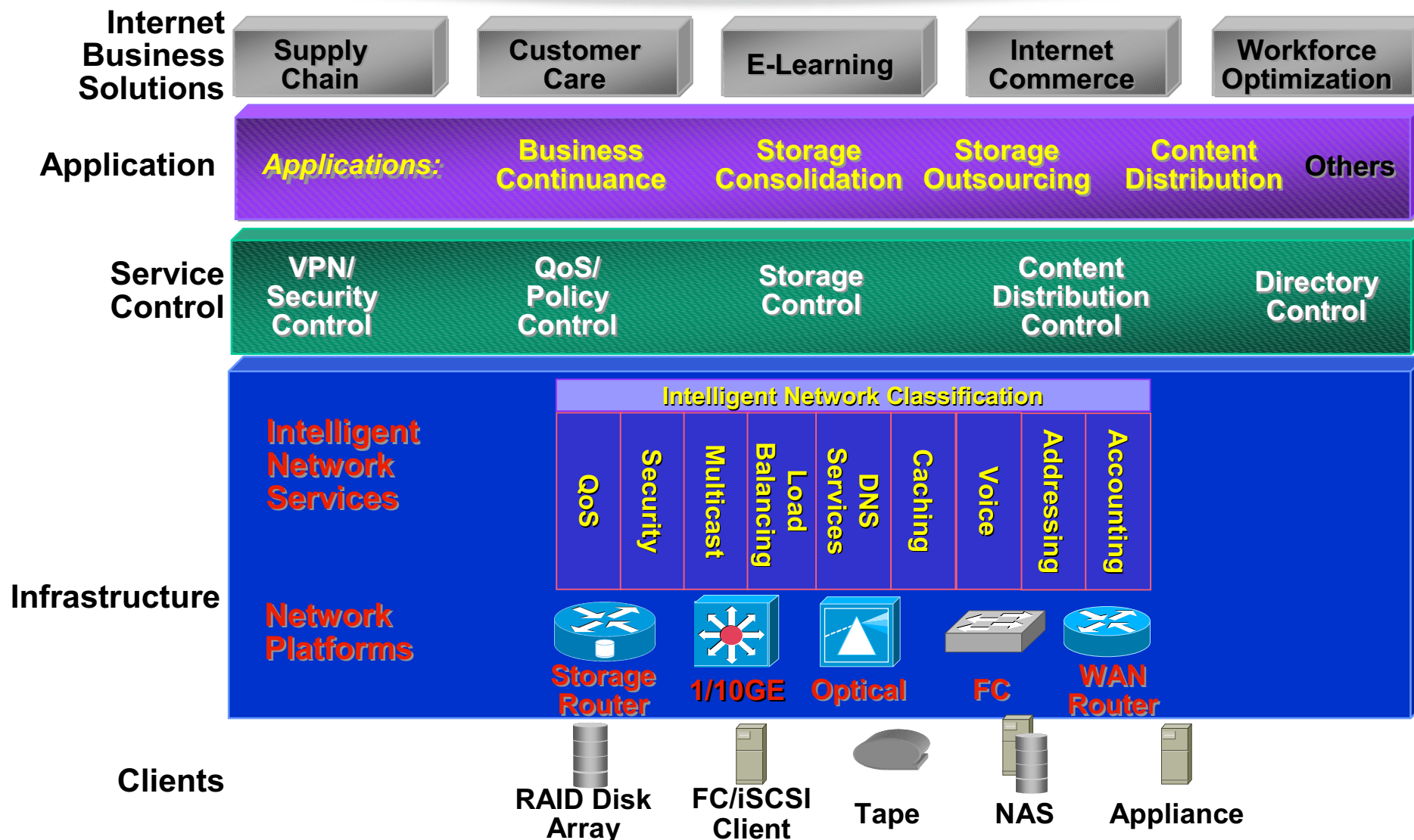


Based on Open Standards



- **IETF IP Storage (IPS) Working Group ; iSCSI, FCIP**
- **Storage Networking Industry Association (SNIA)**
 - **SNIA IP Storage Forum**

Cisco AVVID Building Blocks for Storage Networking





Storage Networking Solutions

- Business Continuance
- Storage Consolidation
- Content Distribution
- Hostage Storage (SP)



Storage Networking Solutions

Business Continuance

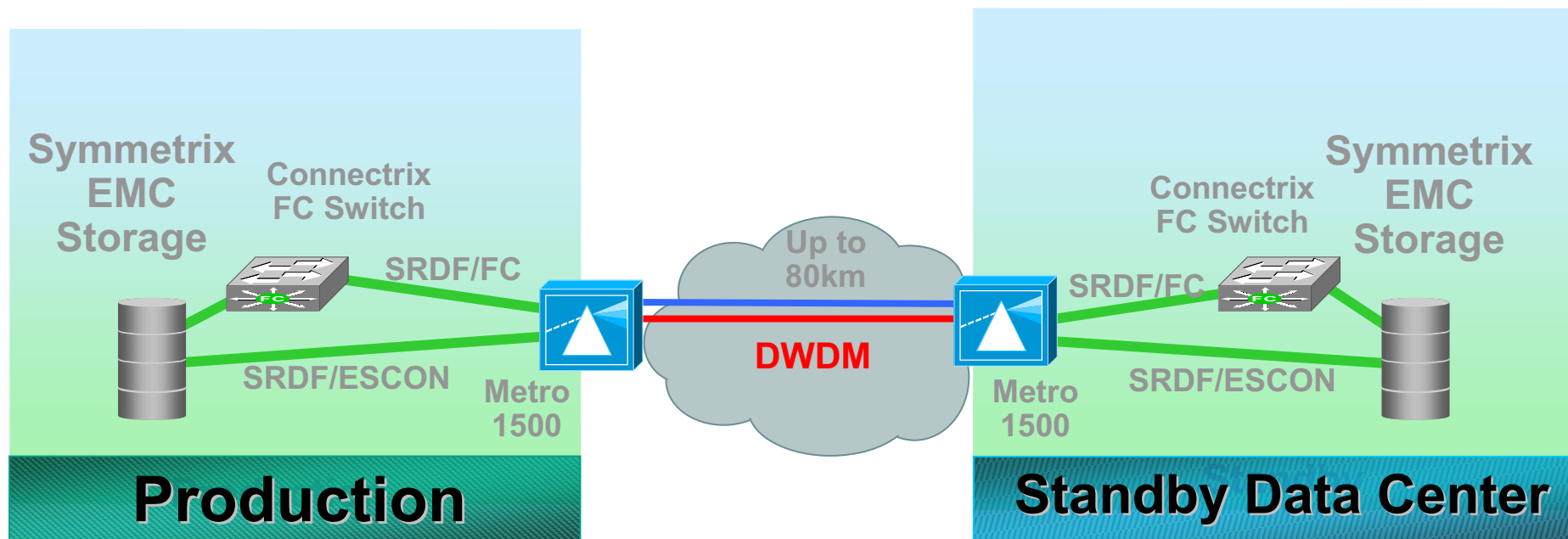
Customer Solution	Networking Technologies
Business Continuance - Replication - sync/async - Backup	•Optical (FC or GE) •Storage over WAN
Storage Consolidation - heterogeneous access to/mgmt shared storage, virtual storage	•Optical (FC or GE) •NAS,NFS,VI •IP Access to Storage
Content Distribution (SP) - Optimized Internet performance	•Storage over WAN •Caching/Storage integration •New Data Center
Hosted Storage(SP) - Small/medium, Datawarehousing/ backup	•Optical (FC or GE) •Storage over WAN •NAS, SCSI over IP

Metro Applications with EMC:

Metro - Mirroring

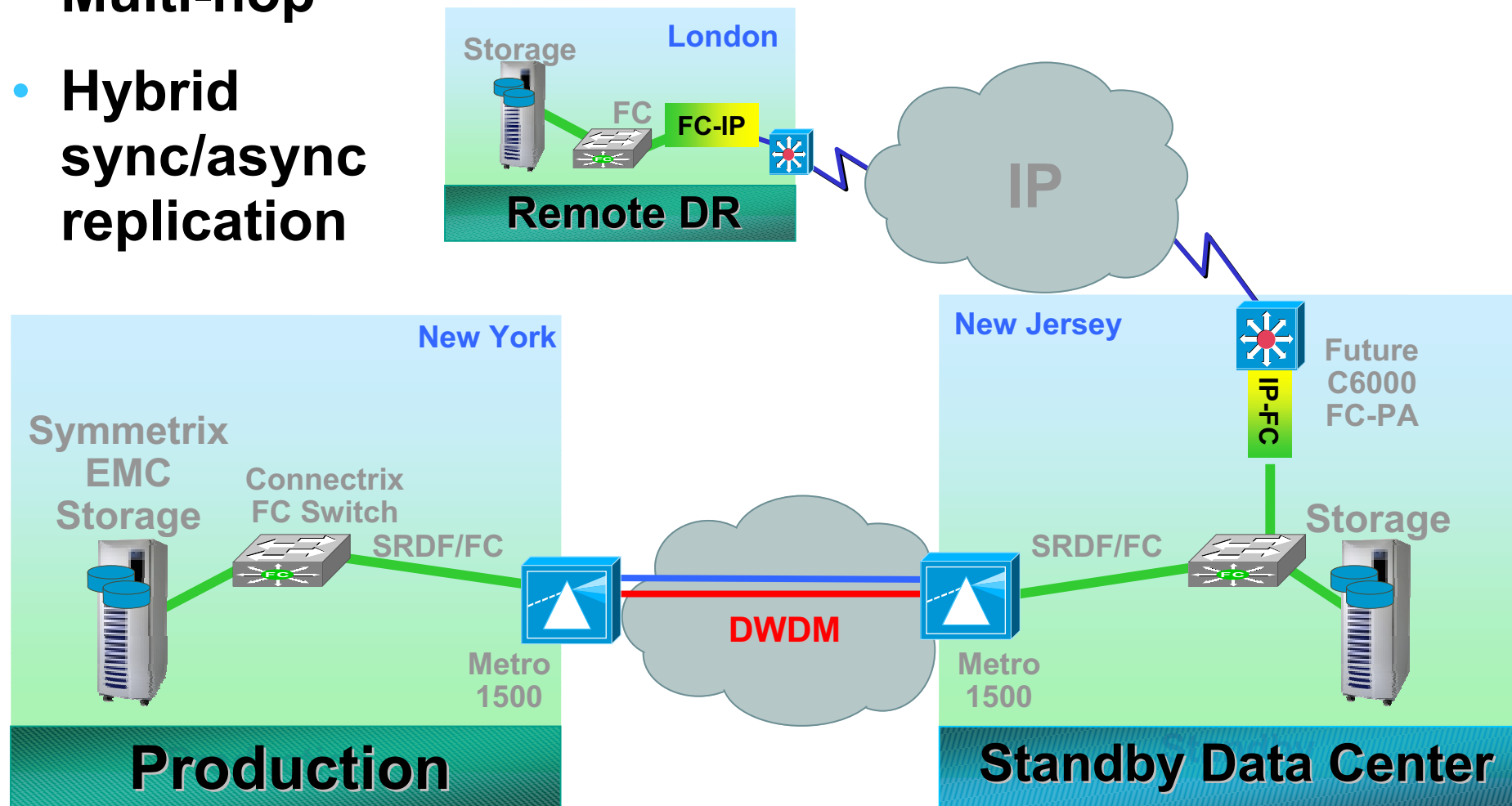


- Sync mirroring - Disaster Recovery
- Async mirroring - backup, archiving, app testing
- SRDF over ESCON - direct connect
- SRDF over FC - via Connectrix (Brocade) switch



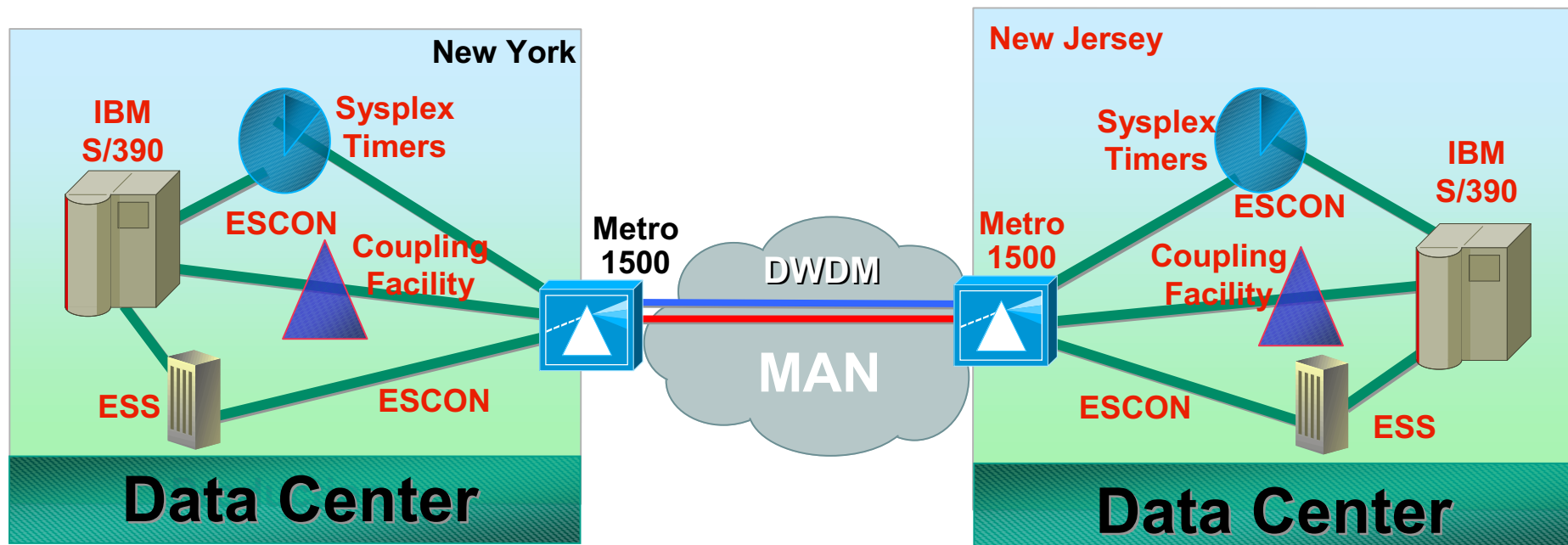
Remote Mirroring - Sync/Async

- Multi-hop
- Hybrid sync/async replication



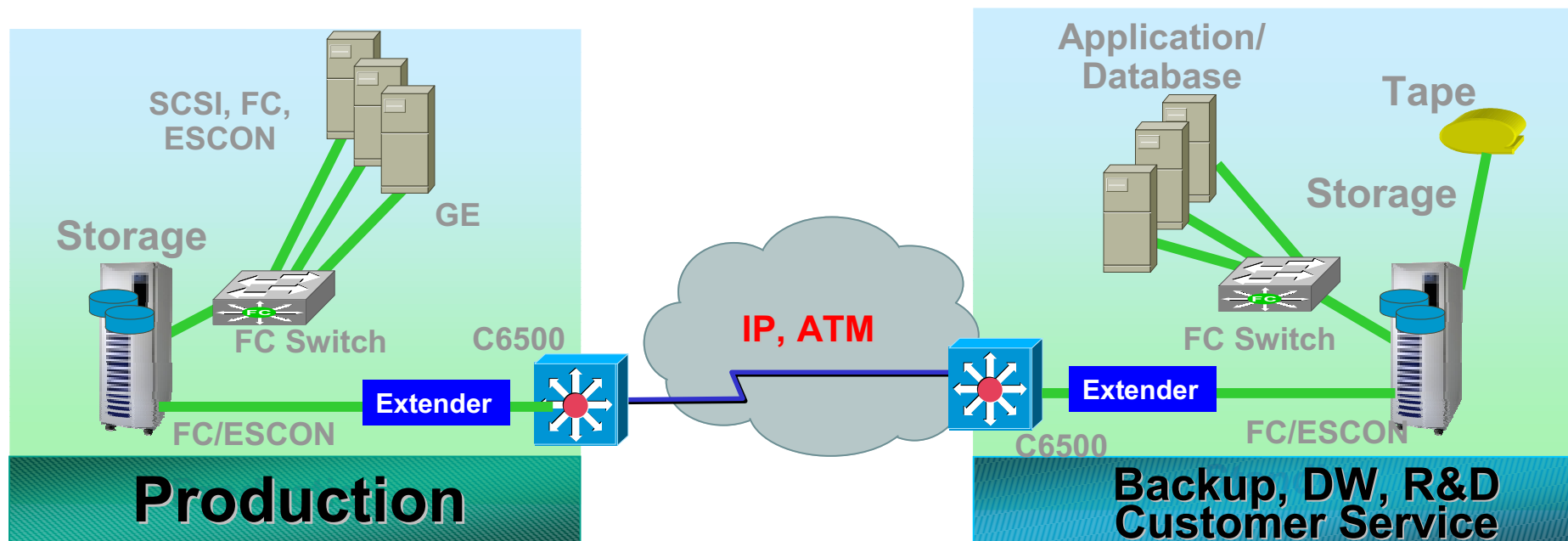
Metro Applications with IBM: Availability and Balancing

- Sync mirroring—disaster recovery
- Continuous application availability
- Workload balancing



Storage-to-storage over WAN Today

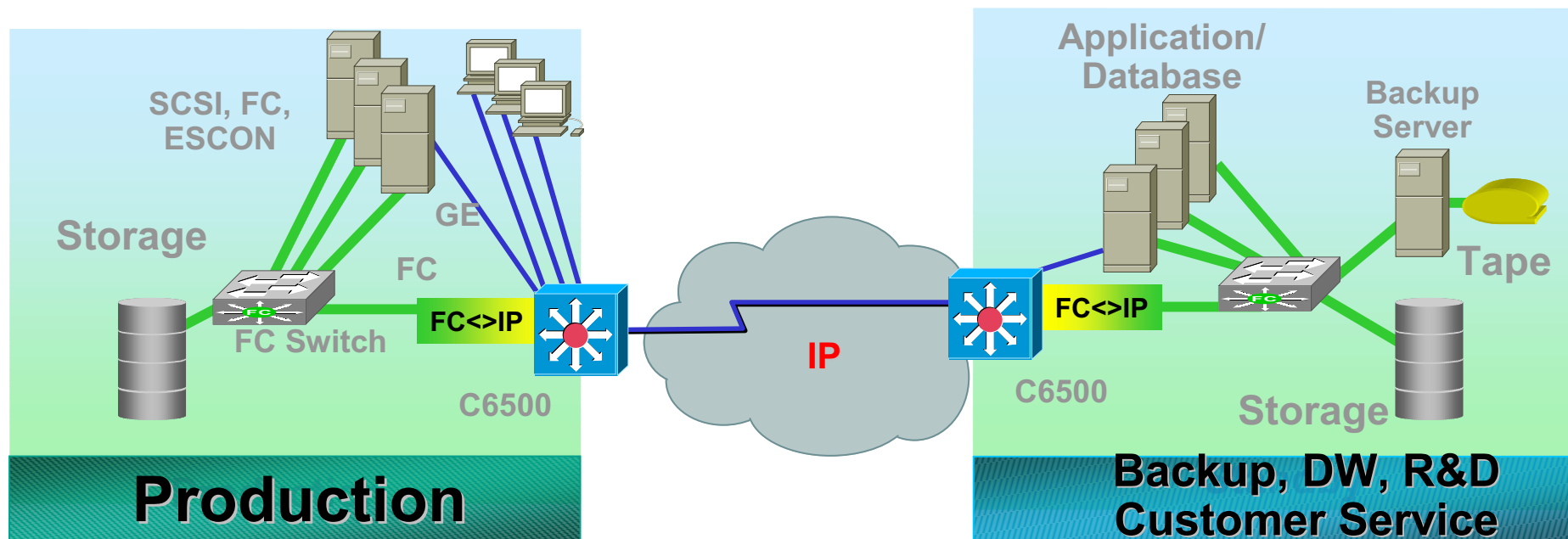
- ESCON or Fibre Channel over IP or ATM
- 3rd party WAN extension devices e.g. CNT
- **Reference Designs**



Brocade Partnership

Fibre Channel Extension over IP

- Uniting SAN islands
- Fibre Channel over IP
- TCP Termination supports WAN
- **Future** Catalyst 6000 Blade

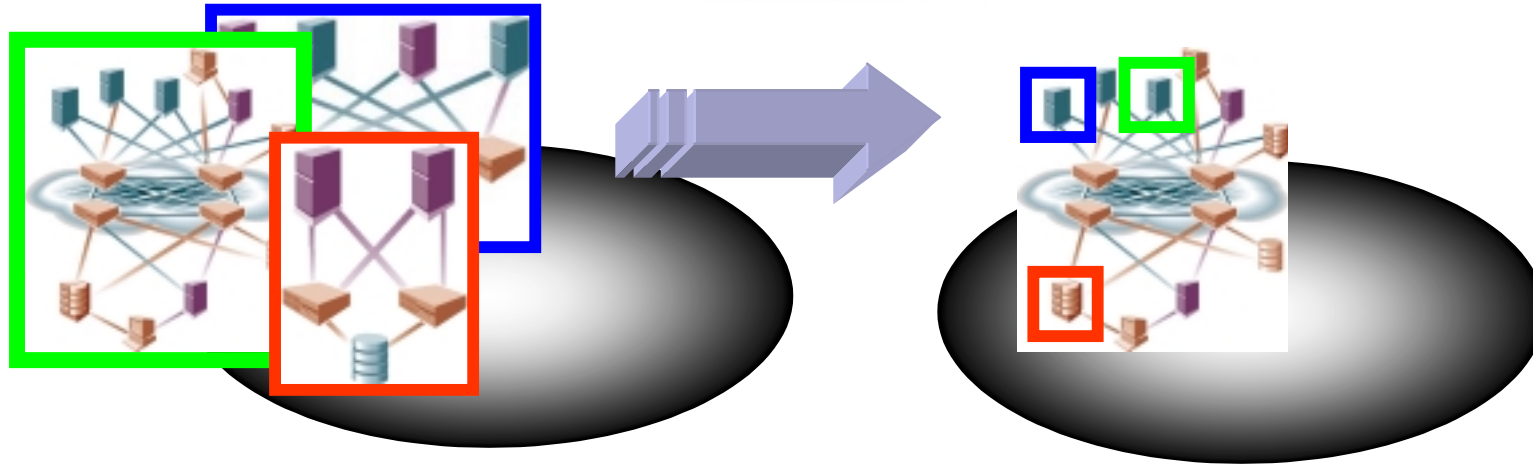


Storage Networking Solutions

Storage Consolidation

Customer Solution	Networking Technologies
Business Continuance - Replication - sync/async - Backup	•Optical (FC or GE) •Storage over WAN
Storage Consolidation - heterogeneous access to/mgmt shared storage, virtual storage	•Optical (FC or GE) •NAS,NFS,VI •SCSI over IP
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Benefits of Storage Consolidation

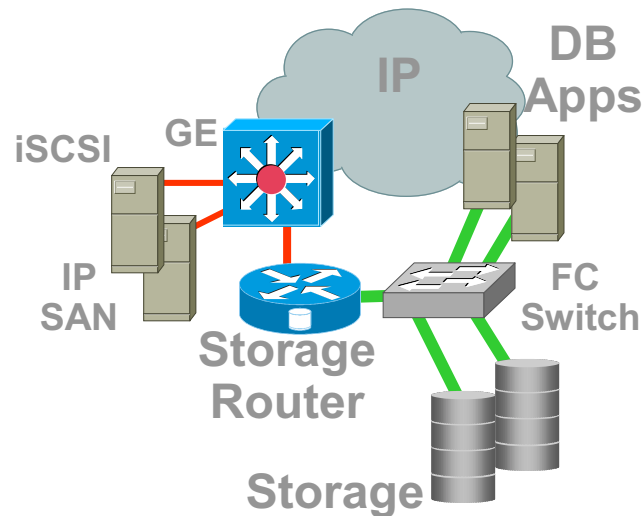


- **Reduction in data management costs**
(from 55% to 15% of total storage budget - IDC)
- **Ability to share, manage and protect data across the enterprise**
- **Improved storage scalability**

IP Access to Storage SAN or NAS your Choice

SAN

- **SCSI-like** block level operations
- High performance DB and applications
- Limited sharing of information
- Fibre Channel or iSCSI/IP

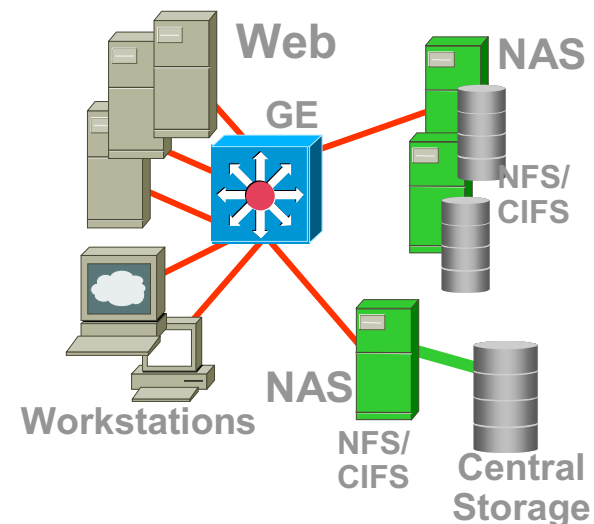


SAN forecast: \$14B market by 2003 (IDC)

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NAS

- File level operations
 - NFS/CIFS/HTTP
- File sharing, web, e-mail, collaboration
- Easy extension over IP data networks

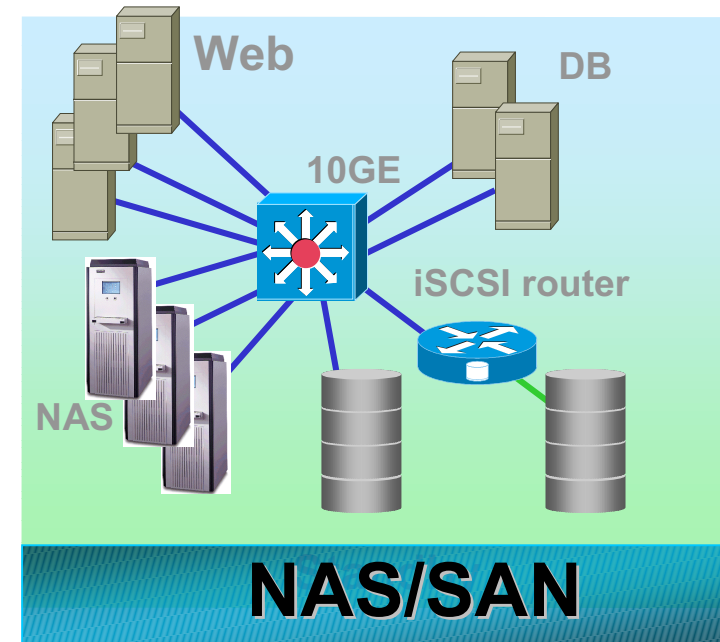
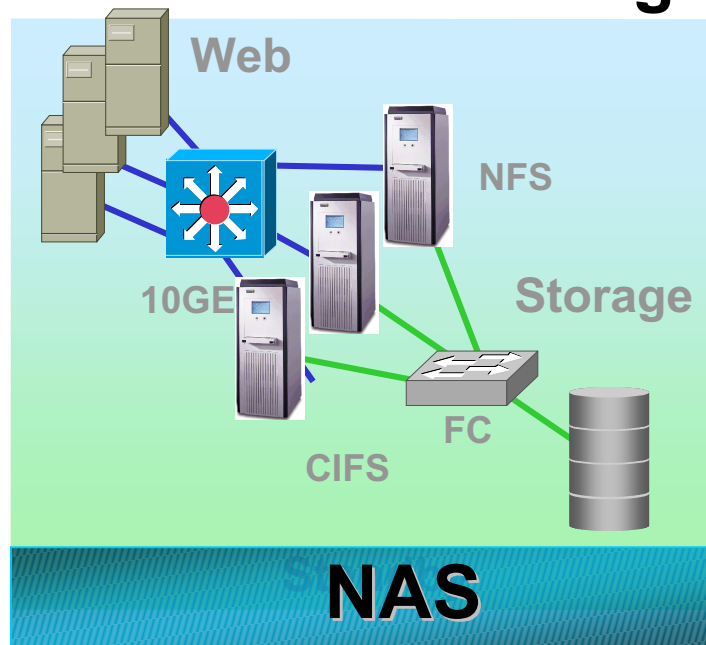


NAS forecast: \$6.5B market by 2003 (IDC)

Cisco Systems - Confidential 20

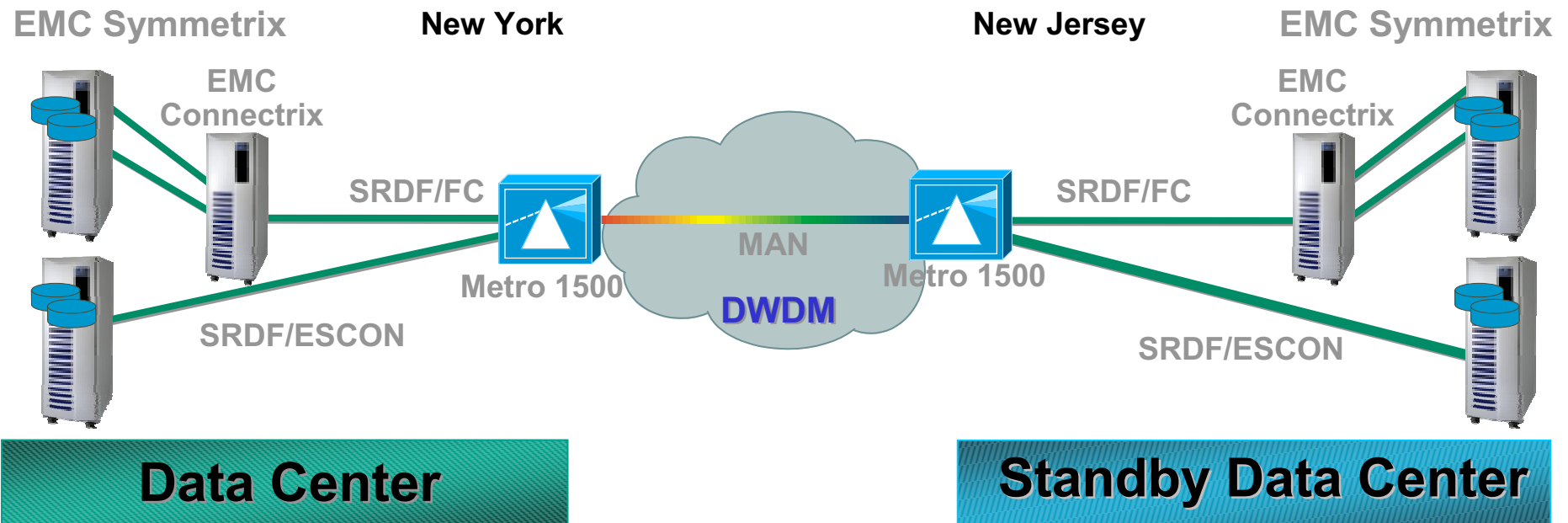
NAS Evolution

- Reference architectures with EMC and NetApps
- Improving performance
 - 10GE, VI over TCP.....
- Cross platform file sharing/virtualization
 - DAFS, Metadata Controllers
- NAS/SAN integration

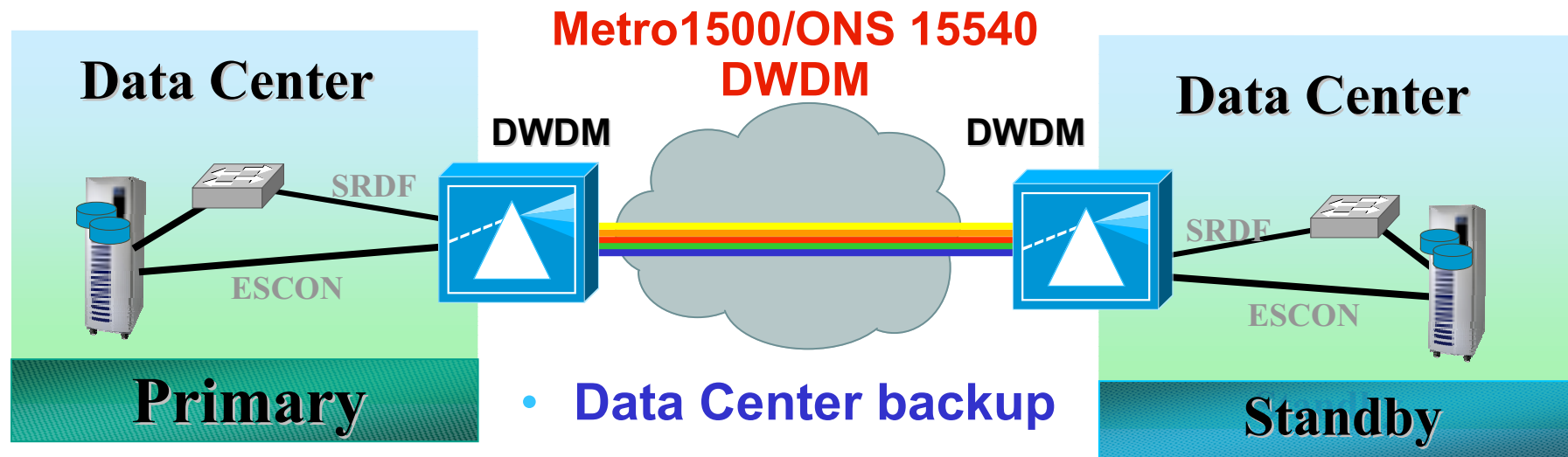


Business Continuance

Sync Mirroring



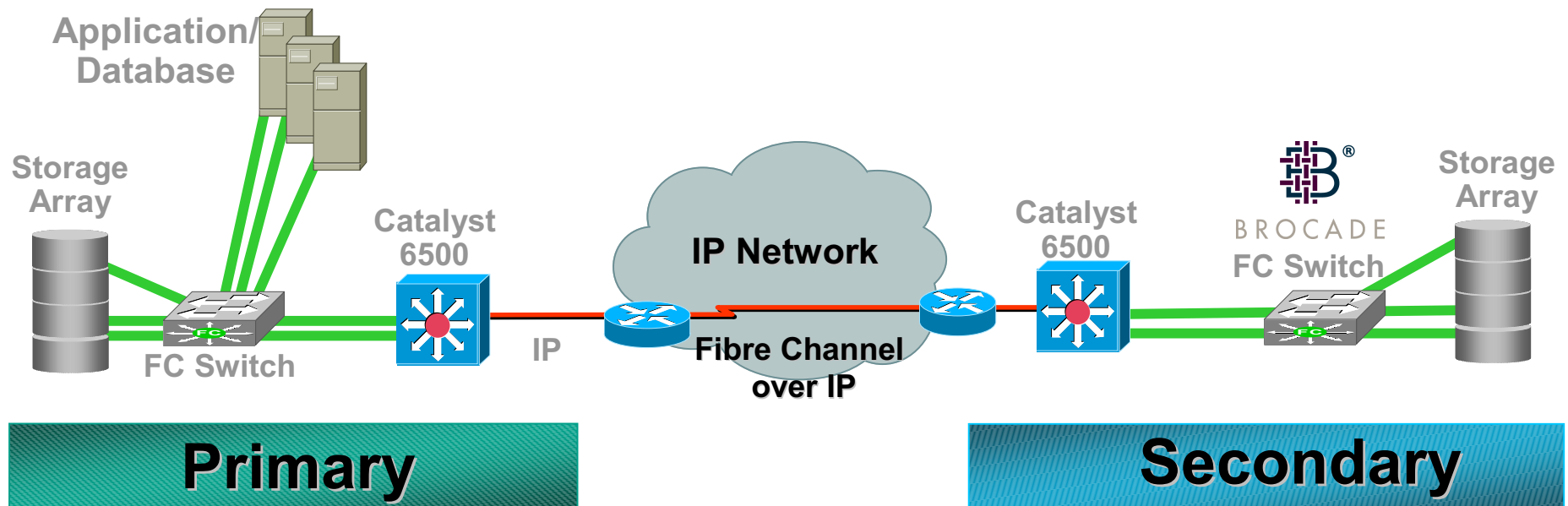
Disaster Recovery over Metro Optical Business Continuance



- Data Center backup
- Disaster Recovery
- Remote mirroring
- Tape vaulting
- Remote printing
- Channel extension

Storage-to-storage over WAN FCIP

- Uniting SAN islands
- Fibre Channel over IP (FCIP) - IETF Proposal
- TCP Termination supports WAN
- Future Catalyst 6000 Blade

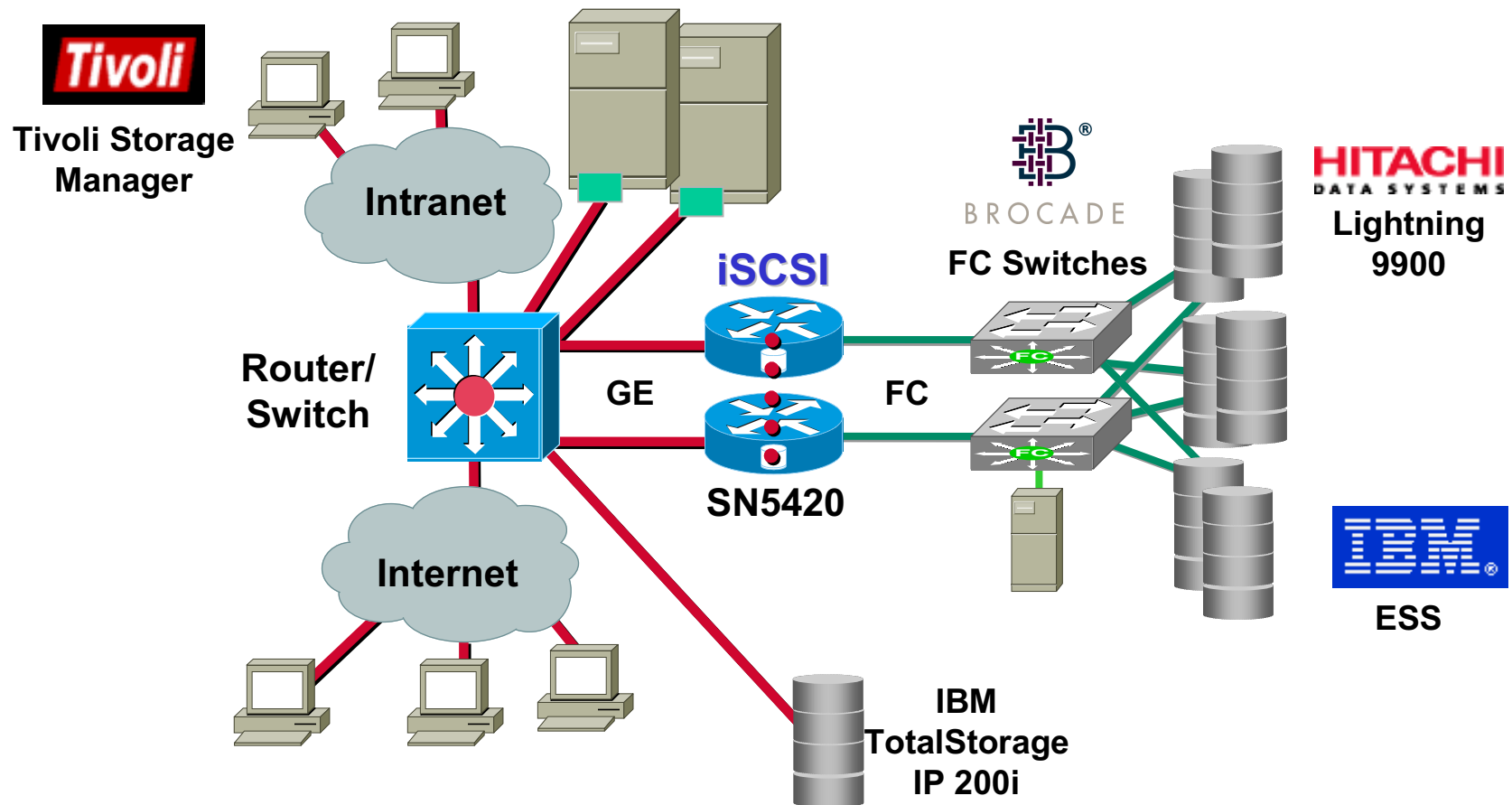


Why IP Access to Storage ?

- **Ubiquitous nature of IP**
 - access storage from LAN, MAN, WAN, Internet
 - economy of scale
- **Scalability**
 - distance, node count, performance (GE/10GE), expertise
- **Single access technology**
- **Manageable, secure and interoperable**
 - (SNMP, MIBs, DNS, LDAP, tools)
 - (IPSEC, VLANs, ACLs, Firewalls)
- **Massive R&D investment in Ethernet/IP**

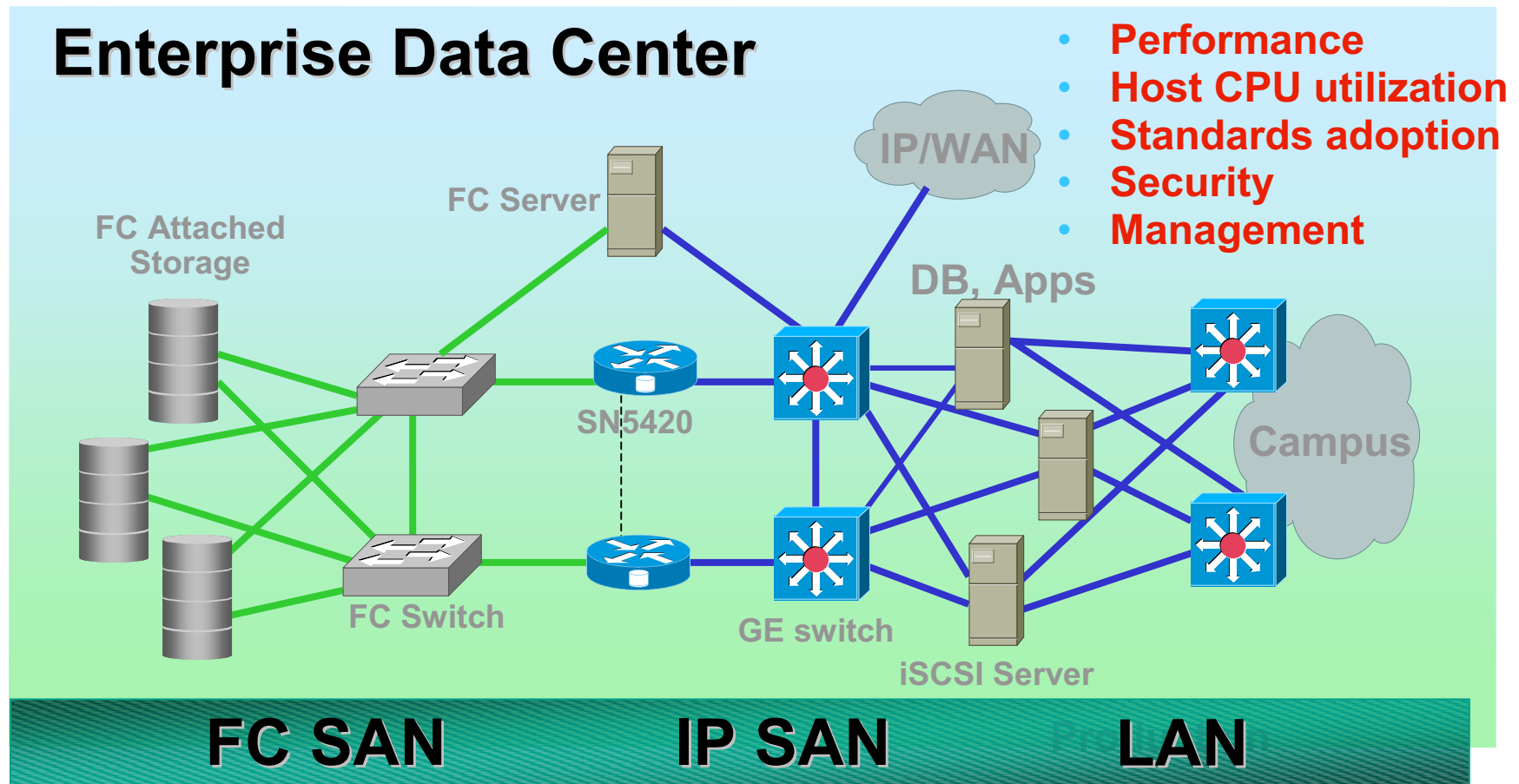
Storage Consolidation

IP Access to Centralized Storage Pool



IP SAN Phased Migration Phase 1 Q2 FY01

Block Access over IP Network FC-iSCSI Router Appliance



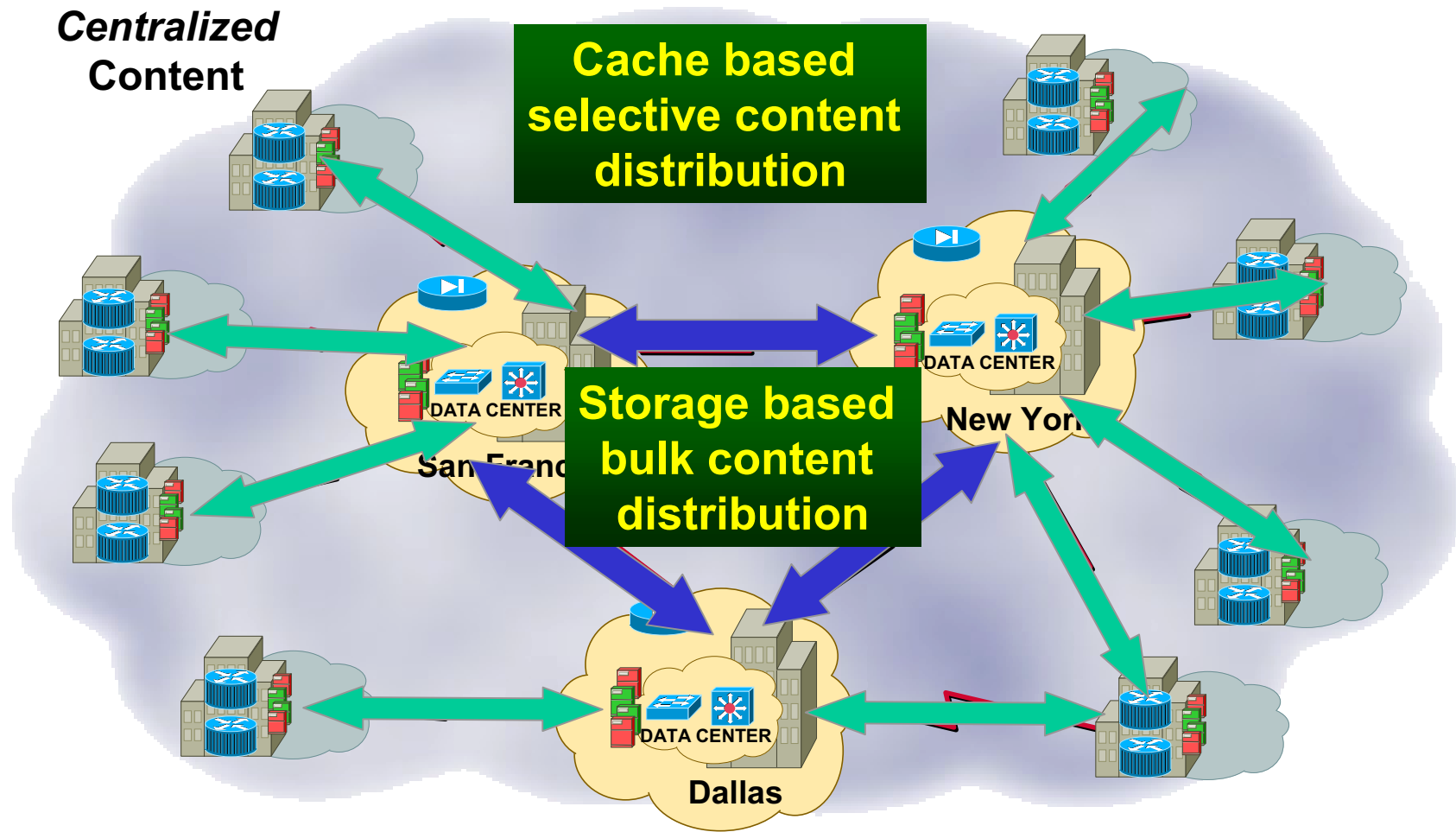
Storage Networking Solutions

Content Distribution (SP)

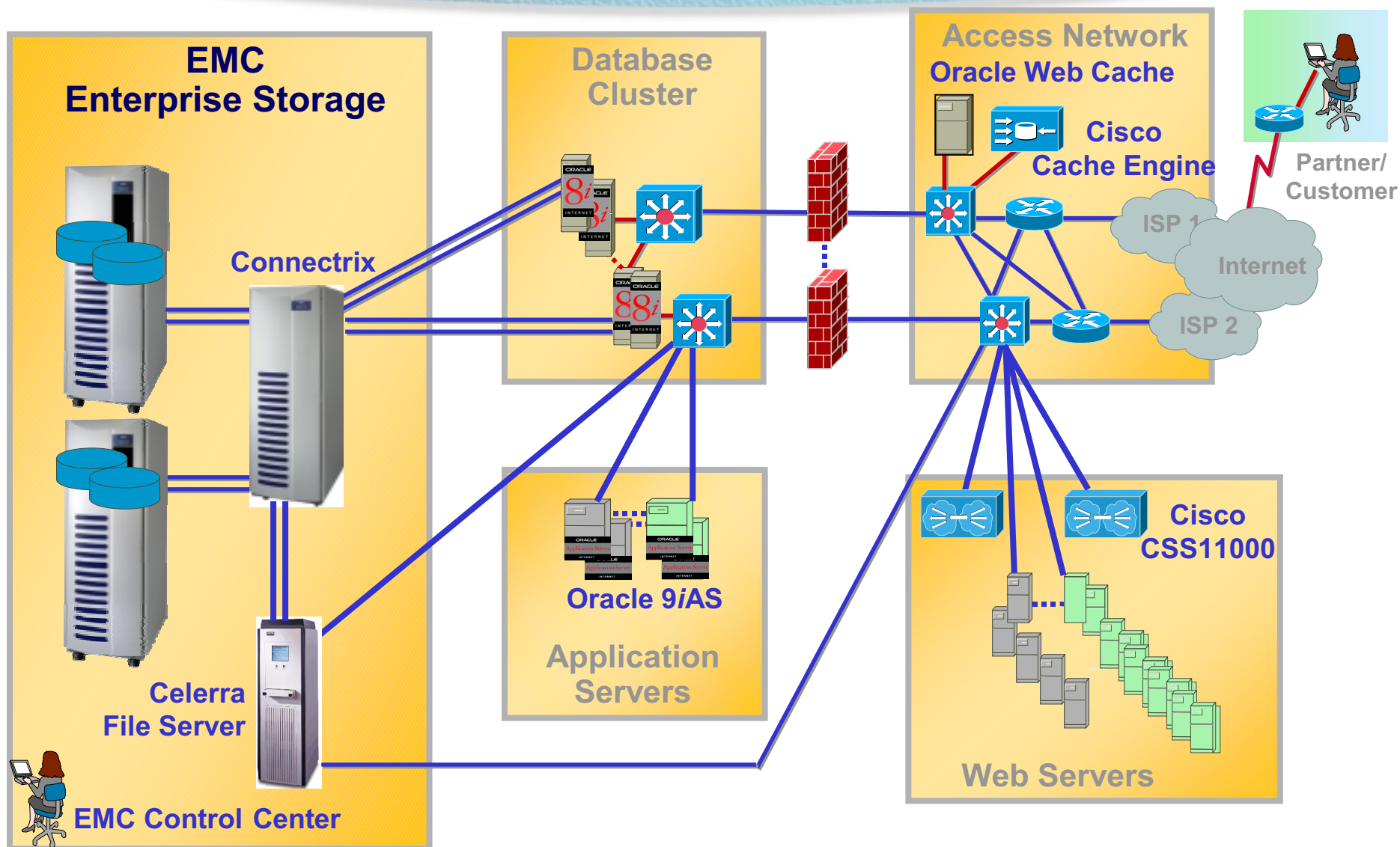
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Content Networking + SAN

Enabling the Internet Data Center



E-Business Data Center SAN/NAS Consolidation

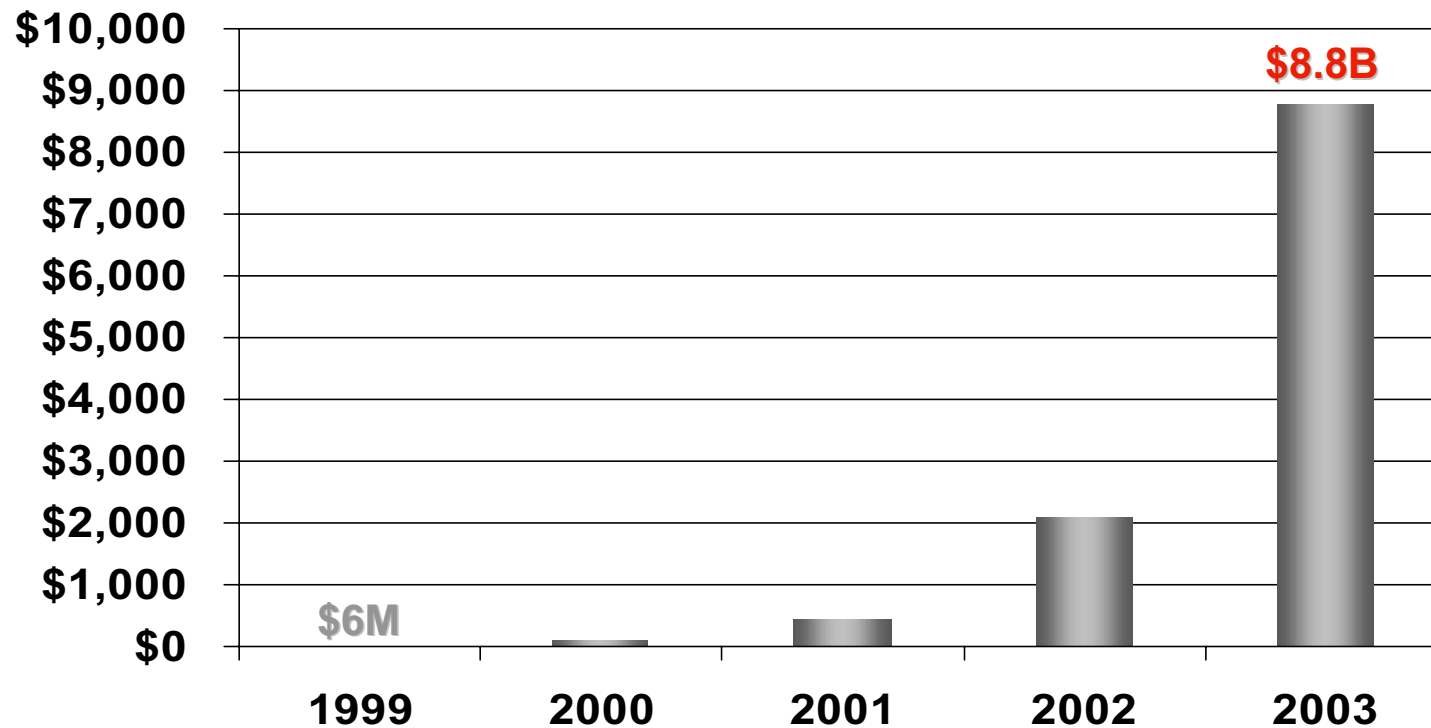


Storage Networking Solutions

Hosted Storage(SP)

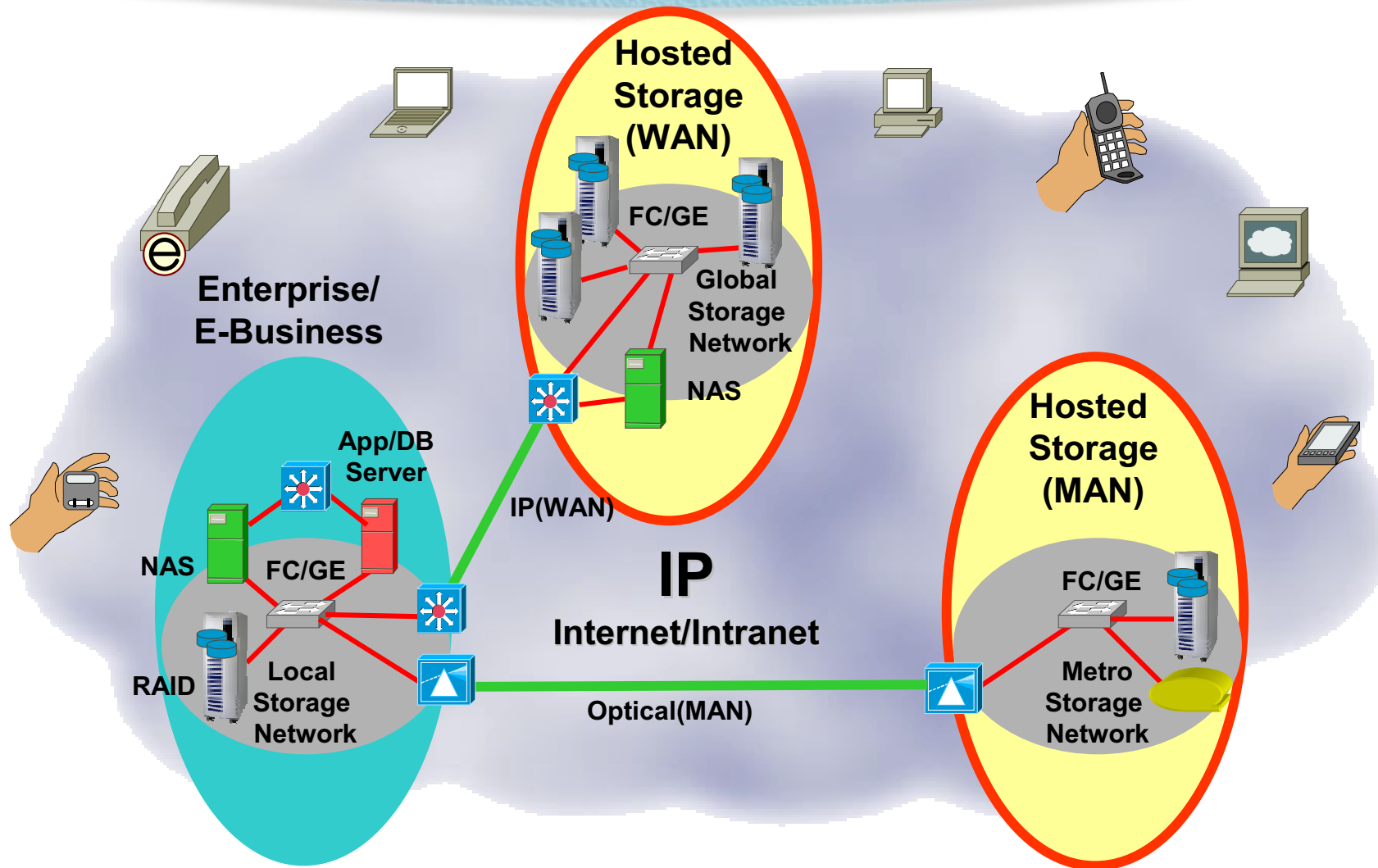
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Storage Service Provider (SSP) Market



Source: Dataquest, March 2000. North America Forecasts

Hosted Storage MAN or WAN



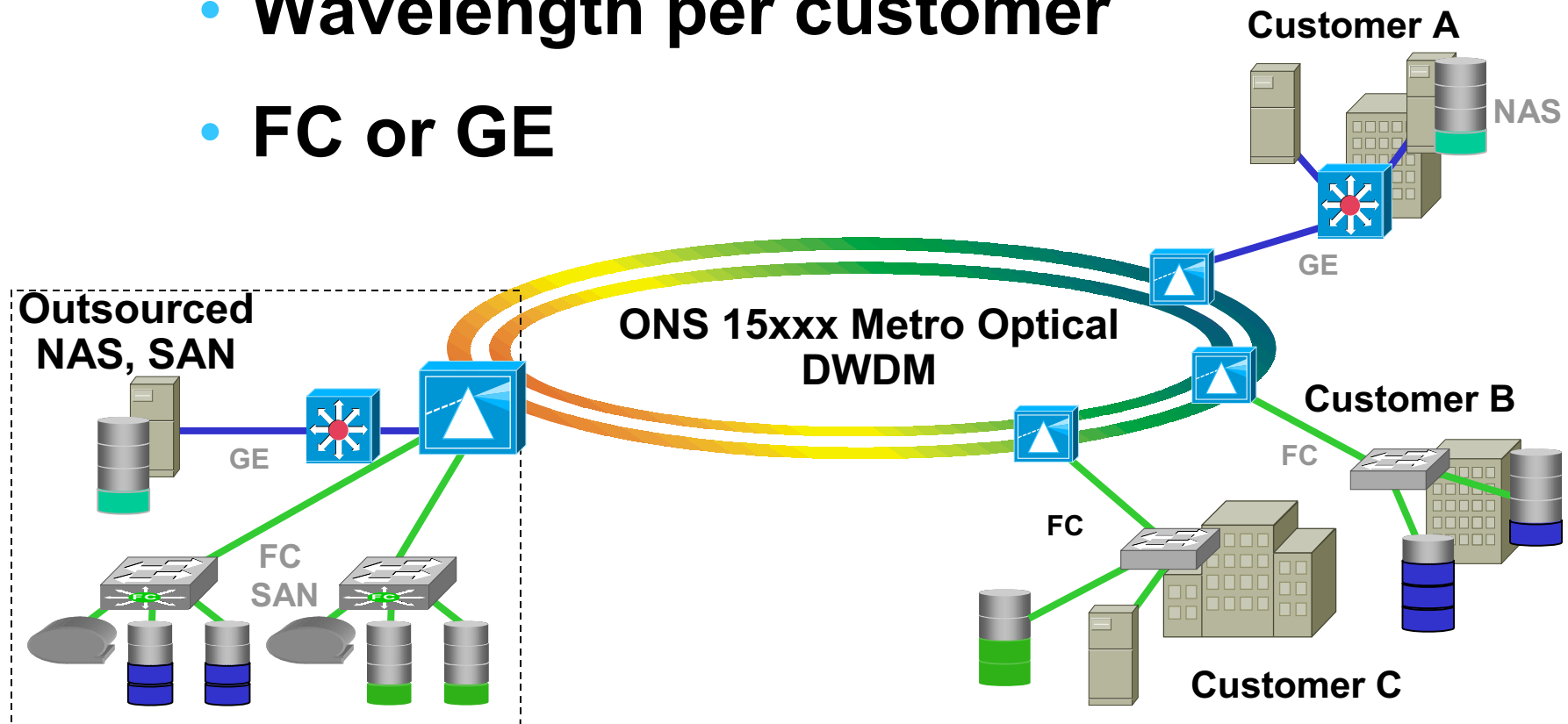
SSP Value Proposition

- **Allow “plug-in” access to unlimited data storage capacity and capabilities**
- **Enable faster time-to-market**
- **Enhance security, availability, efficiency and accessibility of data**
- **Solve IT staff shortage concerns**
- **Implement comprehensive service level agreements**

Storage Service Provider

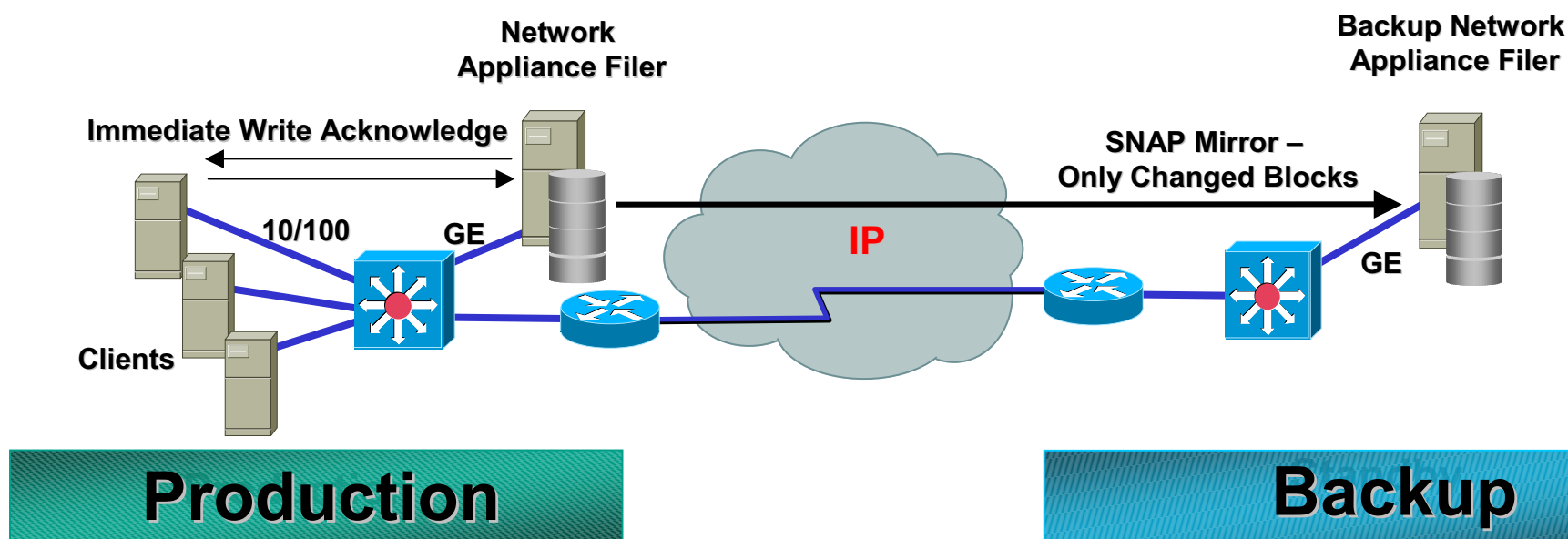
Current Hosted Storage over Metro Optical DWDM

- Wavelength per customer
- FC or GE

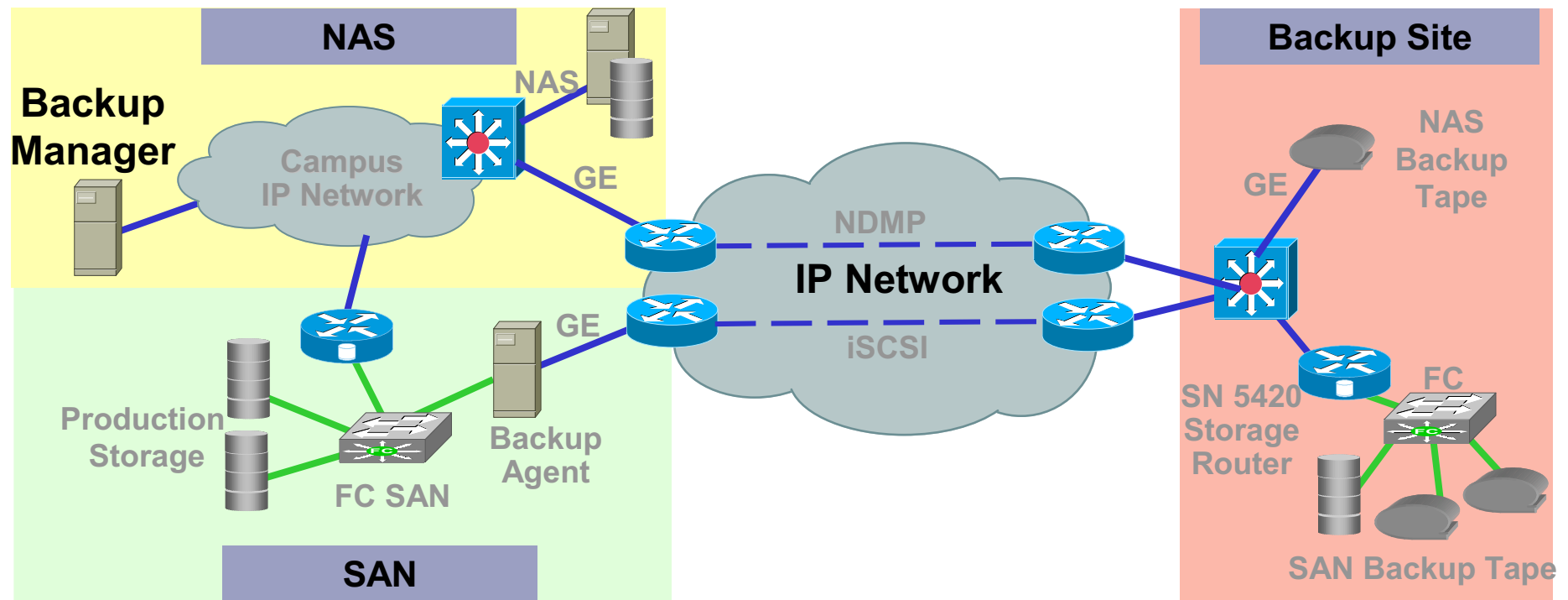


NAS-to-NAS over WAN, Today

- Asynchronous NAS replication
- Distributed Load balancing
 - file sharing (read only)
- No application impact



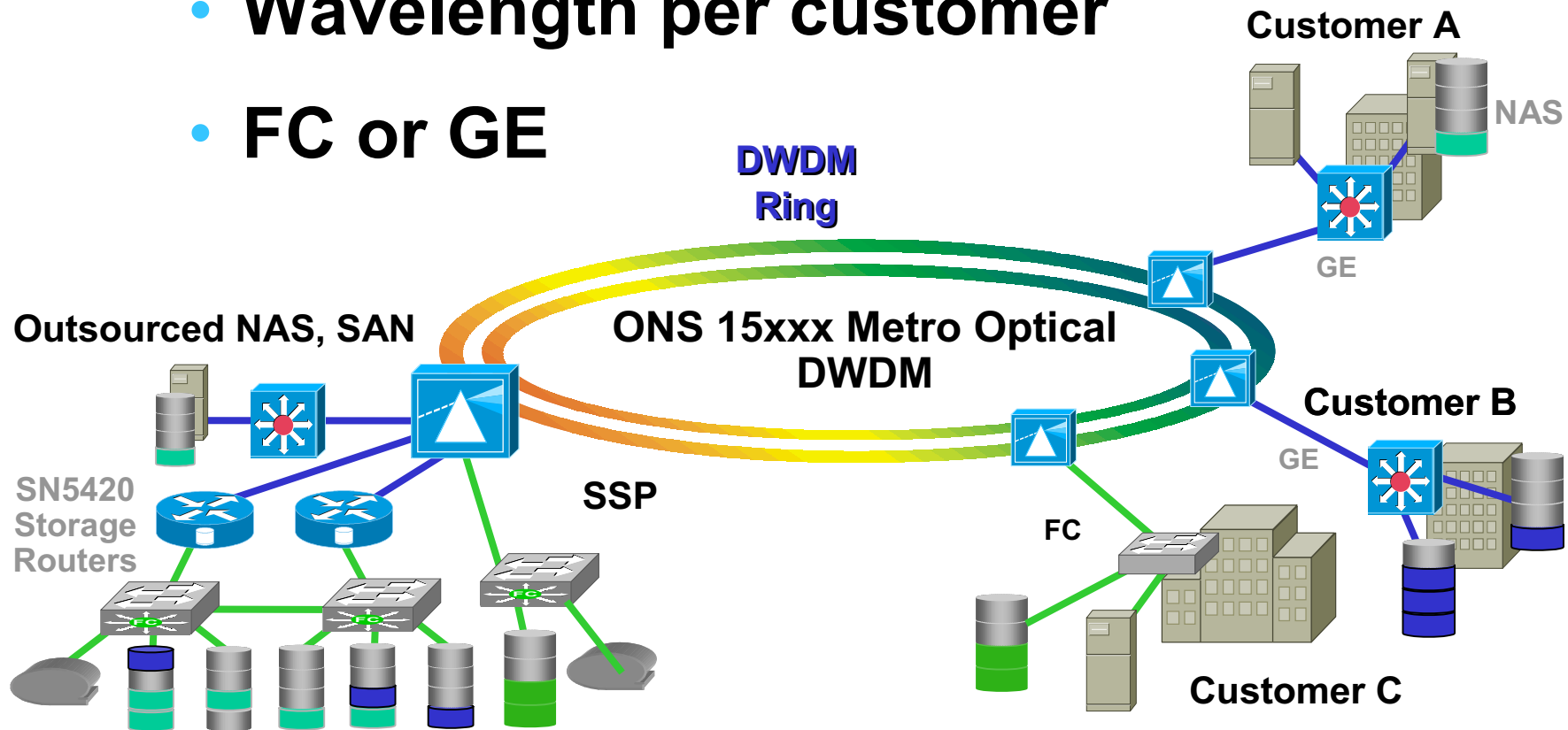
Remote Backup to Tape SAN and NAS



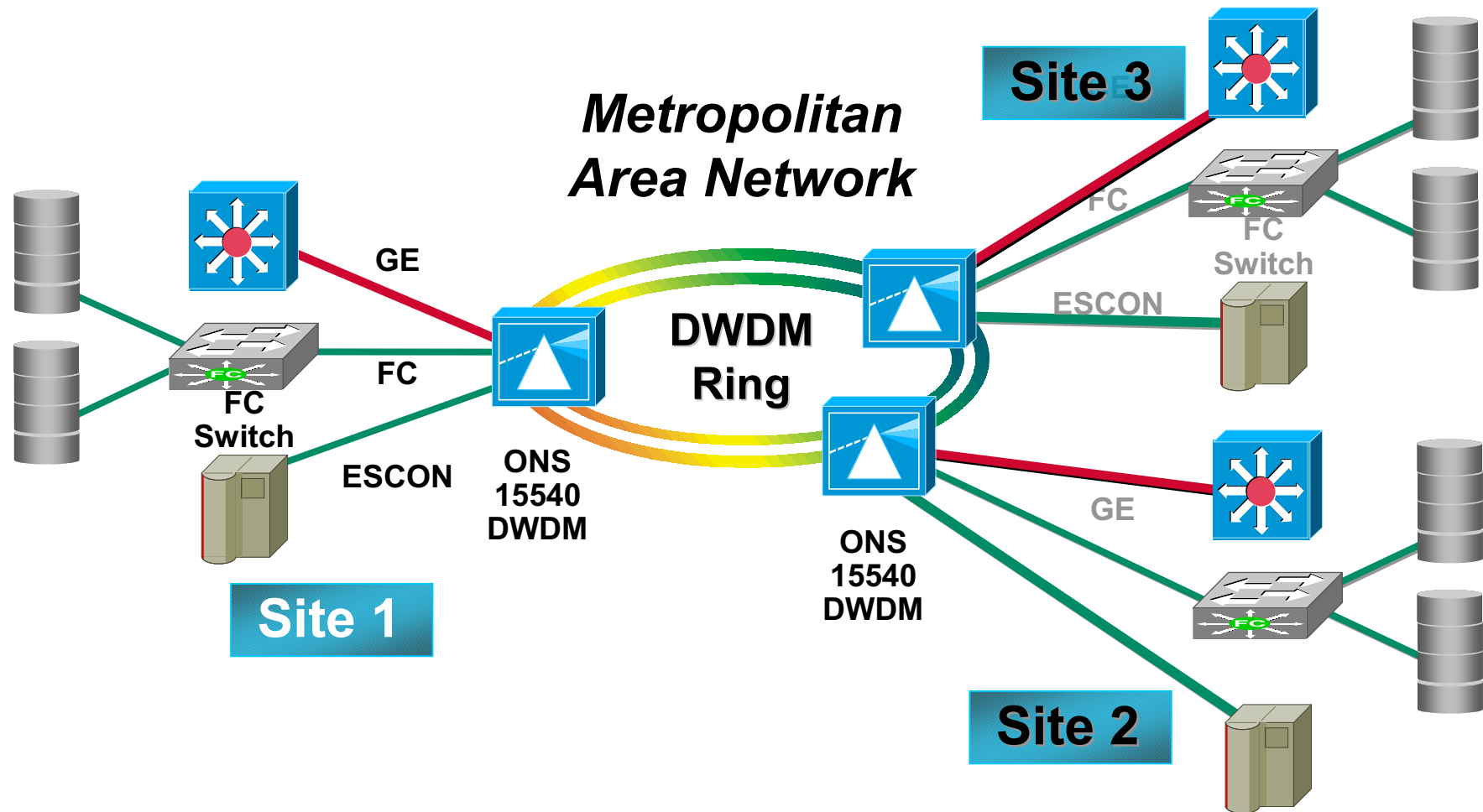
Storage Service Provider

New Hosted Storage over Metro Optical DWDM

- Wavelength per customer
- FC or GE



Multiple Applications over Multiple Locations





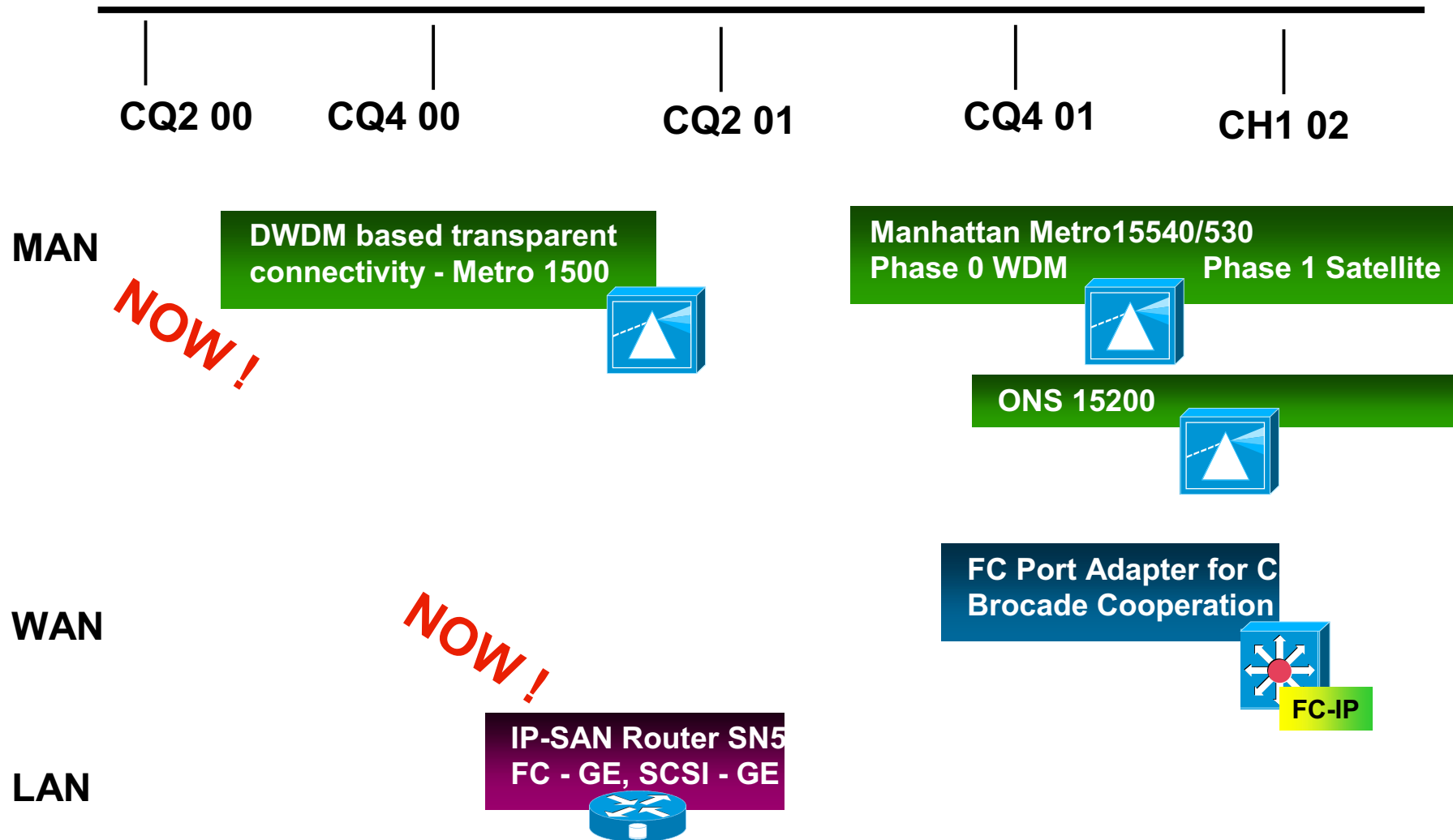
Products for Storage Networking

- Metro DWDM 1500/15540/15530
- ONS15252 (DWDM Optical, **future**)
- SN 5420 Storage Router

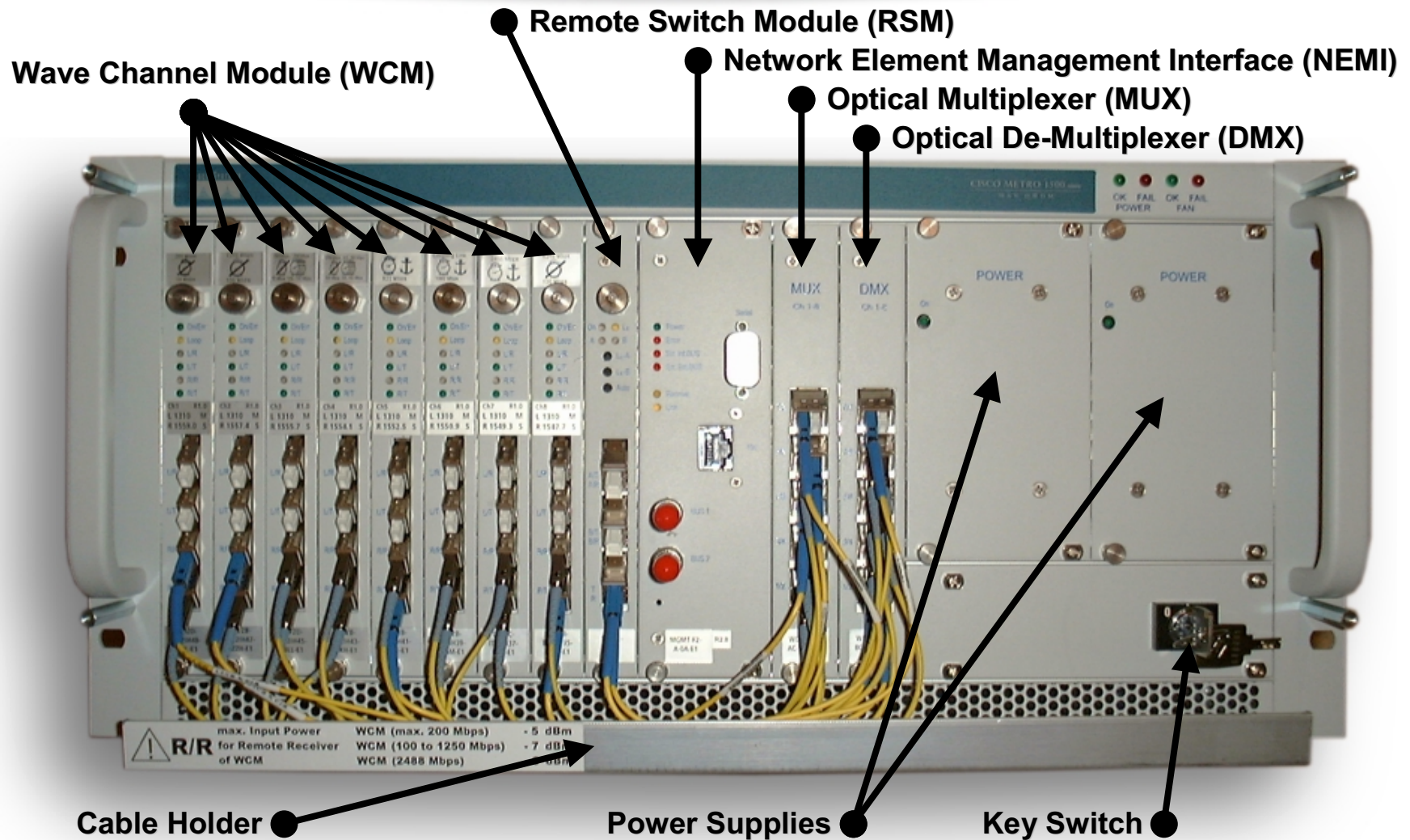


Storage Networking Product Roadmap Summary

NDA



Metro1500 DWDM Eight Channel Chassis

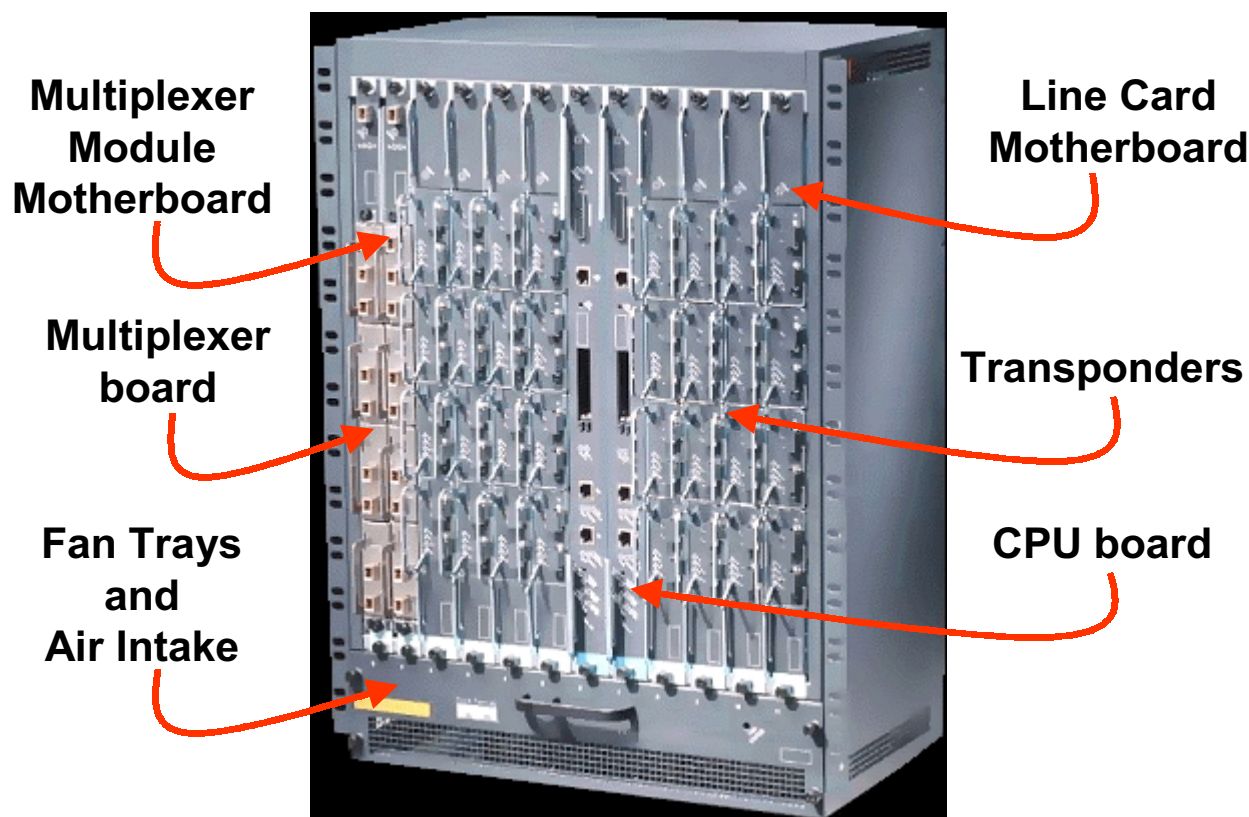


Metro1500 DWDM Summary

- ❑ 8 Channels(WCM)/Shelf
(Max 20Gbps; 2.5Gbps*8channels)
- ❑ 32 Channel system/4 Shelves
(Max 80Gbps; 20Gbps*4 shelves)
- ❑ Up to 2.5Gbps/channel, bit rate and protocol independent
- ❑ Point-to-Point, Point-to-Multipoint, and Hubed Ring Topology.
- ❑ 1:1 line protection
- ❑ SNMP manageable
- ❑ FDDI/TR/E/FE/GE
- ❑ ESCON (32 CH), FICON, FC, Coupling Link
- ❑ ATMOC3/STM-1
- ❑ SONET/SDH OC-12/48
- ❑ Packet over SONET
- ❑ T1/E1, T3/E3

Cisco ONS 15540

Extended Services Platform



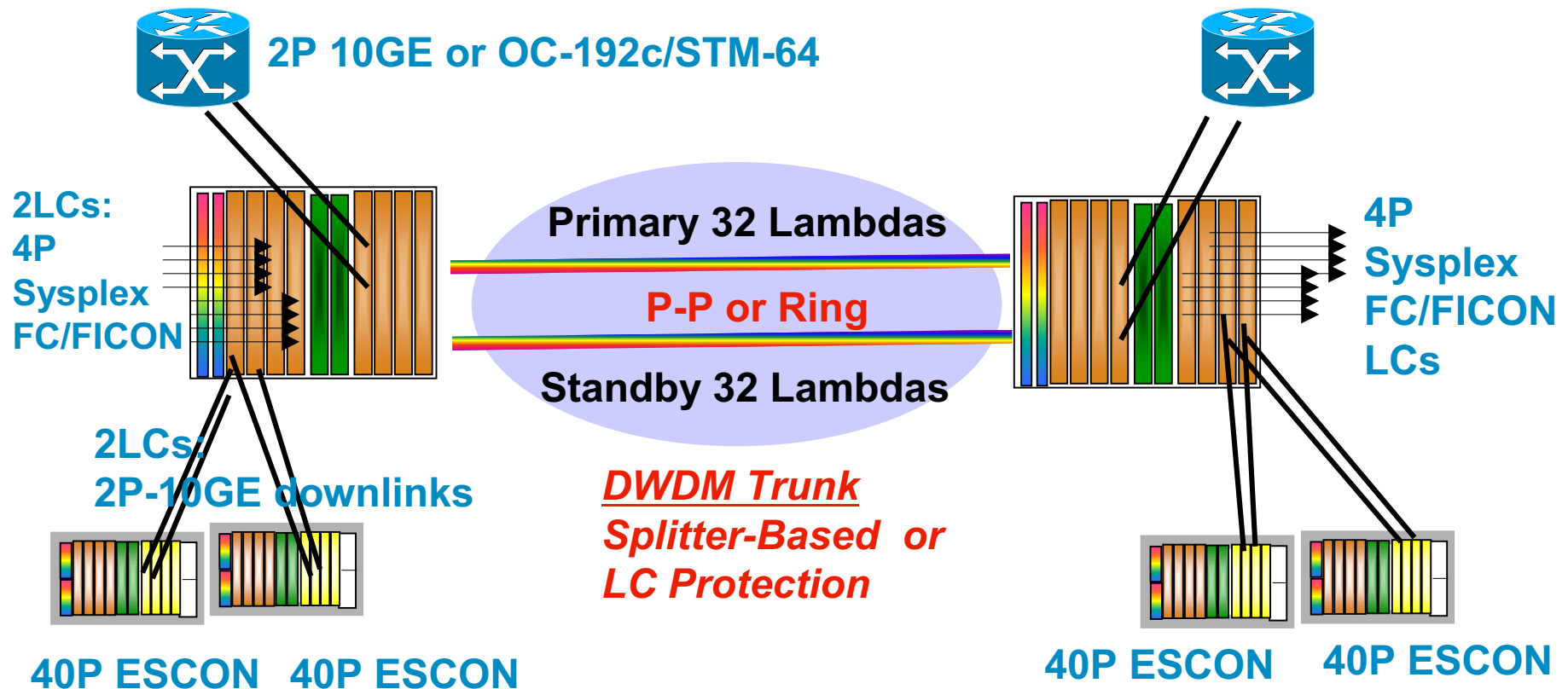
Physical view

- 32+1 wavelengths
- 100GHz grid (C_band) for the first 32 wavelengths(protected)
- plug in transponders (four per line card)
- optical supervisory chnl (33rd wavelength)
- NEBS compliant

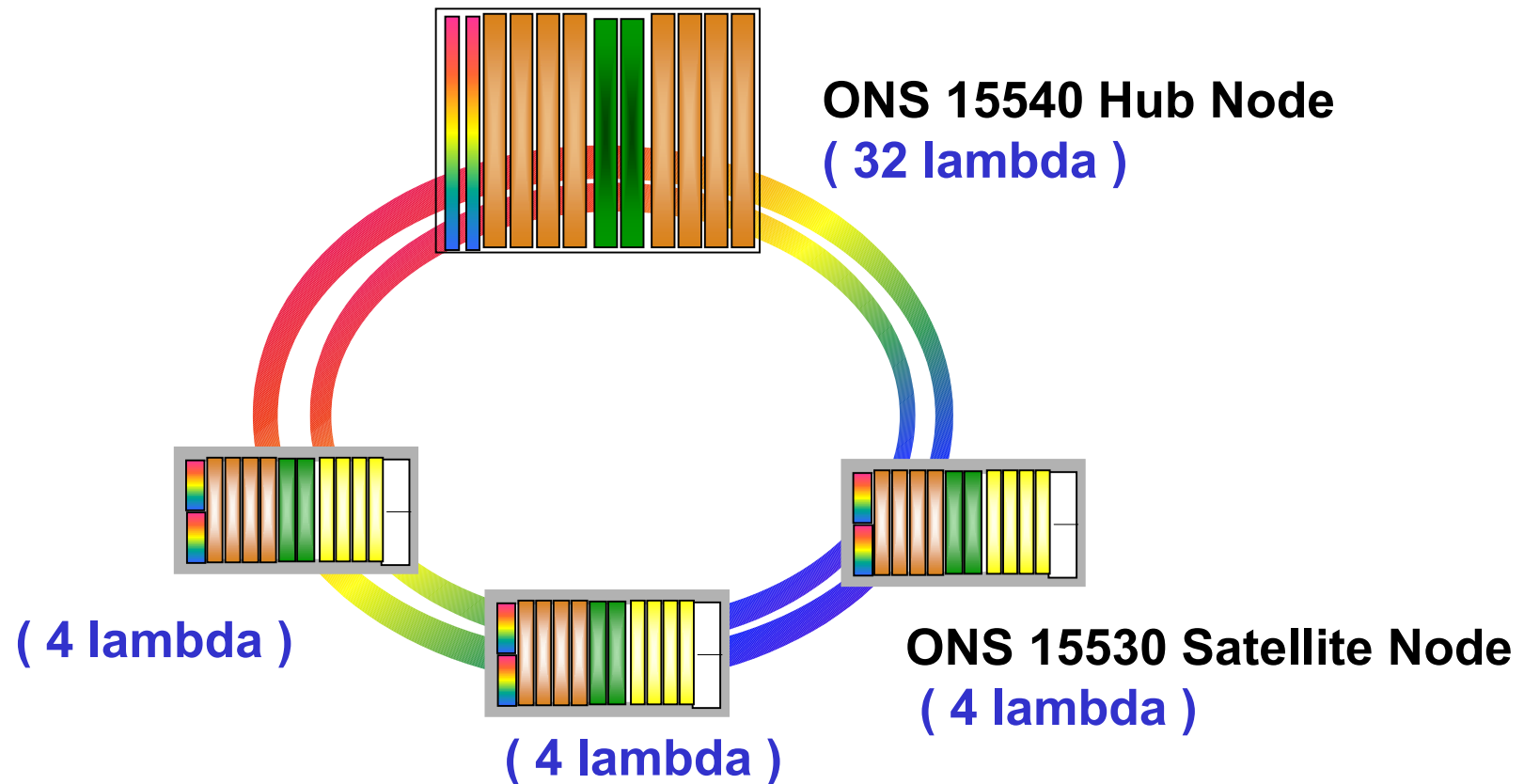
ONS 15540 ESP Features

- **ITU DWDM Grid, 100 GHz separation**
- **Transparent Services**
 - **16 Mb to 2.5Gb transmission rate per wavelength**
 - **Transponders**
 - **Up to 32 channels per shelf**
 - **8 Line Cards per shelf**
 - **4 channels per Line card**
- **OC-3, -12, -48, -192, FE, GE, FC, FICON, ESCON, 10GE**
- **Point-to-point, Bus and Ring**
- **Optical MUX/ADM Options**
 - **4, 8 channel with and without OSC ADM**
 - **32 channel with and without OSC terminal mux/demux**

A Multi-system Configuration Example



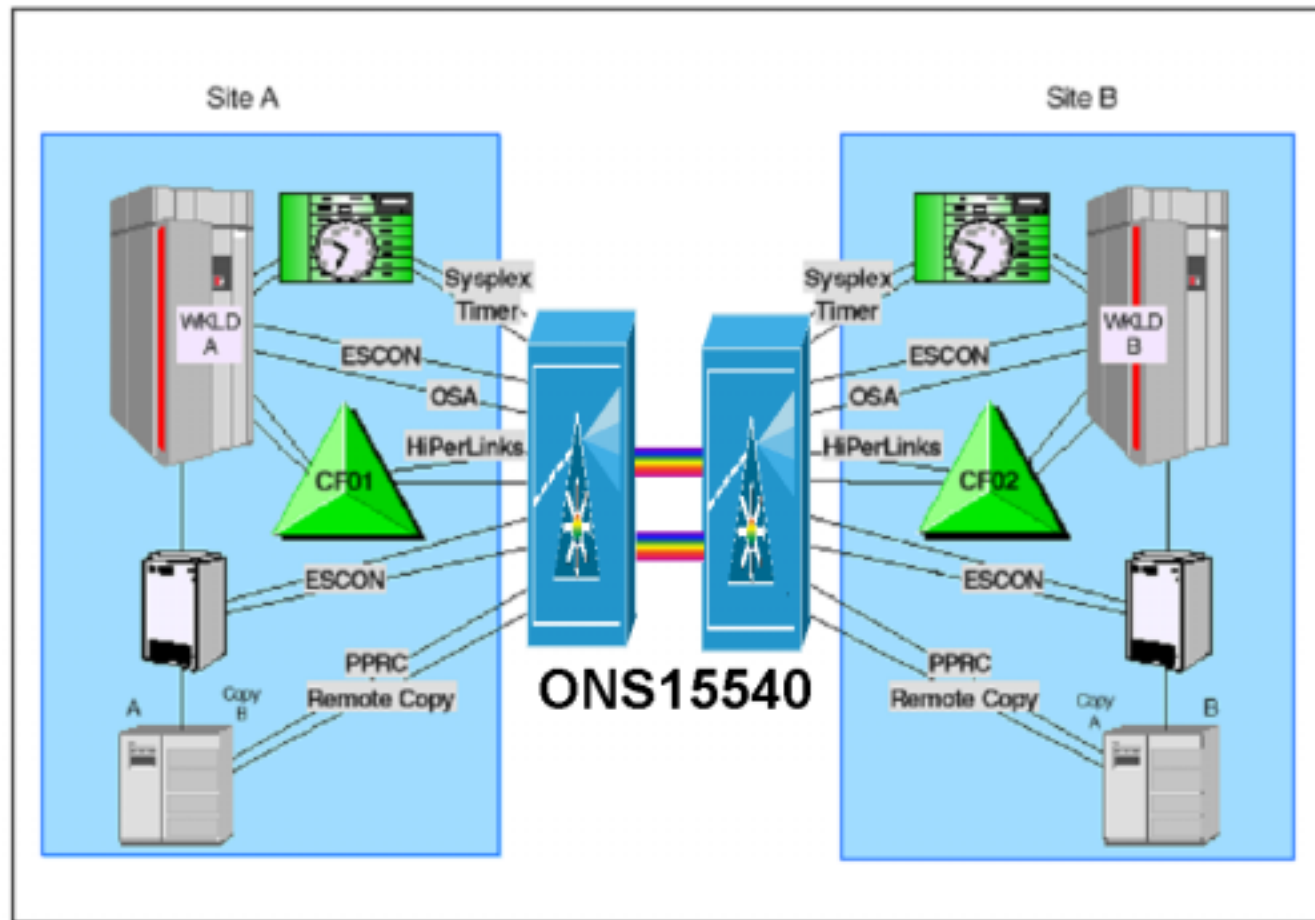
ONS 15540 and 15530 in Ring



Note: Ring with only satellite nodes is also possible

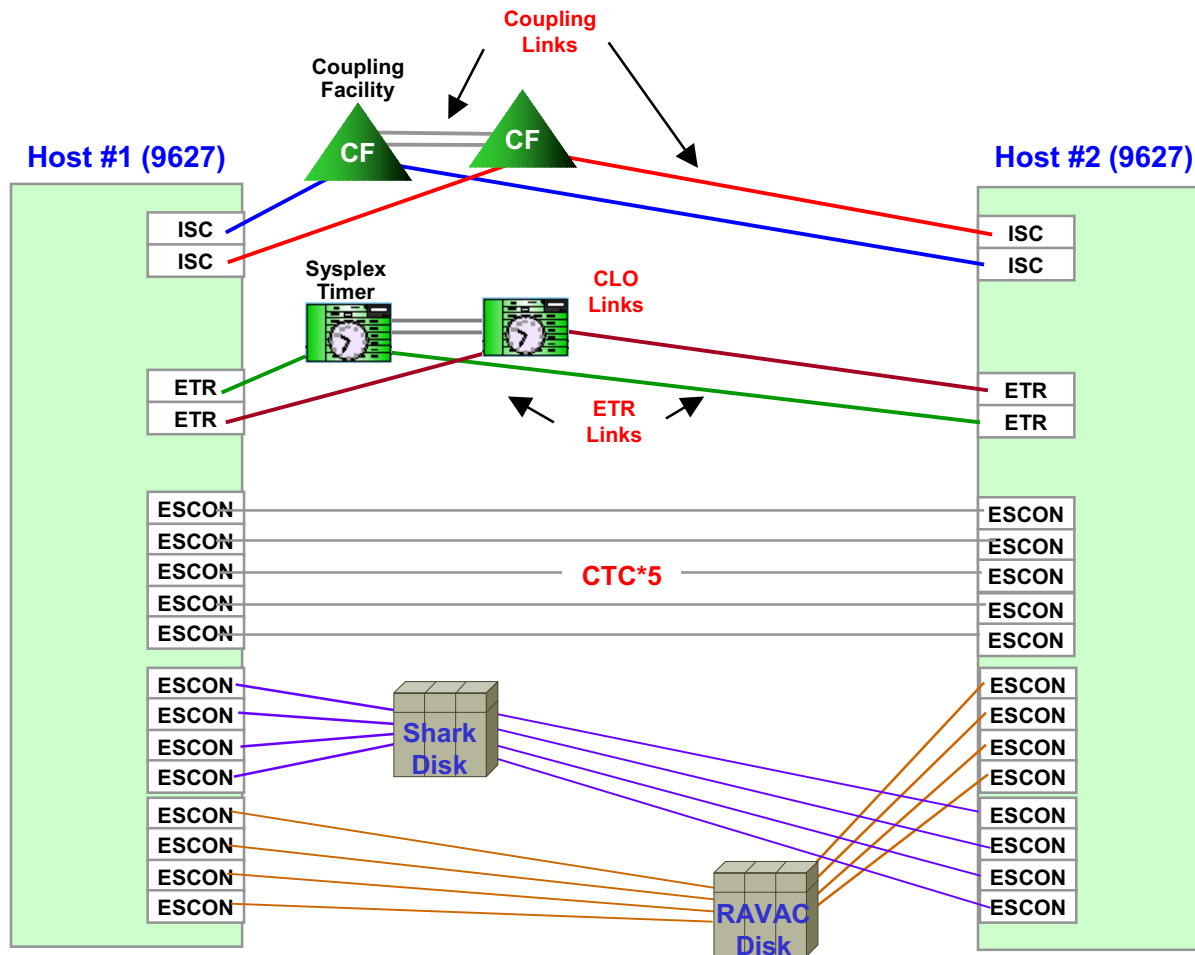
Business Continuance: Enterprise Data Centers

Parallel Sysplex configurations installed in two sites



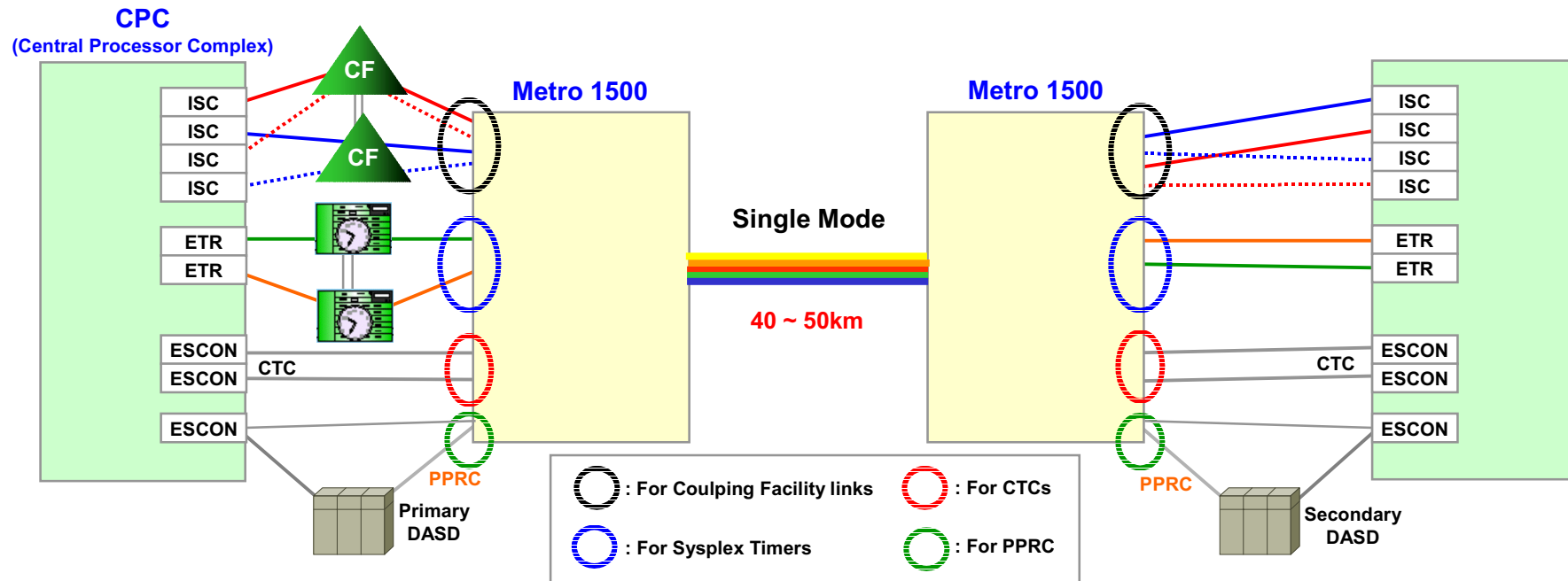
DR 구성방안

(GDPS 구성: Current)



- ISC : InterSystem Channel
- ETR : External Time Reference
- CLO : Control Link Oscillator
- ESCON : Enterprise Systems CONnection
- CTC : Channel To Channel

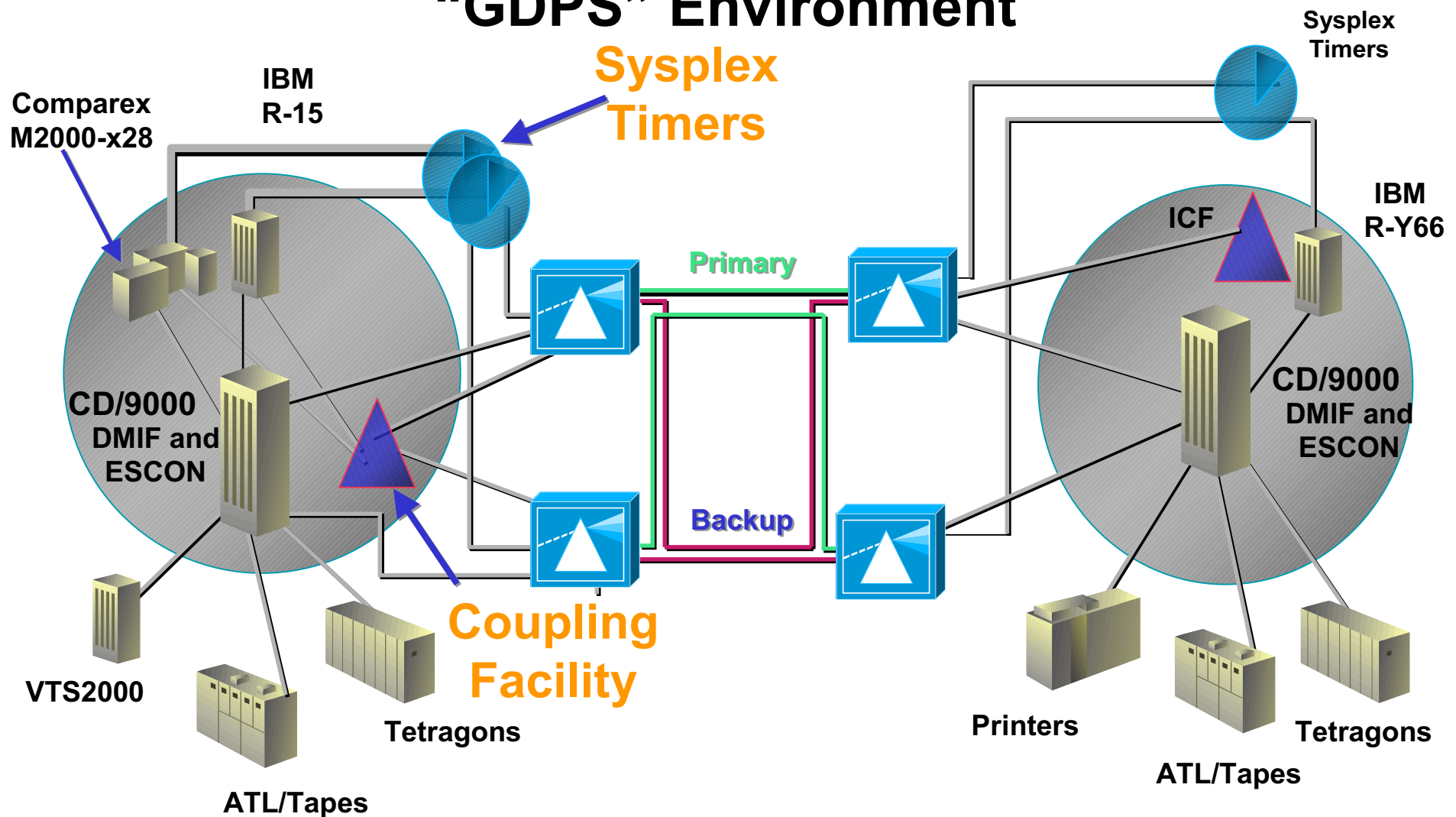
DR 구성방안 (GDPS 구성: Future)



Channel type	Fiber	Connector	Bit Rate	Channel Module
CF links(HiPerLink)	SM	SC Duplex	1.06Gbps	1.062Gbps for IBM Coupling Link WCM
Sysplex Timers	MM(62.5/50um)	ESCON Duplex	8Mbps	Low speed transparent WCM
CTCs(ESCON)	MM(62.5/50um)	ESCON Duplex	200Mbps	TDM channel module 4*ESCON
PPRC(ESCON)	MM(62.5/50um)	ESCON Duplex	200Mbps	TDM channel module 4*ESCON

IBM Environment

“GDPS” Environment



ONS15200 Overview

- **ONS15252 for hub / gateway deployment. Terminates up to 16 channels in a 12U 19" sub-rack**
- **ONS15201 for customer prem. / PoP deployment. Terminates a single channel in a single 'U'**
- **High node and channel counts and long distances achieved without optical amplifiers**
- **Flexible to fibre architecture, traffic types, and traffic patterns**
- **Multiple protection options**
- **Comprehensive management**



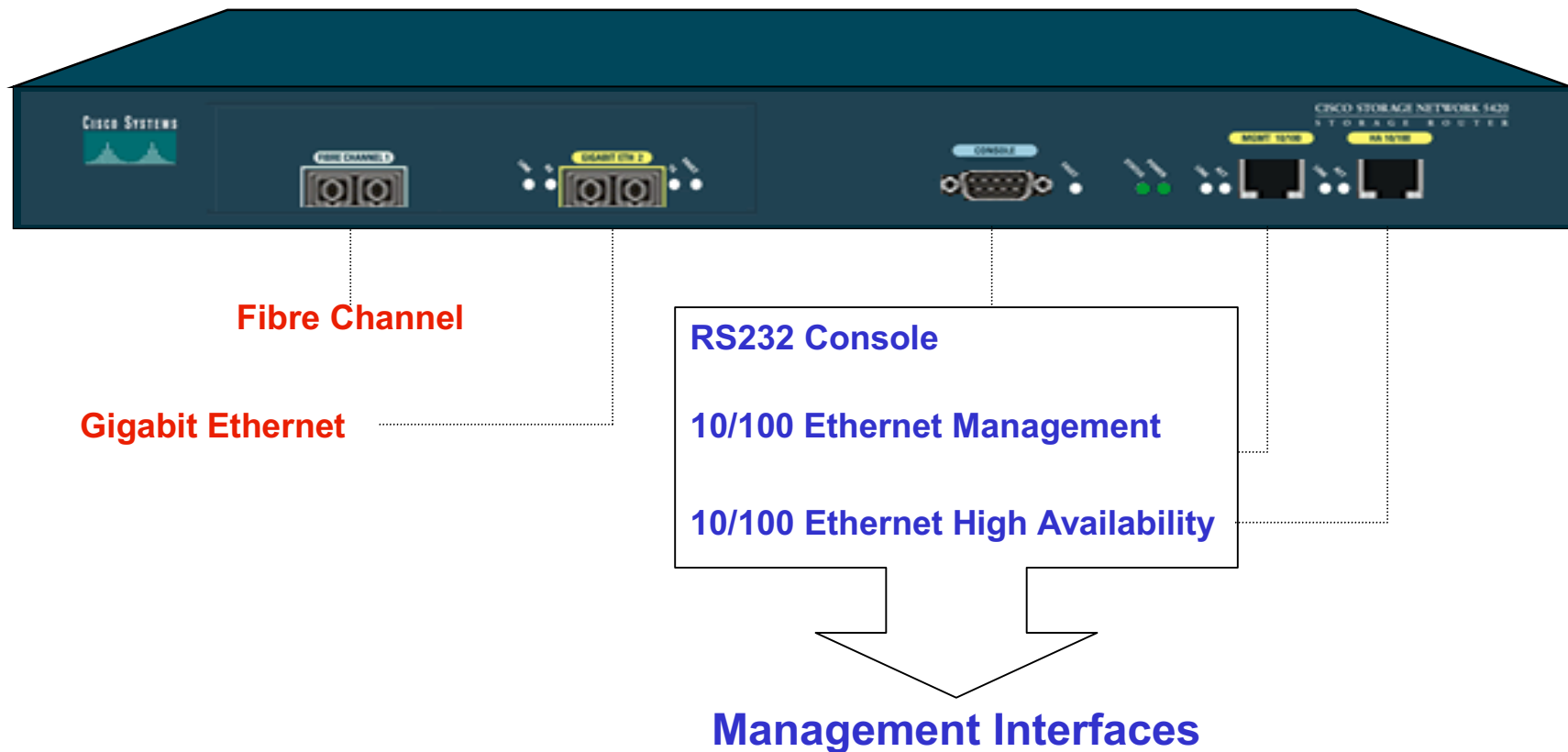
ONS15252



ONS15201

SN5420 iSCSI Networking Product

Universal Access to Storage over IP networks



Key Benefits Summary

- **Transparency (Protocol Independence)**
- **Scalability**
- **Fast, dynamic bandwidth provisioning**
- **Simplifies high speed networking**
- **Use the Capabilities the customer has already invested in the Cisco Router & Switching Platforms**
- **Design & Implement the Network to be:**
 - Simple** - Series of Point to Point Services
 - Scalable** - Build Linear Rings
 - Deterministic** - Use Etherchannel with L3 or DPT or SONET for the CPE Backbone



Thank You for Attending

