



Agenda

- **Storage Consolidation**
- **Business Continuance**
- **Storage Outsourcing**

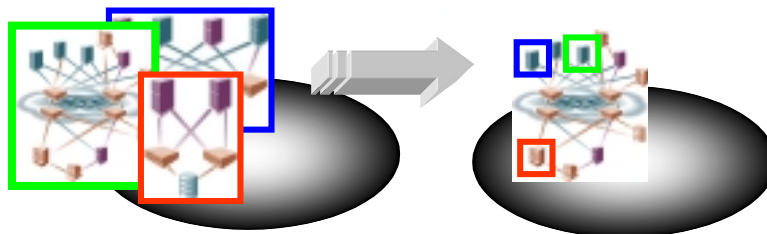
Storage Networking Applications

Storage Consolidation

Customer Solution	Networking Technologies
Storage Consolidation - Storage Area Networks - Network Attached Storage	<ul style="list-style-type: none"> • IP Access to Storage • Network Attached Storage
Business Continuance - Synchronous Mirroring - Disaster Recovery - Replication - Backup and Restore	<ul style="list-style-type: none"> • Storage over Metro Optical • Storage over WAN • IP Access to Storage
Hosted Storage(SP) - IDC Storage Hosting - Remote Outsourcing	<ul style="list-style-type: none"> • IP Access to Storage • Storage over Metro Optical • Network Attached Storage • Storage over WAN

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Benefits of Storage Consolidation



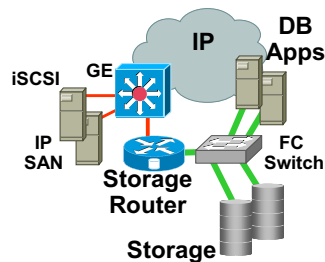
- **Reduction in data management costs**
(from 55% to 15% of total storage budget - IDC)
- **Ability to share, manage and protect data across the enterprise**
- **Improved storage scalability**

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IP Access to Storage SAN or NAS your Choice

SAN

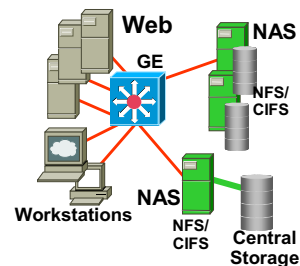
- SCSI-like **block level operations**
- High performance DB and applications
- Limited sharing of information
- Fibre Channel or iSCSI/IP



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

NAS

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

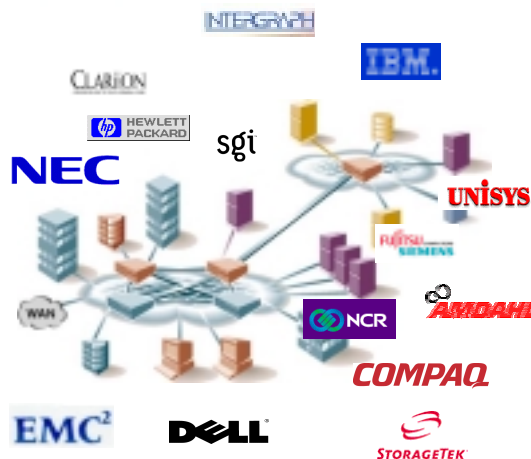


NAS forecast: \$6.5B market by 2003 (IDC)

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FibreChannel SANs The Reality

- Interoperability is still poor
- Only simple configurations being deployed
- FibreChannel infrastructure revenue expected to ramp to \$2.8B by 2003
- Brocade market leader for simple 8/16 port switch fabrics - OEMs to Compaq, EMC, HP ...
- McData market leader for high-end 32/64 port directors - OEM to EMC



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Why IP Access to Storage?

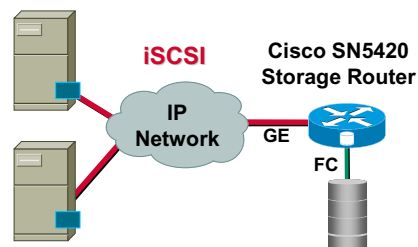
- Ubiquitous nature of IP
 - access storage from LAN, MAN, WAN, Internet
 - economy of scale
- Scalability
 - distance, node count, performance (GE/10GE), expertise
- Single access technology
- Manageable, secure and interoperable
(SNMP, MIBs, DNS, LDAP, tools)
(IPSEC, VLANs, ACLs, Firewalls)
- Massive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

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Introducing...SN5420 Storage Router

Universal Access to Storage over IP networks

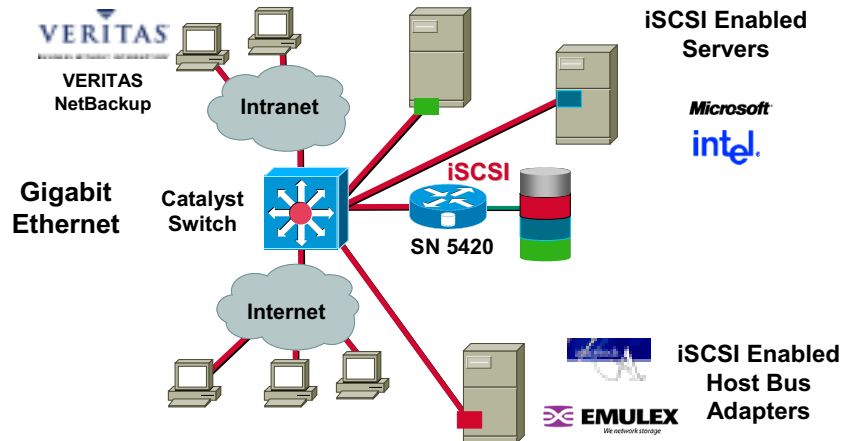
- Features and Benefits
 - Share storage resources
 - Extend storage over IP networks
 - Security ACLs/LUN Mapping
 - High availability
 - Heterogenous support for Windows NT, Solaris, and Linux
 - Standards-based
 - Web-based management



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Storage Consolidation

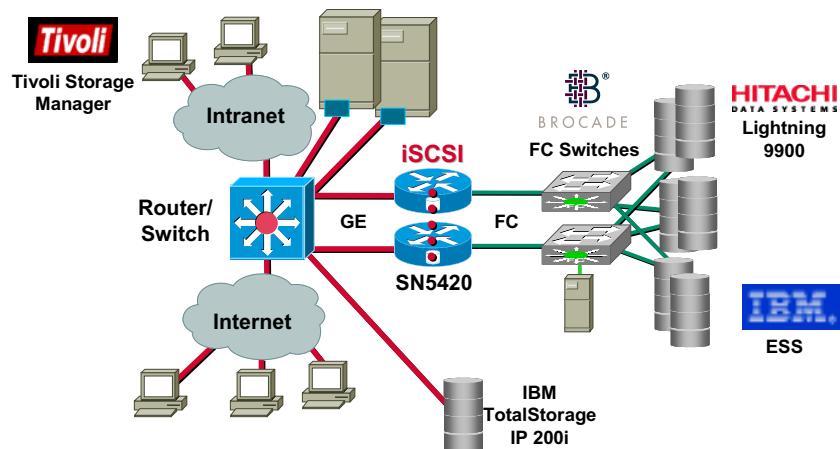
IP Access to Shared Storage Resources



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Storage Consolidation

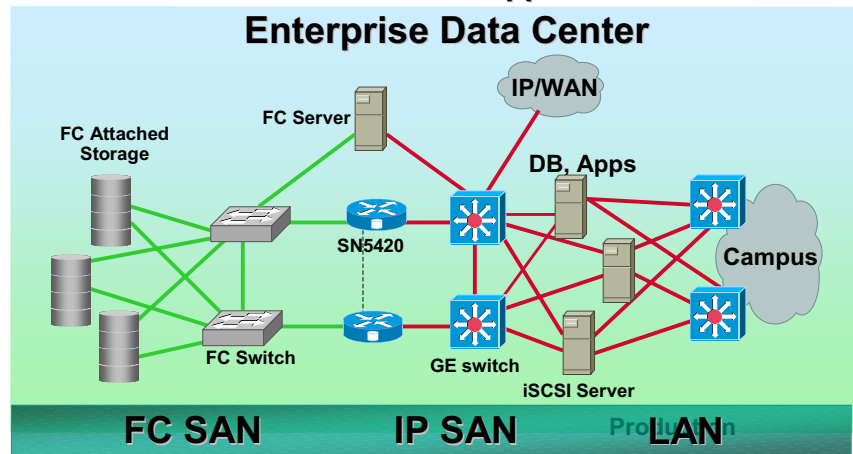
IP Access to Centralized Storage Pool



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IP SAN Phased Migration Phase 1 Q2 FY01

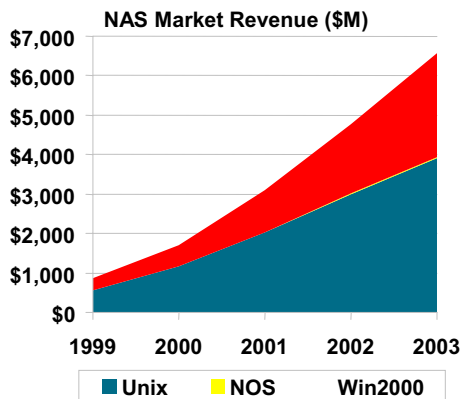
Block Access over IP Network
FC-iSCSI Router Appliance



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File-oriented Access Network Attached Storage (NAS)

- Mail servers, web servers, collaboration e.g engineering
- NFS, CIFS, HTTP
- File serving – LANs and remote offices – and other appliances
- Reduces management costs
- Faster deployment
- Network attached disks
- Complementary to SAN for consolidation
- Challenges: performance, scalability, availability

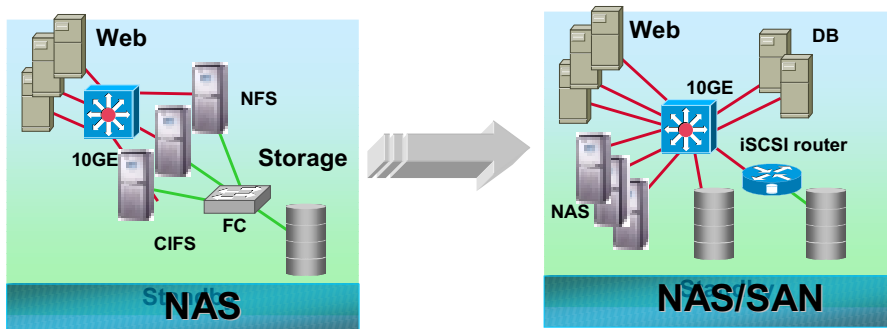


Source IDC Report #21352 -1999 Worldwide Disk Systems Market Forecast and Review

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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

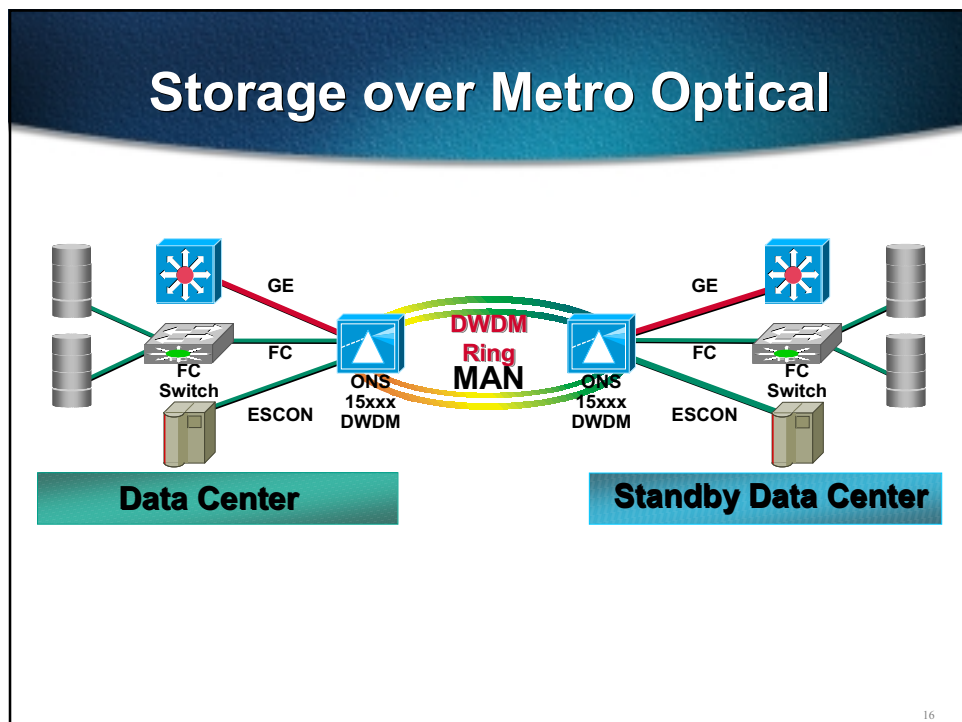
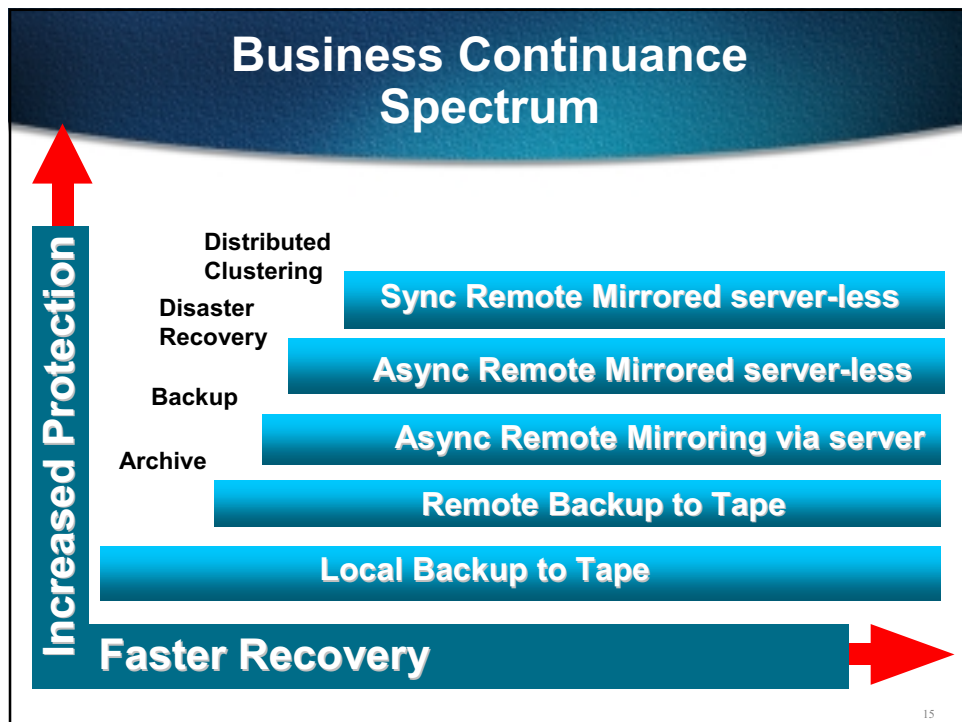


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Storage Networking Solutions Business Continence

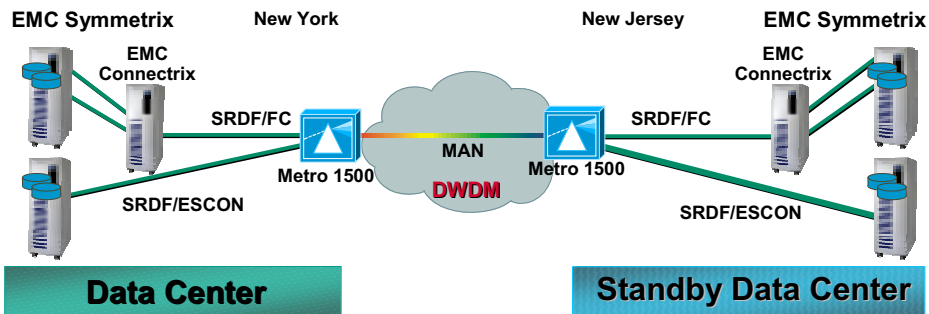
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Business Continuance

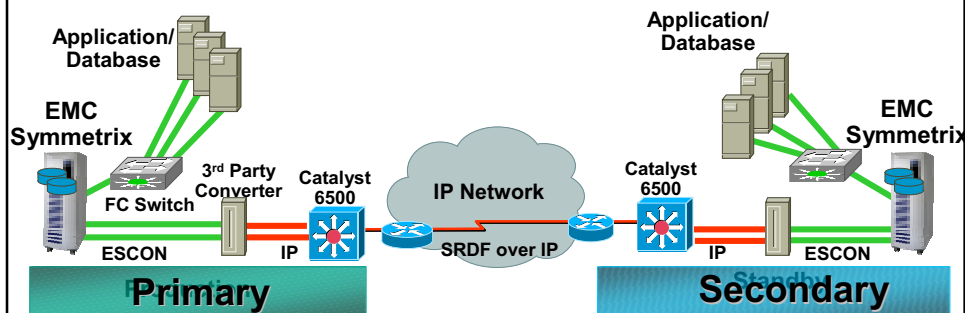
Sync Mirroring



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Storage-to-storage over WAN Today

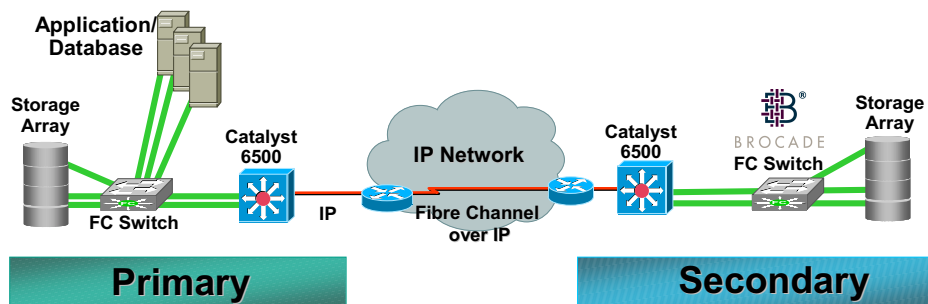
- Asynchronous replication, backup, content distribution
- SRDF(ESCON) over IP
- 3rd party WAN extension devices e.g. CNT
- [Reference Designs](#)



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Storage-to-storage over WAN FCIP

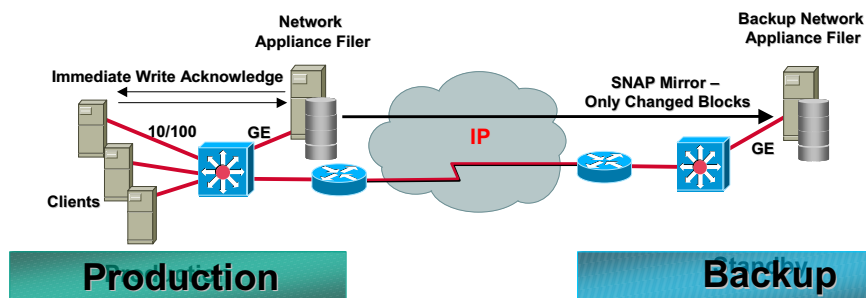
- Uniting SAN islands
- Fibre Channel over IP (FCIP) - IETF Proposal
- TCP Termination supports WAN
- **Future** Catalyst 6000 Blade



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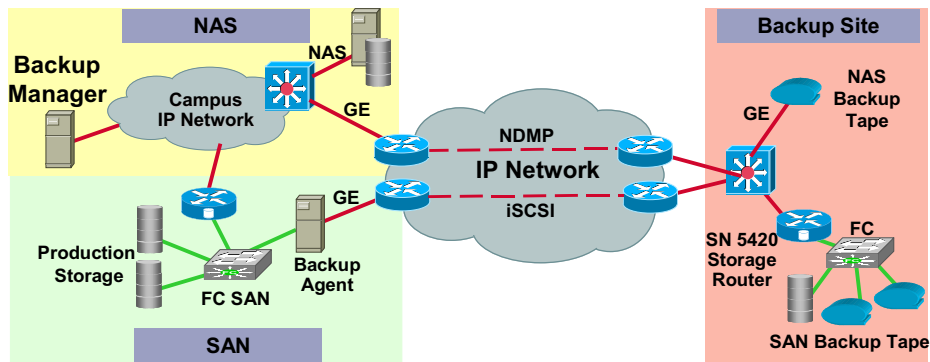
NAS-to-NAS over WAN, Today

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



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Remote Backup to Tape SAN and NAS



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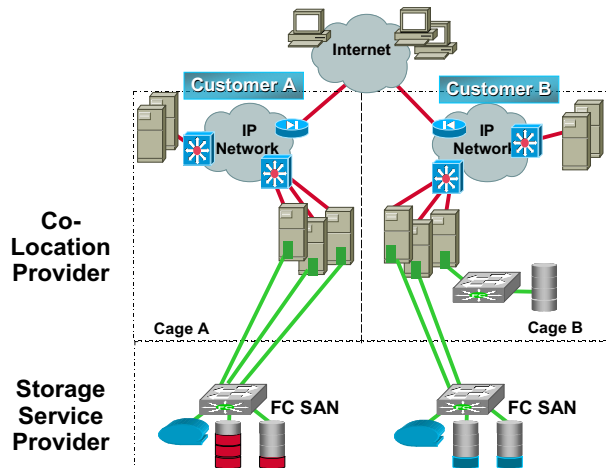
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Storage Service Provider

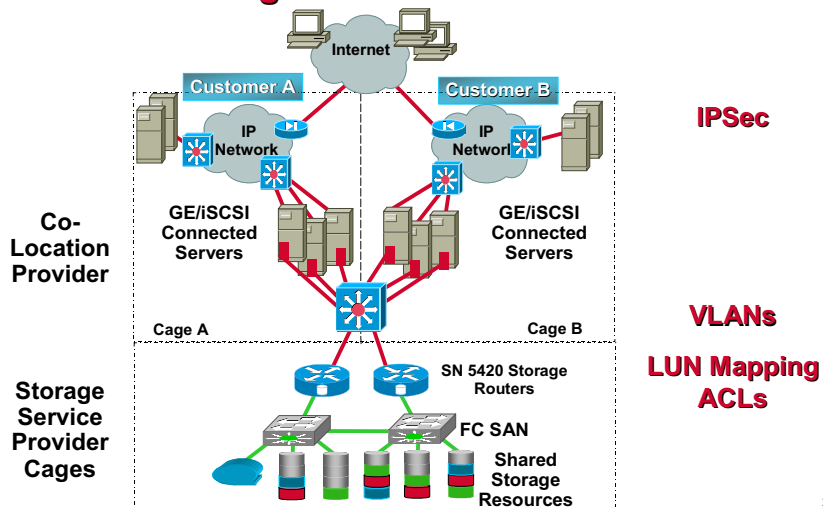
Current Co-location Architecture



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Storage Service Provider

New IP Storage Co-location Architecture

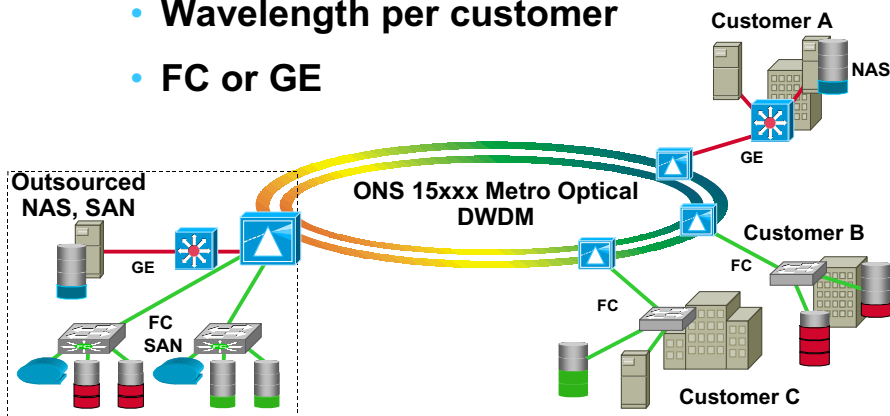


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Storage Service Provider

Current Hosted Storage over Metro Optical DWDM

- Wavelength per customer
- FC or GE

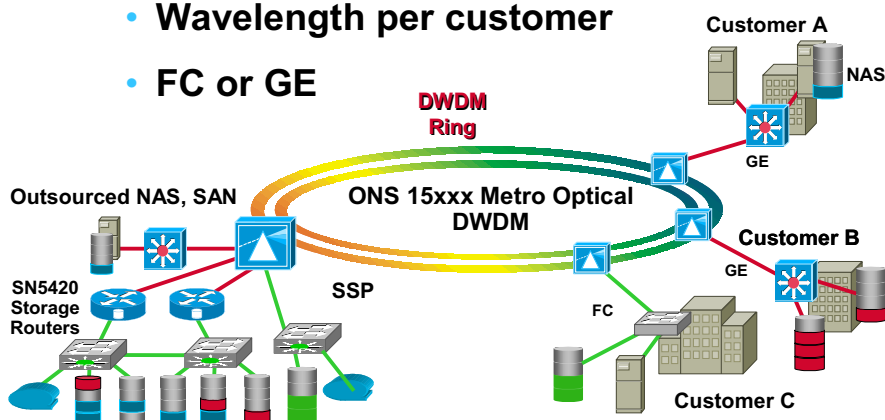


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Storage Service Provider

New Hosted Storage over Metro Optical DWDM

- Wavelength per customer
- FC or GE



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