



SN 5420 Storage Router Introduction and Application

Enterprise Tech OPS Team

Kim, Kyung-Bae

kbkim@cisco.com



Agenda

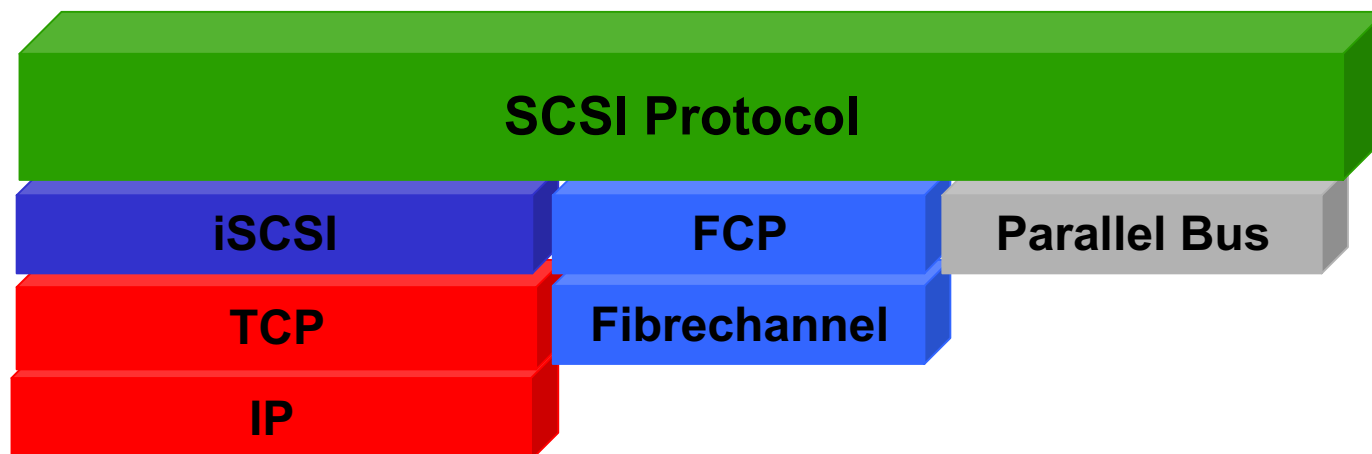
- ✚ iSCSI Technology and Architecture
- ✚ SN 5420 Product Overview
- ✚ SN 5420 SAN Application
- ✚ Customer Example
- ✚ SN 5420 DEMO



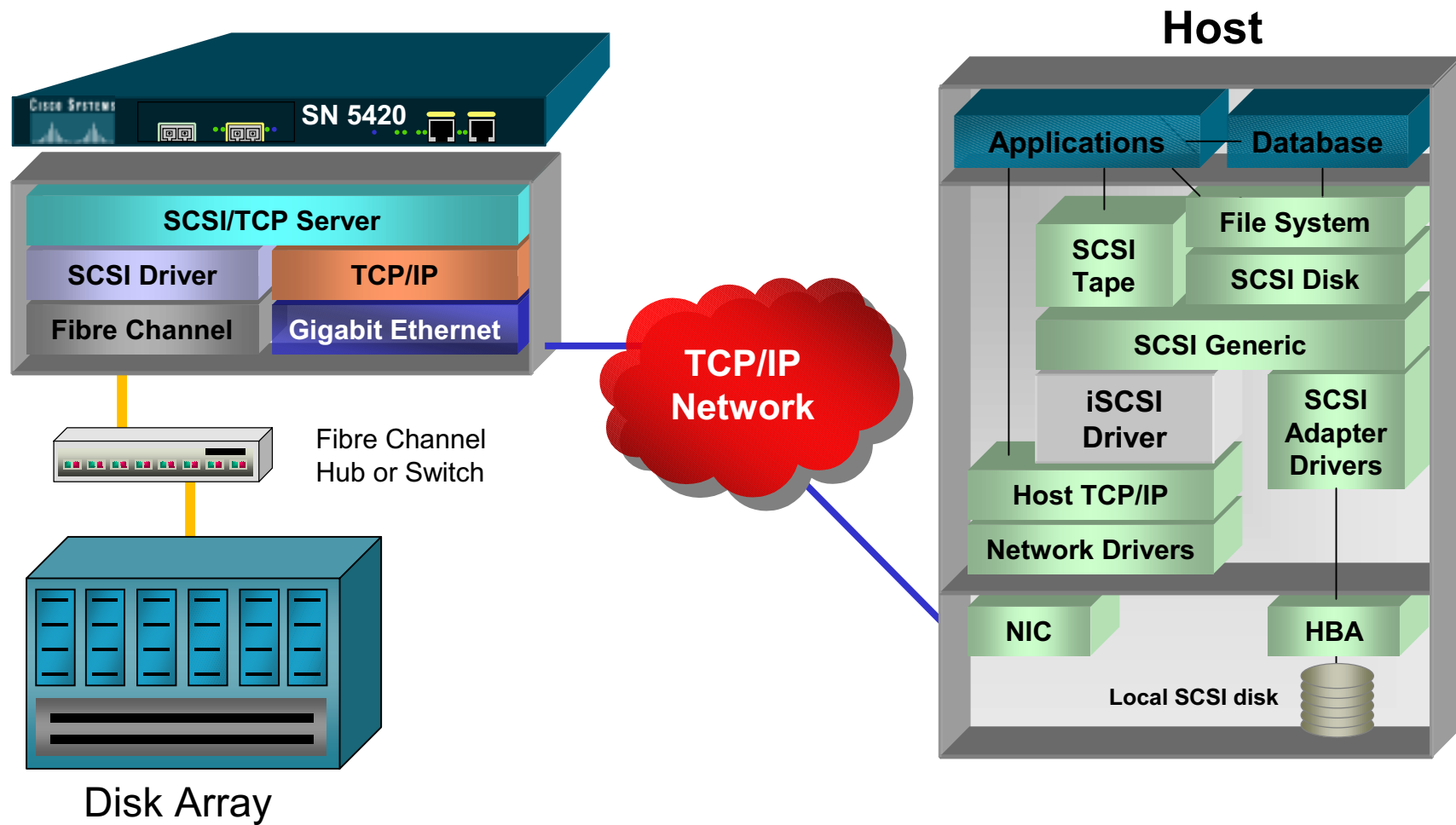
iSCSI Technology and Architecture

What is iSCSI?

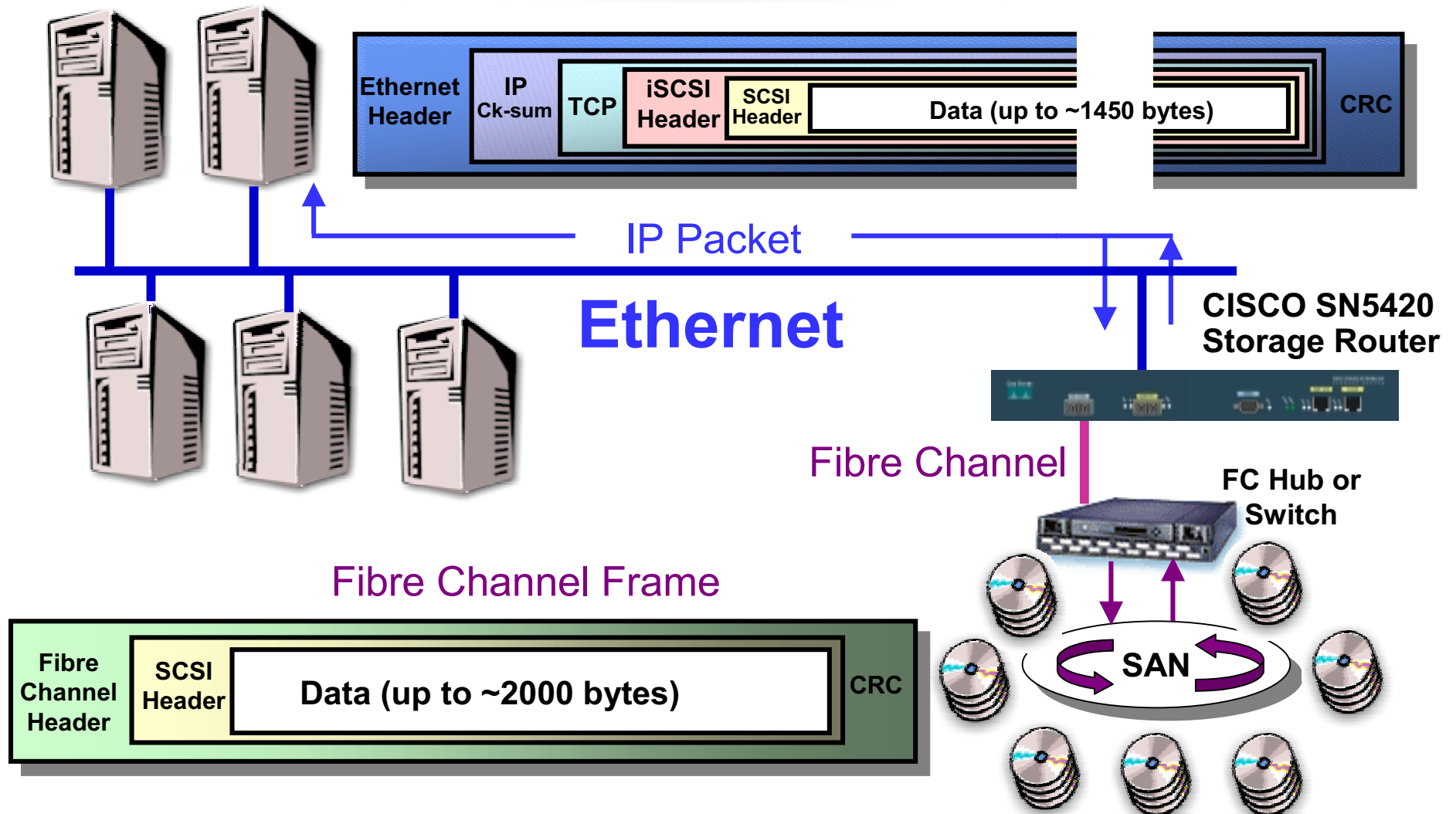
- Protocol originally developed by IBM, Cisco and SANgate
- Submitted to IETF – formal working group formed – draft specification available at:
 - <http://www.ietf.org/internet-drafts/draft-ietf-ips-iscsi-05.txt>
- Objective: to provide *common standard* transport for storage protocols over TCP/IP



Cisco iSCSI Architecture



Encapsulation - iSCSI

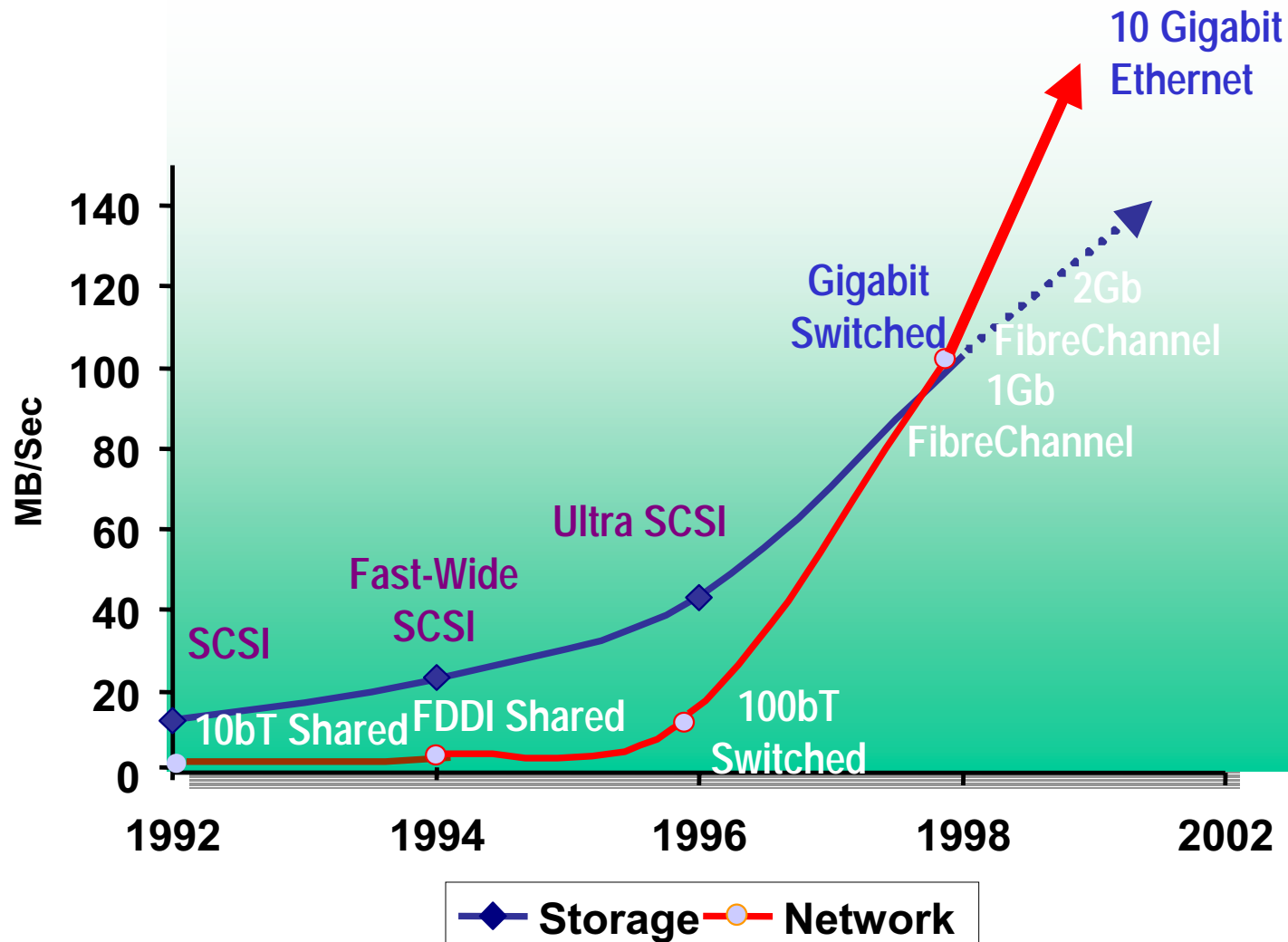


Why IP Access to Storage?

- 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

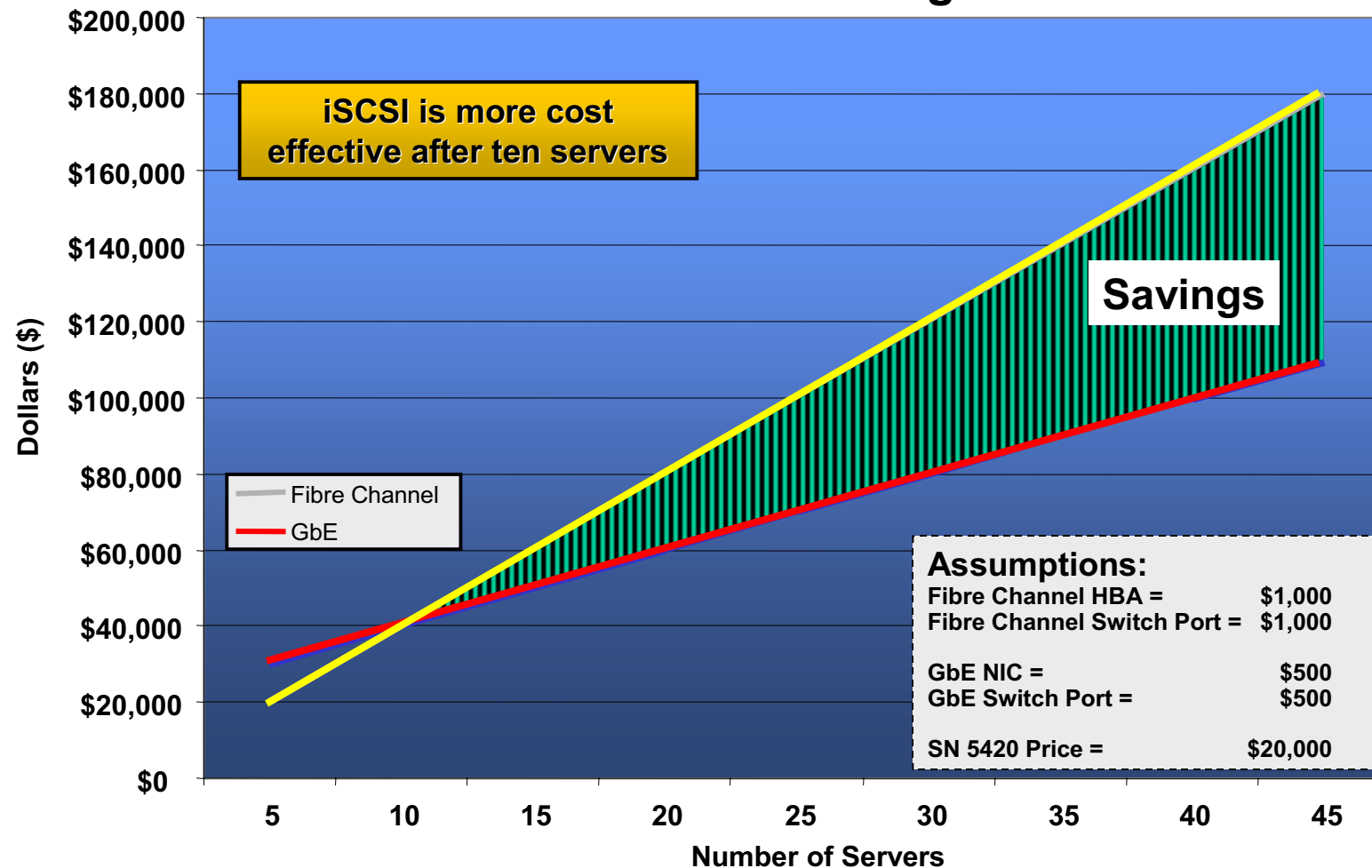
IP Latency and Throughput

Bandwidth is not a Bottleneck






Return on Investment for iSCSI

Cost Comparison Fibre Channel vs. GE to Connect Server Cluster to Storage Pool



Supported Operating Systems

- Linux
- Solaris
- Windows NT
- Windows 2000
- AIX  Under development by IBM
- HP UX  Under development by HP
- Netware  Under development by Novell

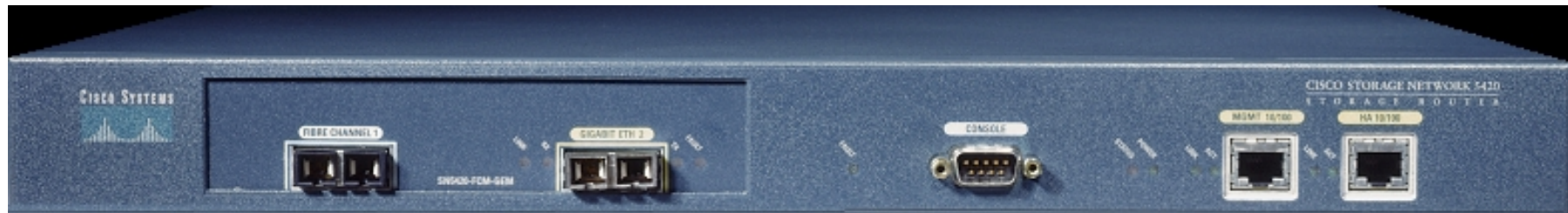


SN 5420 Product Overview

Industry's First iSCSI Networking Product

Universal Access to Storage over IP Networks

Cisco SN5420 Storage Router



Fibre Channel

RS232 Console

Gigabit Ethernet

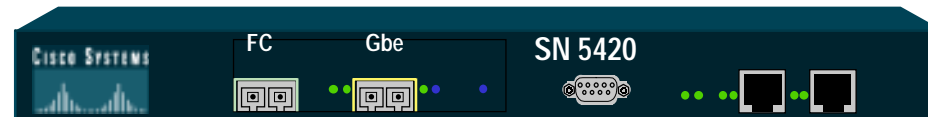
10/100 Ethernet Management

10/100 Ethernet High Availability

Management Interfaces

SN 5420 Storage Router Features

- Automatic device discovery
- Device mapping
- URL addressing



CISCO SYSTEMS
EMPOWERING THE INTERNET GENERATION®

CISCO STORAGE NETWORK 5420
S T O R A G E R O U T E R

[Monitor](#) [Configuration](#) [Maintenance](#) [Support](#) [Logout](#) [Help](#)

System
Processor and SW

Interfaces
Mgmt Interface
HA Interface
Fibre Channel
Show Targets
Gigabit Ethernet
Static Routes

Services
HA Cluster
SCSI Routers

Fibre Channel Target Information

Loop Id	Port Id	WWPN	Number of Luns	Device Type
1	N/A	22:00:00:20:37:a7:0d:76	1	Disk
7	N/A	22:00:00:20:37:a7:0d:68	1	Disk
8	N/A	22:00:00:20:37:a7:0b:4c	1	Disk
9	N/A	22:00:00:20:37:a7:0d:26	1	Disk
4	N/A	10:00:00:02:3d:00:04:60	0	
2	N/A	22:00:00:20:37:a7:0c:51	1	Disk
3	N/A	22:00:00:20:37:a7:0c:76	1	Disk
5	N/A	10:00:00:02:3d:07:06:80	0	
6	N/A	10:00:00:02:3d:00:04:c0	0	

CLI Interface for Management

- Command driven or accessed through the wizard-like Setup Command Facility

```
[LabA3]#  
add          Add entry to access list, app, etc.  
create       Create interfaces, apps, and access lists  
delete       Delete interfaces, apps, and access lists  
download     Download new SN5420 software  
verify       Verify SN5420 software  
failover     Fail an application over to another SN5420  
exit         Exit Administrator mode  
logout       Terminate session  
ping         send ICMP pings to a host  
reboot       Reboot the SN5420  
save         Save various objects  
set          Set various parameters, natch'  
show         Show various parameters and categories  
start        Start applications  
stop         Stop applications  
import       Import data  
restore      Restore a saved configuration
```


GUI Interface for Management

[Operation](#)[Configuration](#)[Maintenance](#)[Support](#)[Logout](#)[Help](#)

System

SN 5420

[Processor and SW](#)

[Mgmt Interface](#)

[HA Interface](#)

[Interface 1](#)

[Interface 2](#)

[HA Cluster](#)

[IP Routers](#)

[SCSI Routers](#)

SN 5420 Storage Router Front Panel - Click on a component for more information



Clicking on components will reveal the status of:

- [Processor and SW](#)
- [Mgmt Interface](#)
- [HA Interface](#)
- [Interface 1](#)
- [Interface 2](#)

High Availability

1 to 1

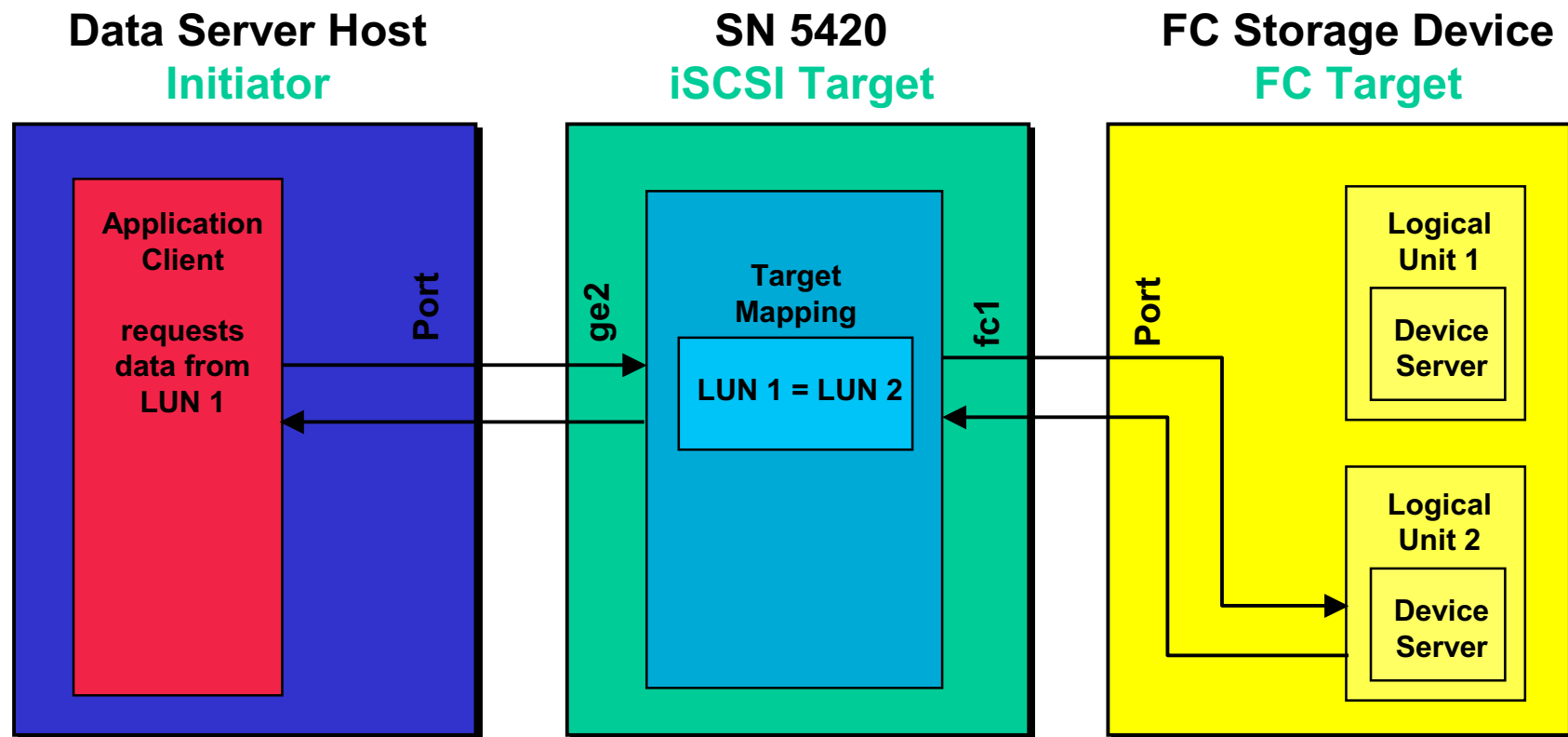


High Availability

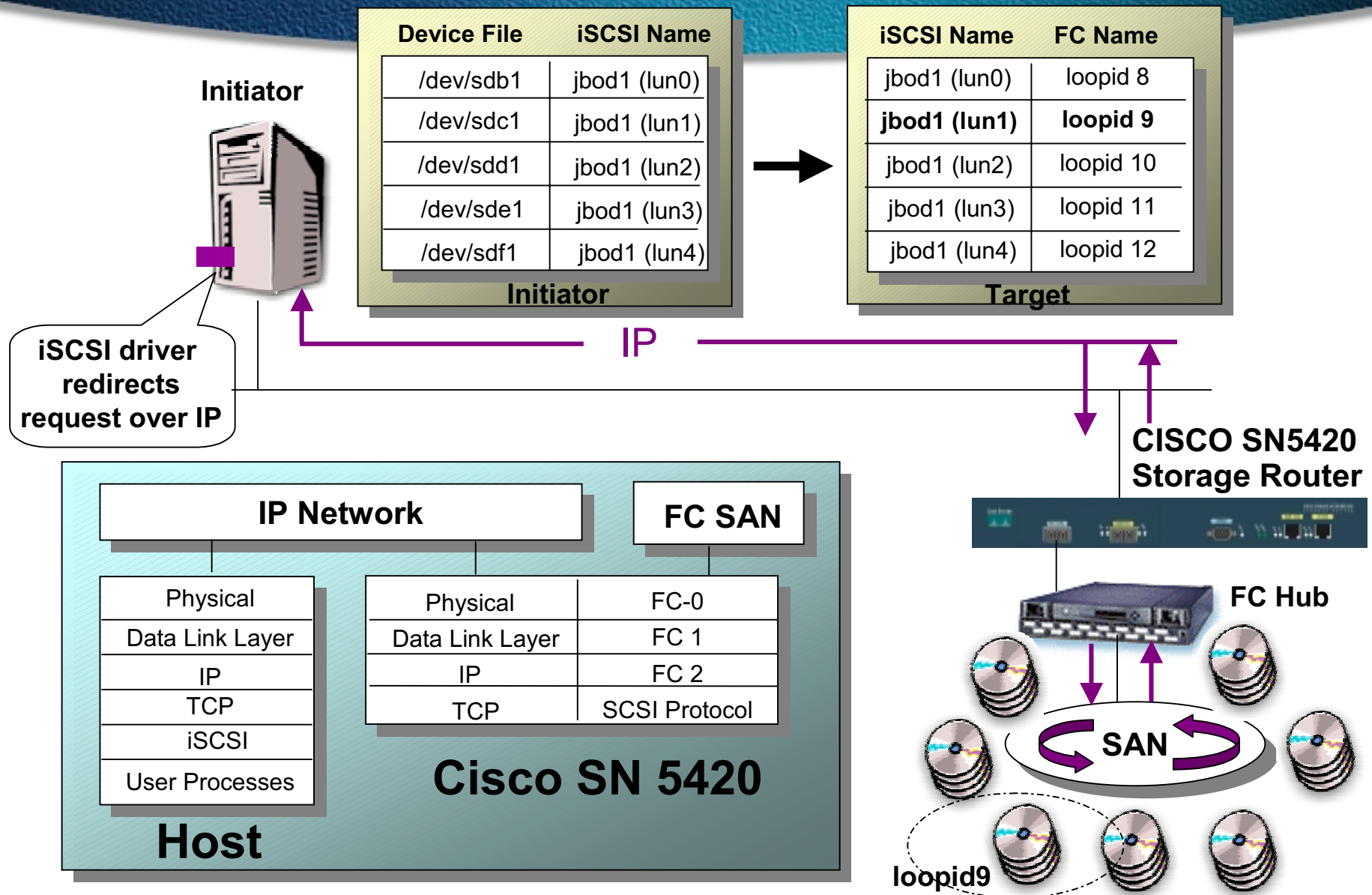
N + 1



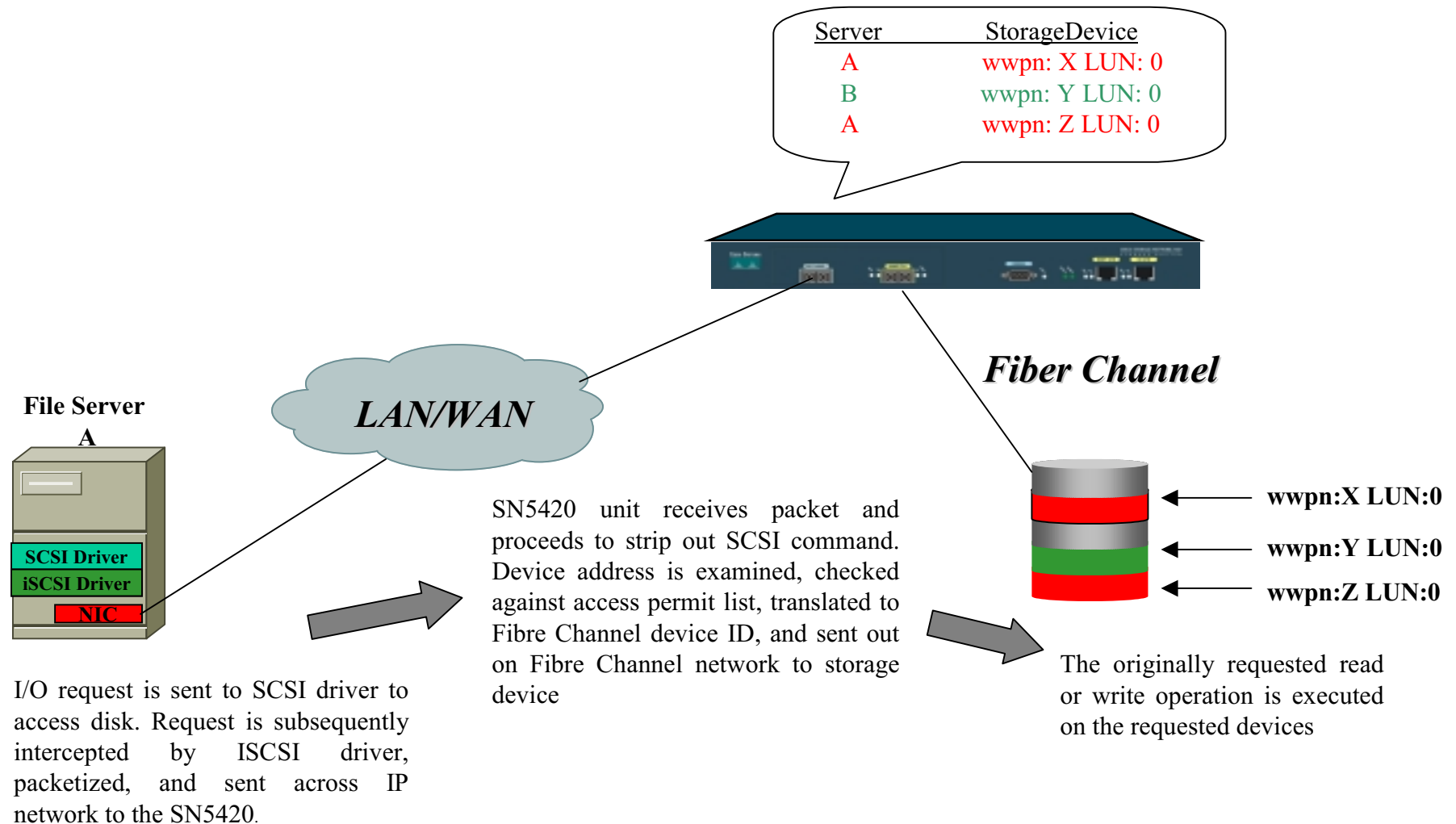
SCSI Over IP



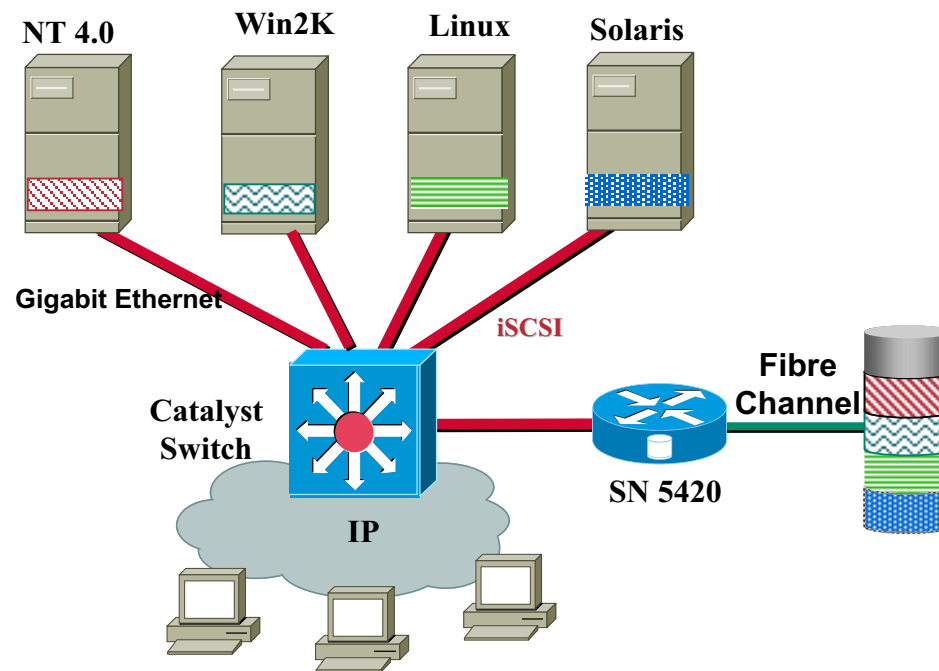
Distributed Block Server Fibre Channel Hub & JBOD



iSCSI of SN5420 Procedure

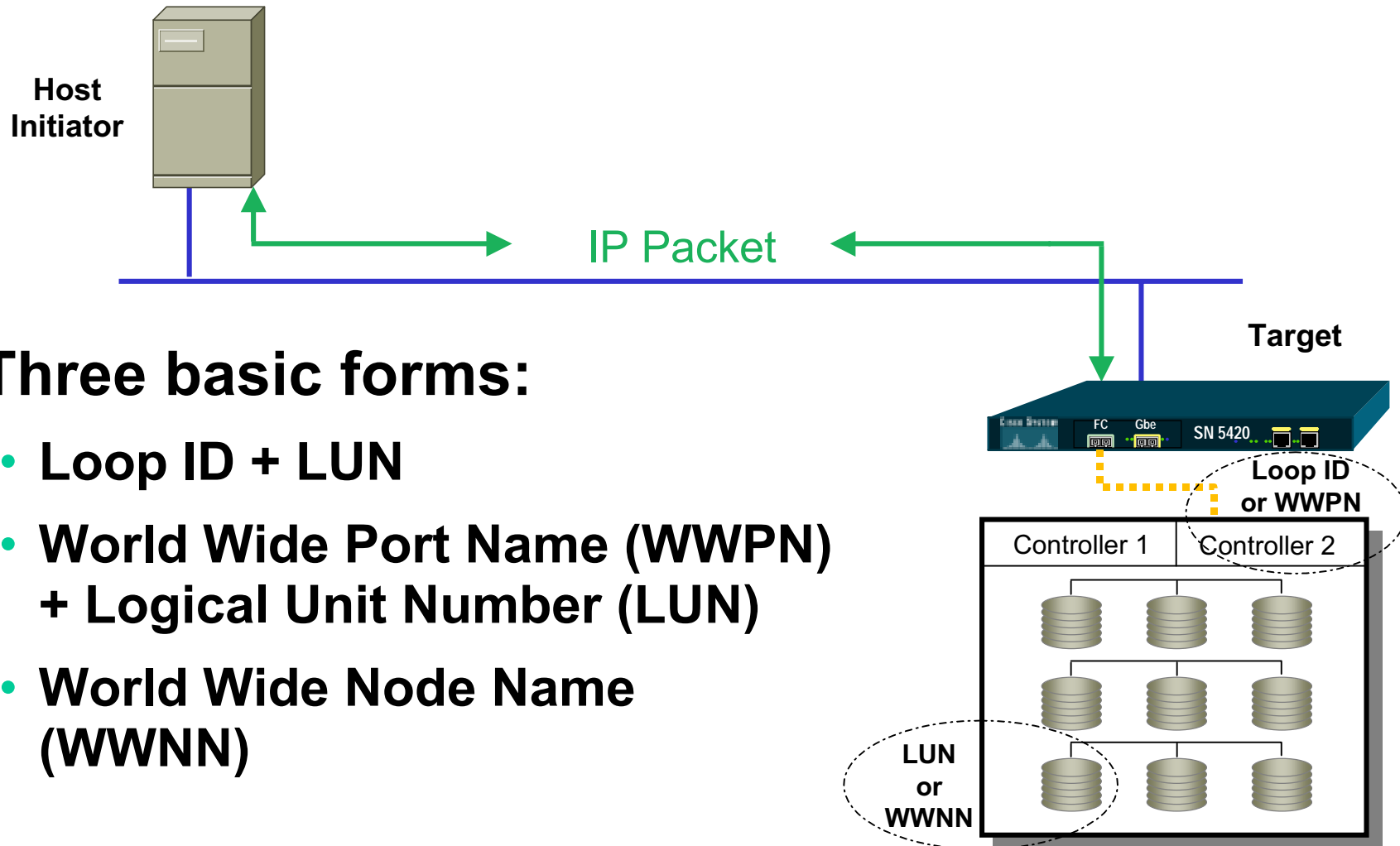


NICs with Cisco iSCSI Drivers



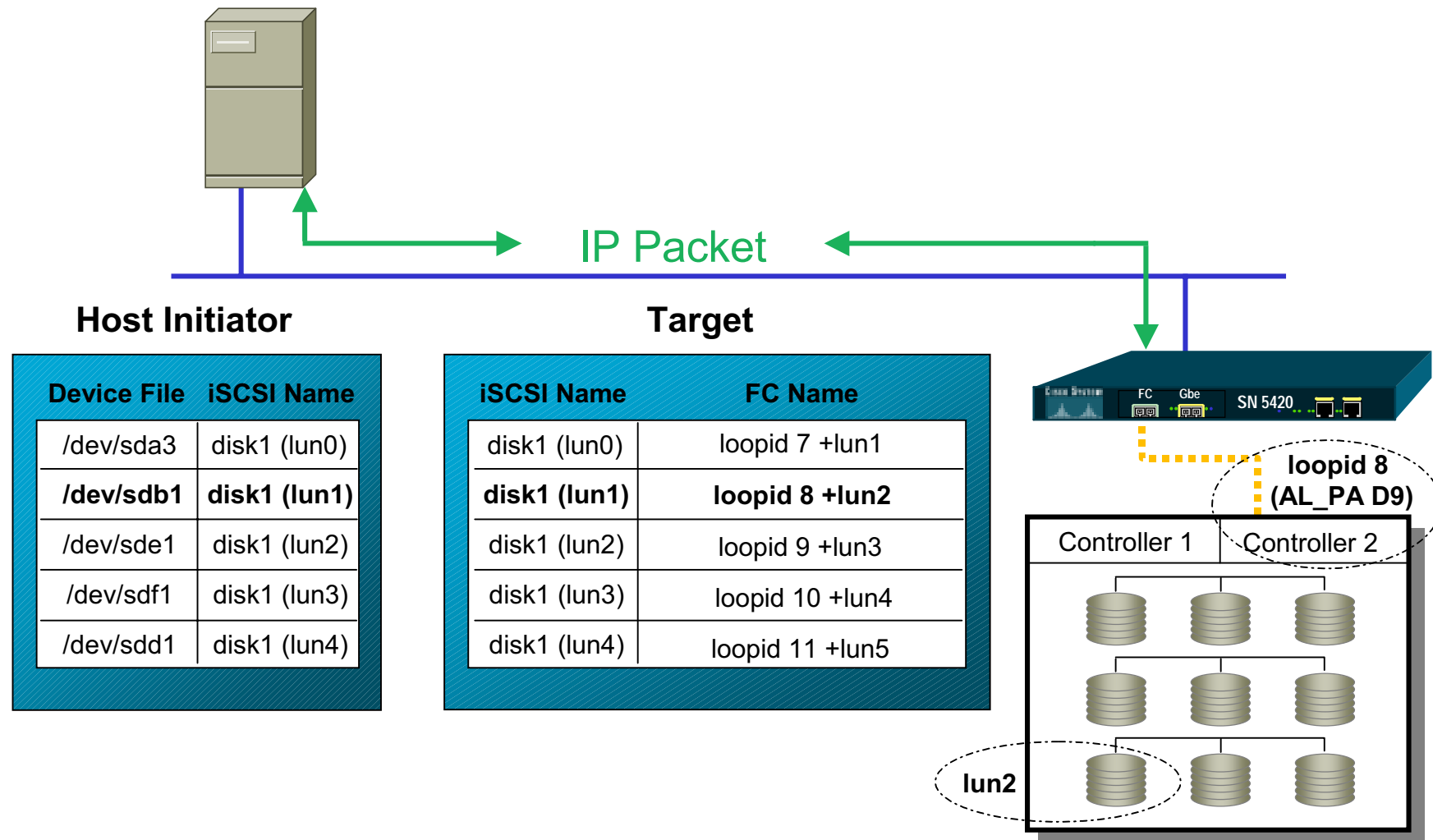
Showing a group of heterogeneous file servers accessing centralized storage resources over the IP network using iSCSI services provided by the SN 5420 storage router.

Fibre Channel Device Identification



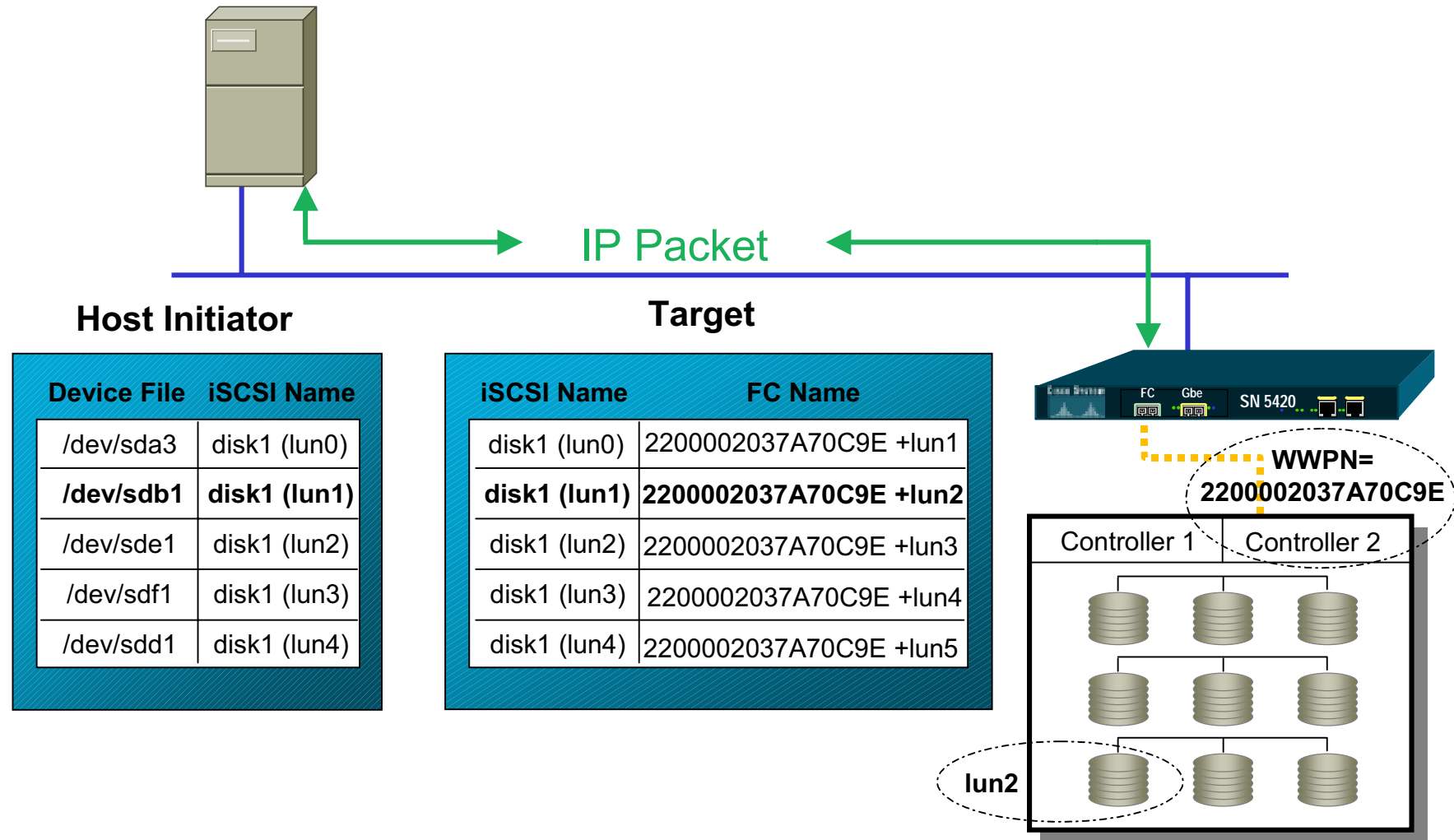
LUN Mapping

Using Loop ID + LUN

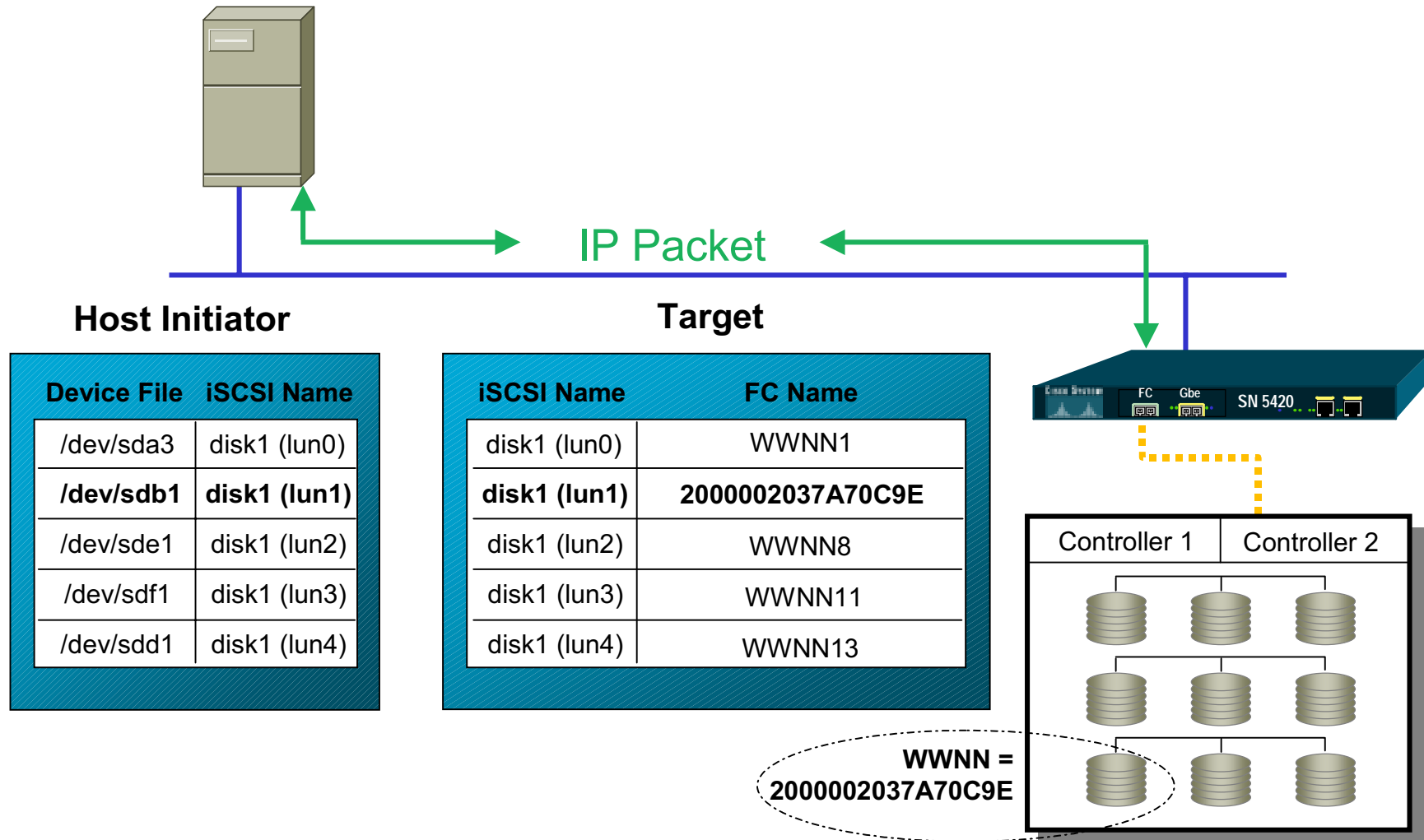


LUN Mapping

Using WWPN + LUN



LUN Mapping Using WWNN



SN 5420 Storage Router Capacity

Number Of iSCSI Services Task Instances Per SN 5420 Unit	Maximum Host Servers Supported By Each iSCSI Services Task Instance	Total Maximum Host Servers Supported Per SN 5420
4	32	128

Number Of Targets Configurable For Each Host Server	Number Of Logical Units (LUNs) Configurable Per Index – NT / Win2000 Host Operating Systems	Number Of Logical Units (LUNs) Configurable Per Index – Linux / Solaris Host Operating Systems
8	8	32

Maximum Total Number Of Storage Devices Per NT4.0 Or Win2000 Host	Maximum Total Number Of Storage Devices Per Solaris Or Linux Host
64 (Luns)	256 (Luns)

Other Features

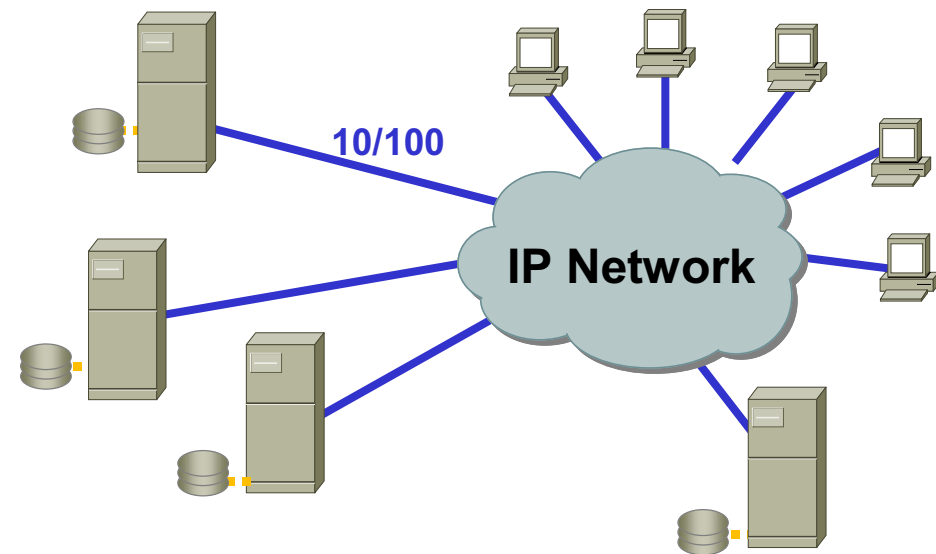
- Auto-discovery of storage devices
- Access Control Lists
- Supports iSCSI standard
- SNMP MIB support
- iSCSI drivers
- Backed by Cisco's extensive service and support programs



SN 5420 SAN Application

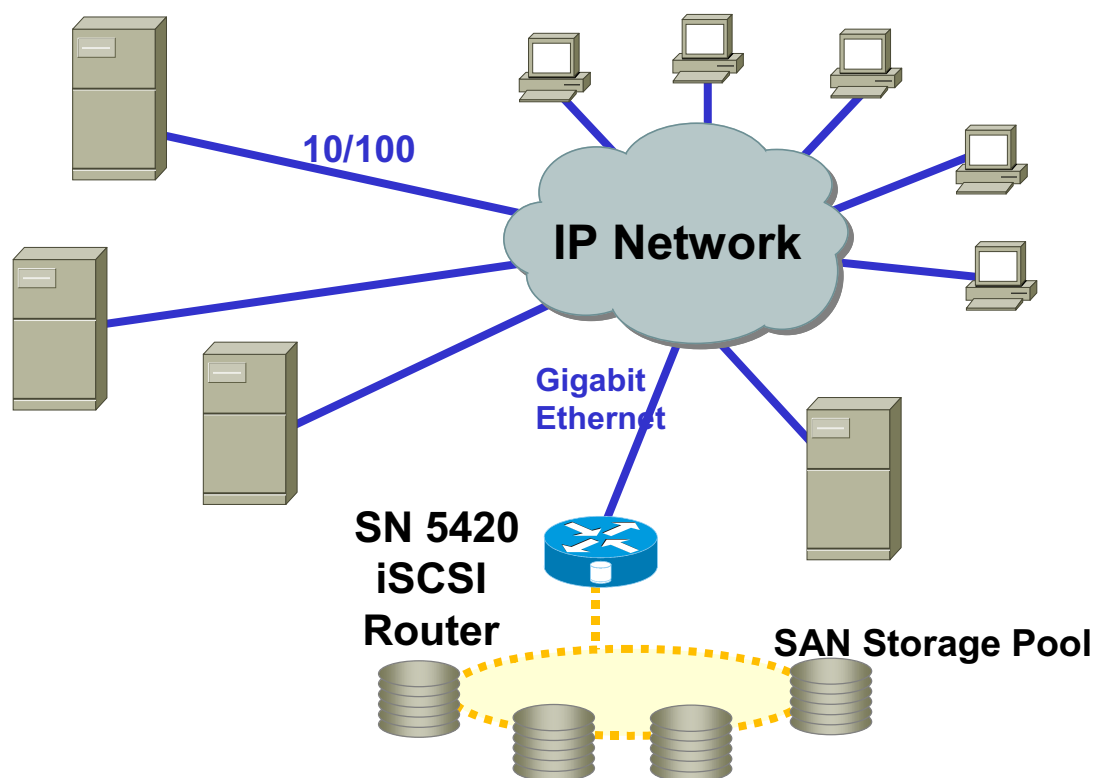
Enterprise Network Current

- Difficult to manage without centralized storage pool
- Poor disk utilization
- Difficult to scale with direct attached storage
- Depend on server vendor for storage solution



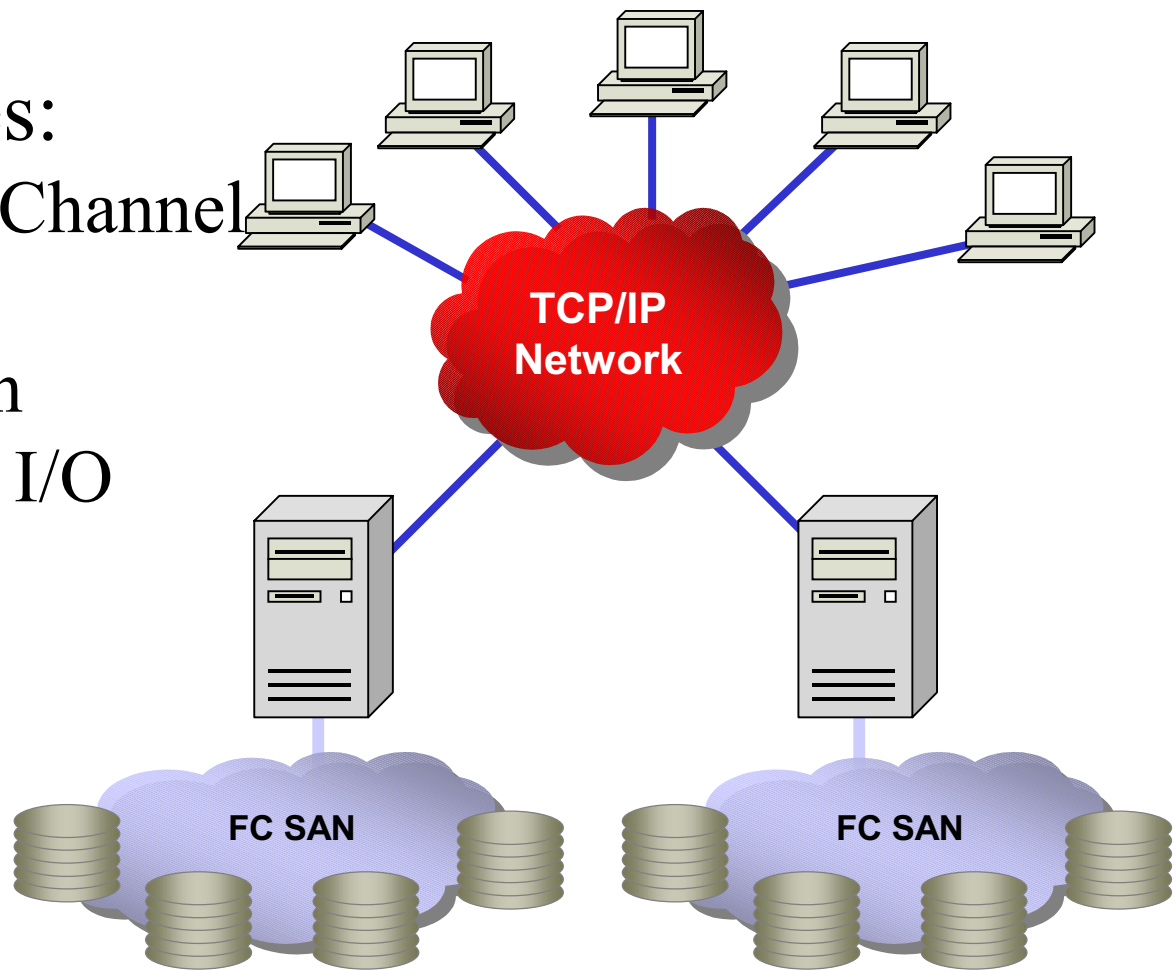
Enterprise Network with SN 5420

- SAN-based Storage Pool for centralized management and higher disk utilization
- Hosts remain on IP network
- Transparent block access of storage via Cisco SN5420 storage router



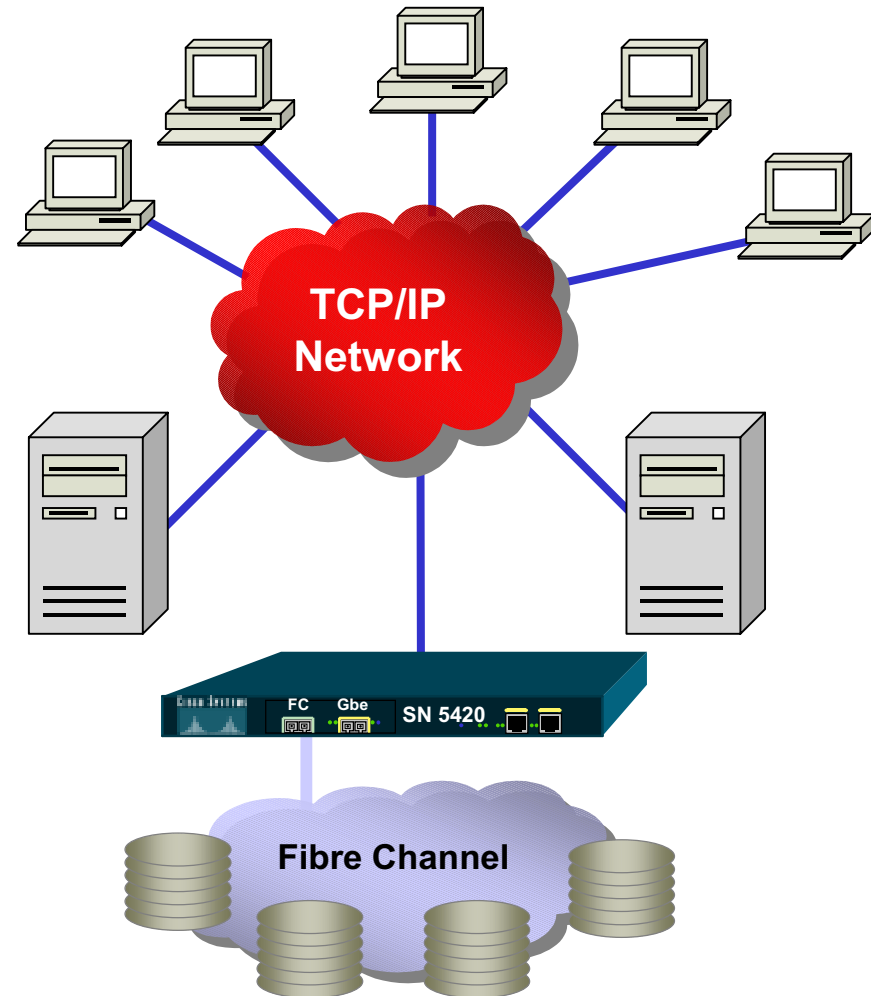
Current SAN Islands

- Disadvantages:
- Requires Fibre Channel in servers
- Servers are both application and I/O processors

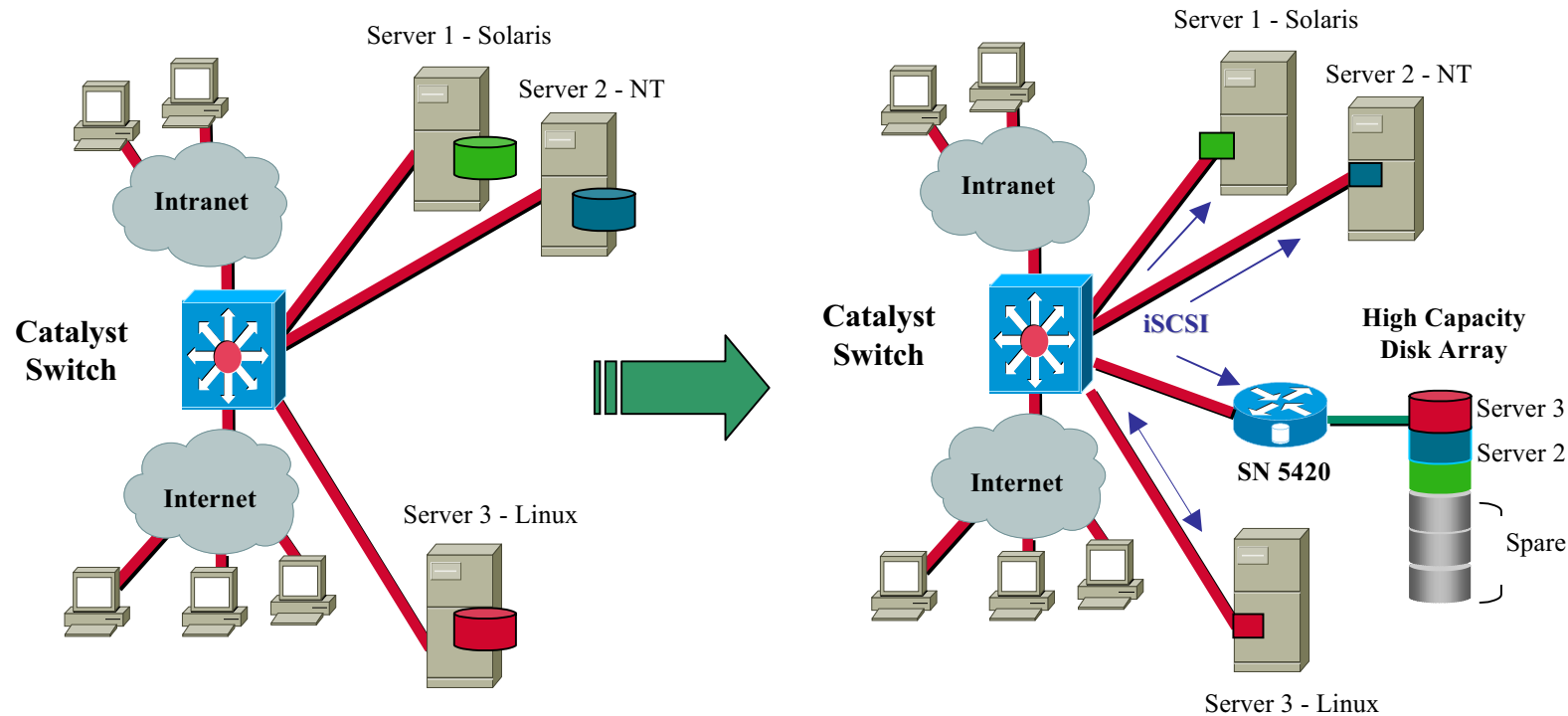


SAN Island Consolidated with SN 5420

- **Advantages:**
 - Fibre Channel used for storage only
 - IP accessible storage from anywhere
 - Servers are dedicated to application processing
 - Storage is pooled by linking SAN islands



Storage Consolidation – LAN



Left diagram shows servers 1, 2, and 3's previous dependency on direct attached storage and on the right after the implementation of iSCSI and the SN5420 to allow all servers to share a common IP accessible high capacity storage array.

Storage Consolidation – MAN

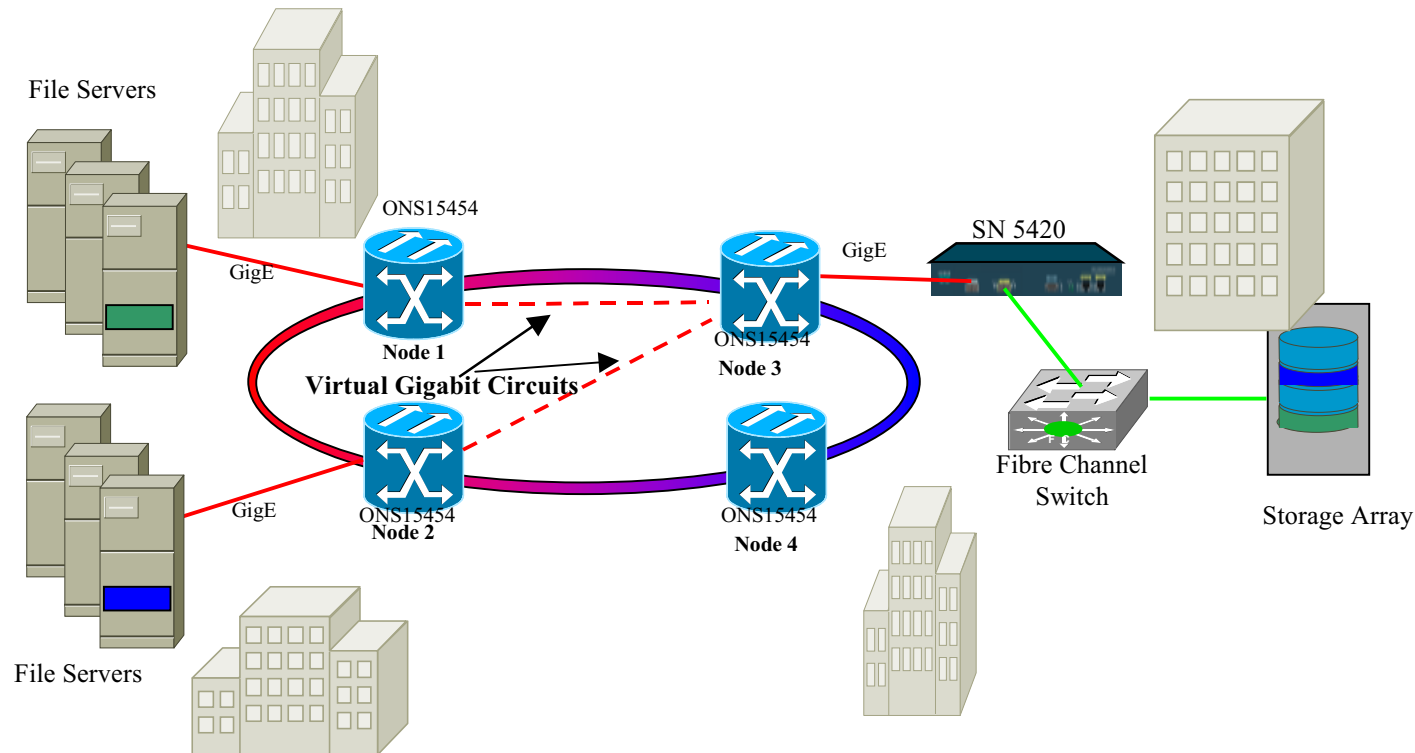
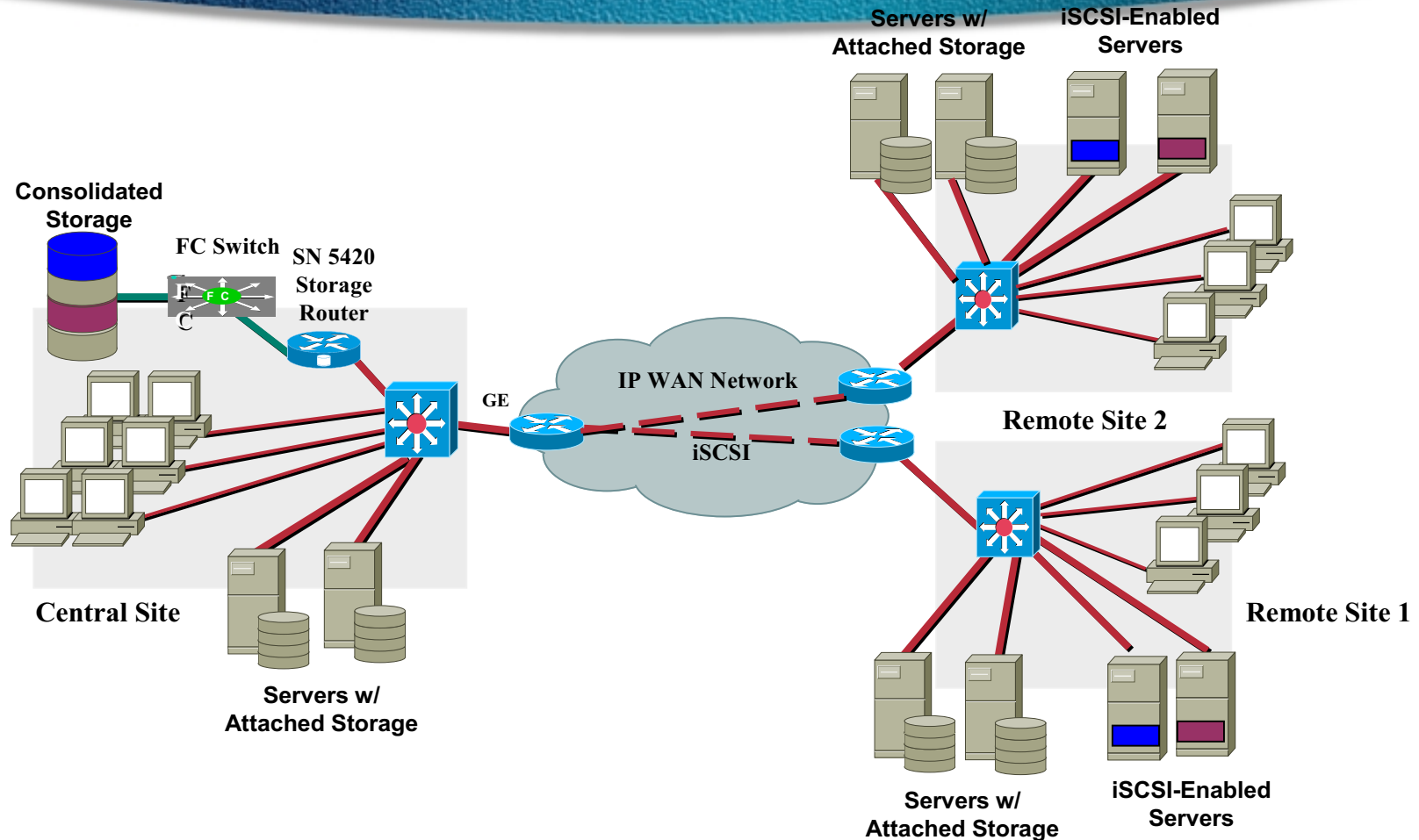


Diagram depicts the distributed deployment of File Servers utilizing a Sonet optical metro network infrastructure. The SN5420 utilizes virtual Gigabit Ethernet circuits to provide the file servers with access to storage resources over IP.

Storage Consolidation – WAN



Storage consolidation involving iSCSI enabled servers accessing consolidate storage resources at the central site using the SN 5420 Storage Router.

Storage Outsourcing – LAN

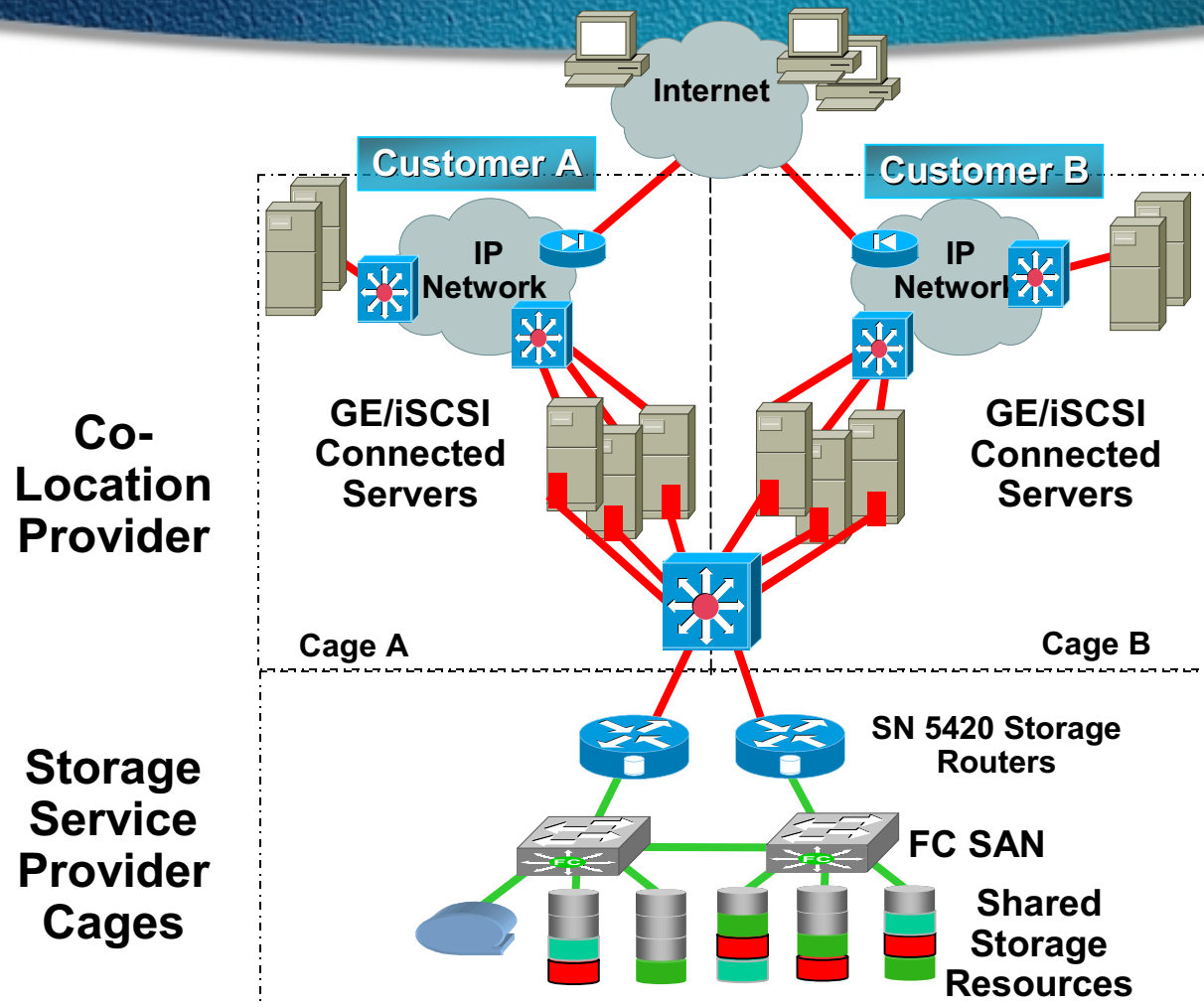


Diagram shows file servers for customer A and B at co-location facility attached to Storage Service Provider gear at the same location. Storage Service Provider cage utilizes the SN 5420 Storage Router

Storage Outsourcing – MAN

- Wavelength per customer
- FC or GE

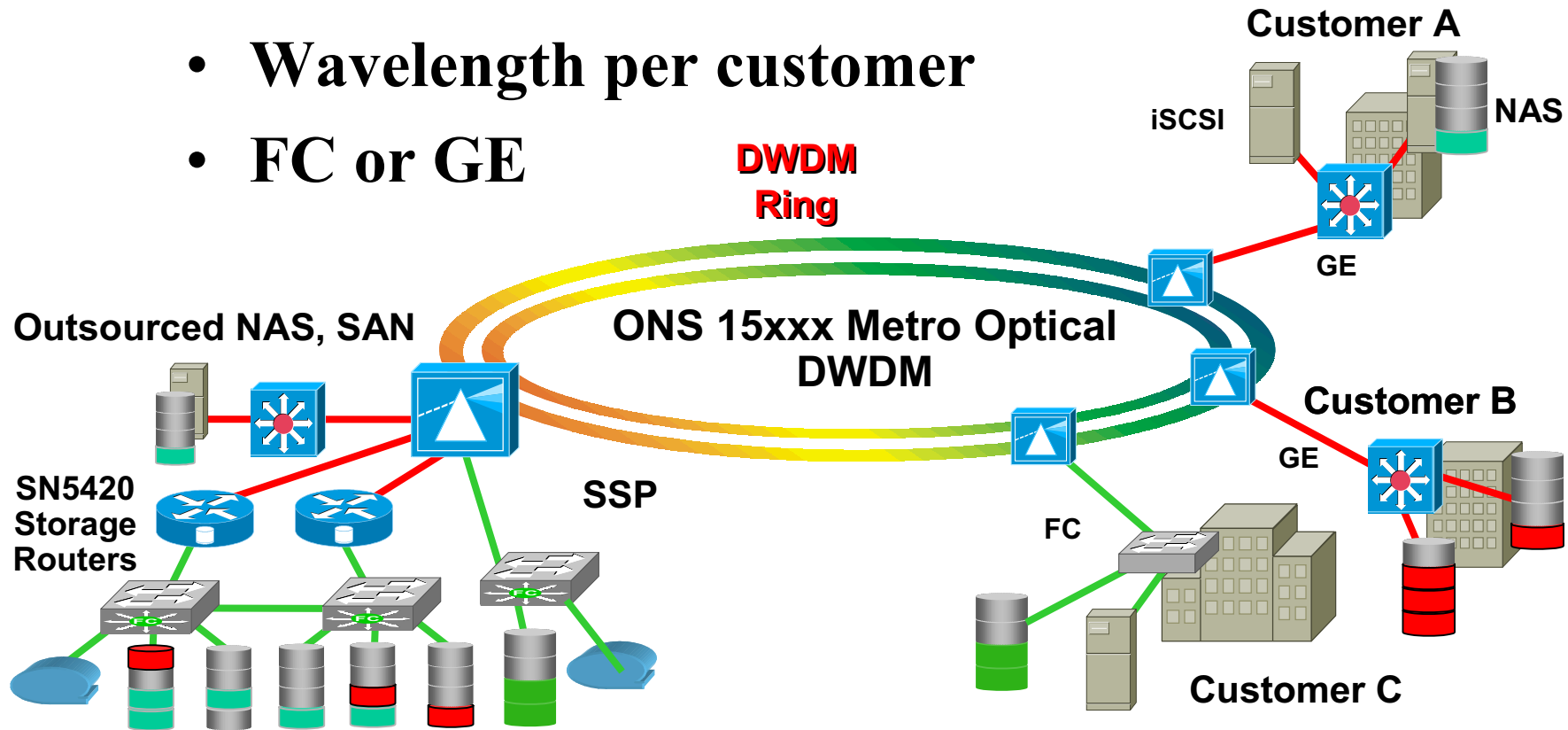
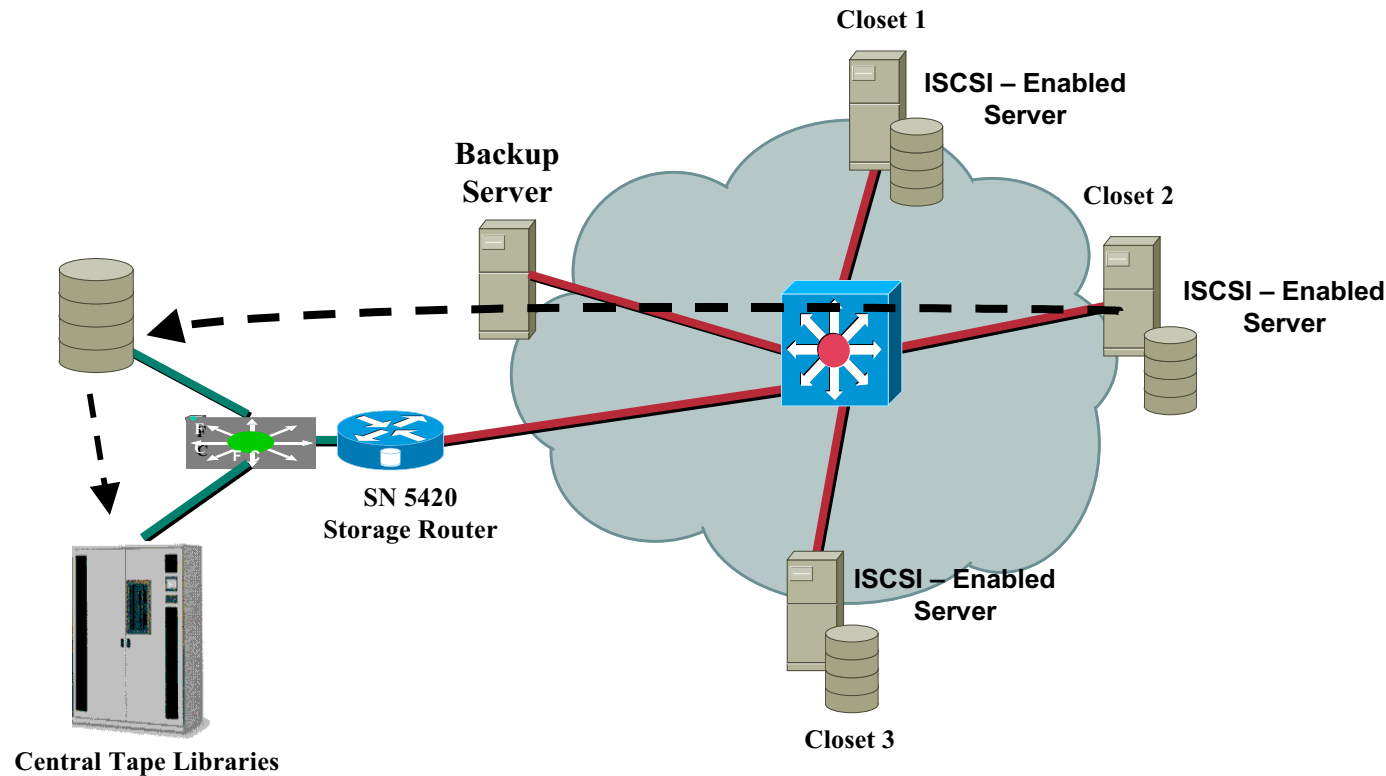


Diagram shows a SN5420 iSCSI deployment over a Metro Optical Network where a Storage Server Provider (SSP) is using the SN5420 to provide managed storage resources to 3 clients using a common high capacity storage array.

Host-Based Storage Replication And Backup – LAN



Backup to centralized tape library using the SN5420 Storage Router to provide iSCSI over IP storage resource connectivity between servers in closets and a centralized tape library.

Host-Based Storage Replication And Backup – WAN

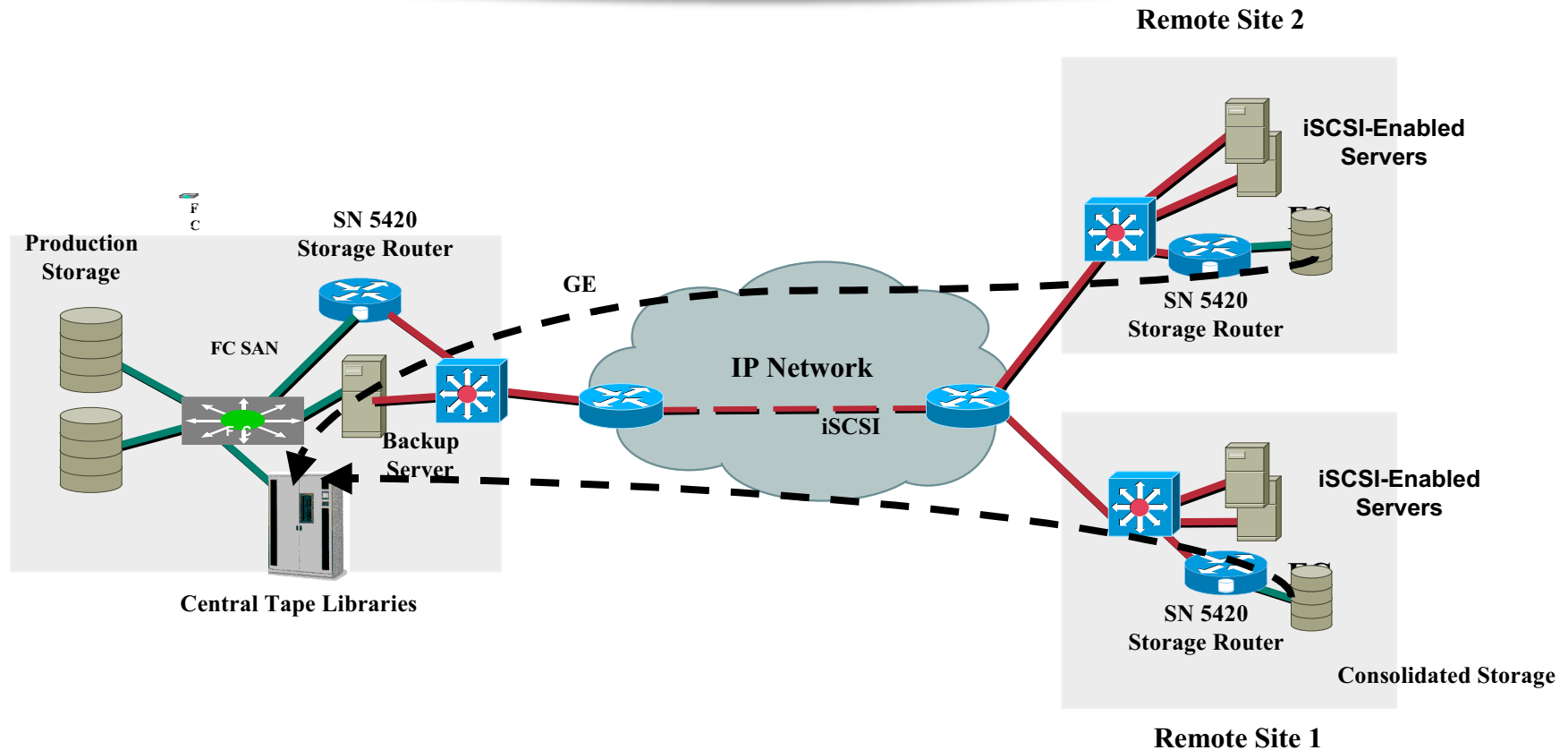


Diagram shows remote host-based backup over the WAN using the SN5420 to provide iSCSI transport between the remote site servers and the centralized tape library



Customer Example

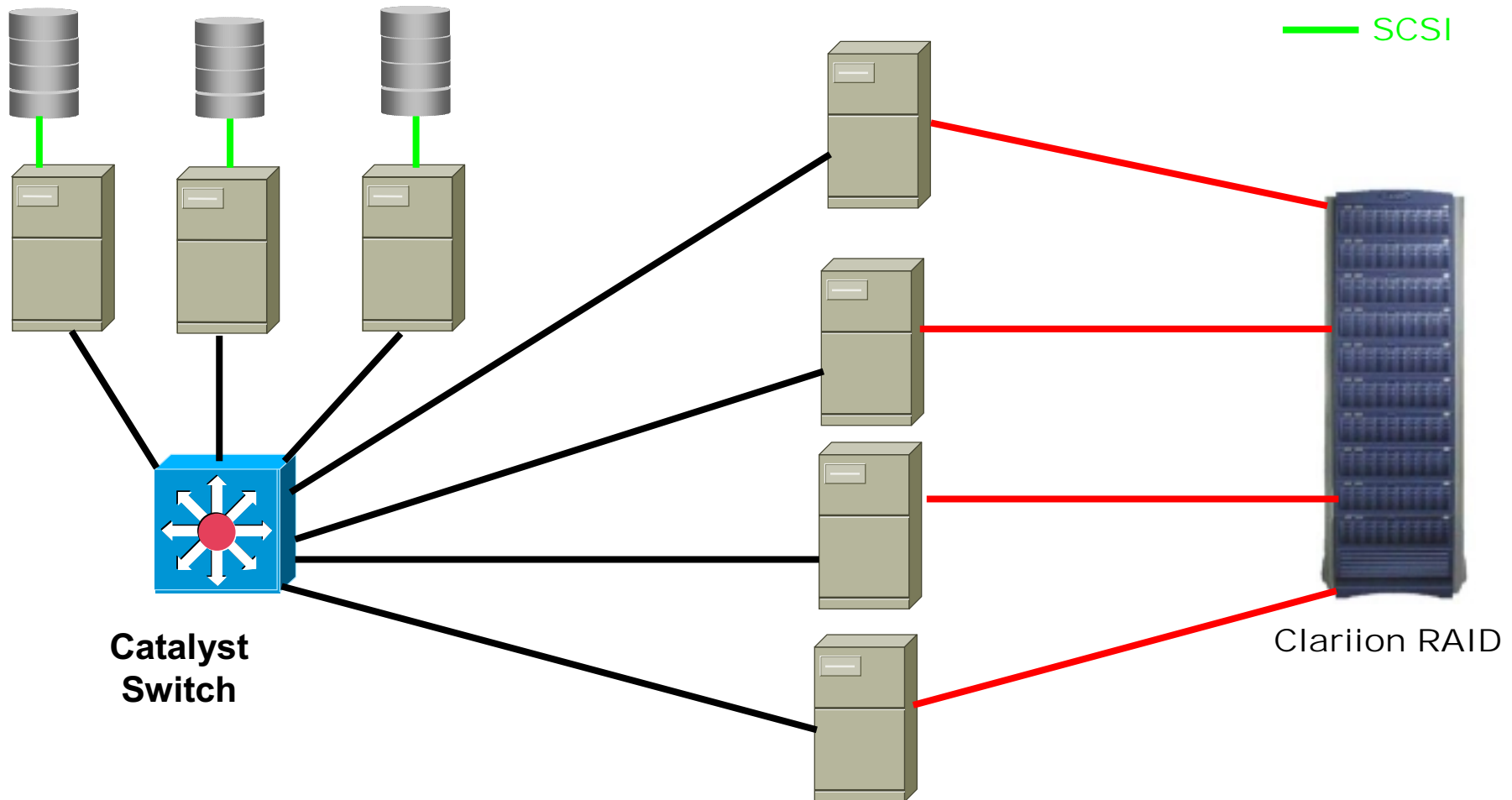
University – Before

28 servers with DAS

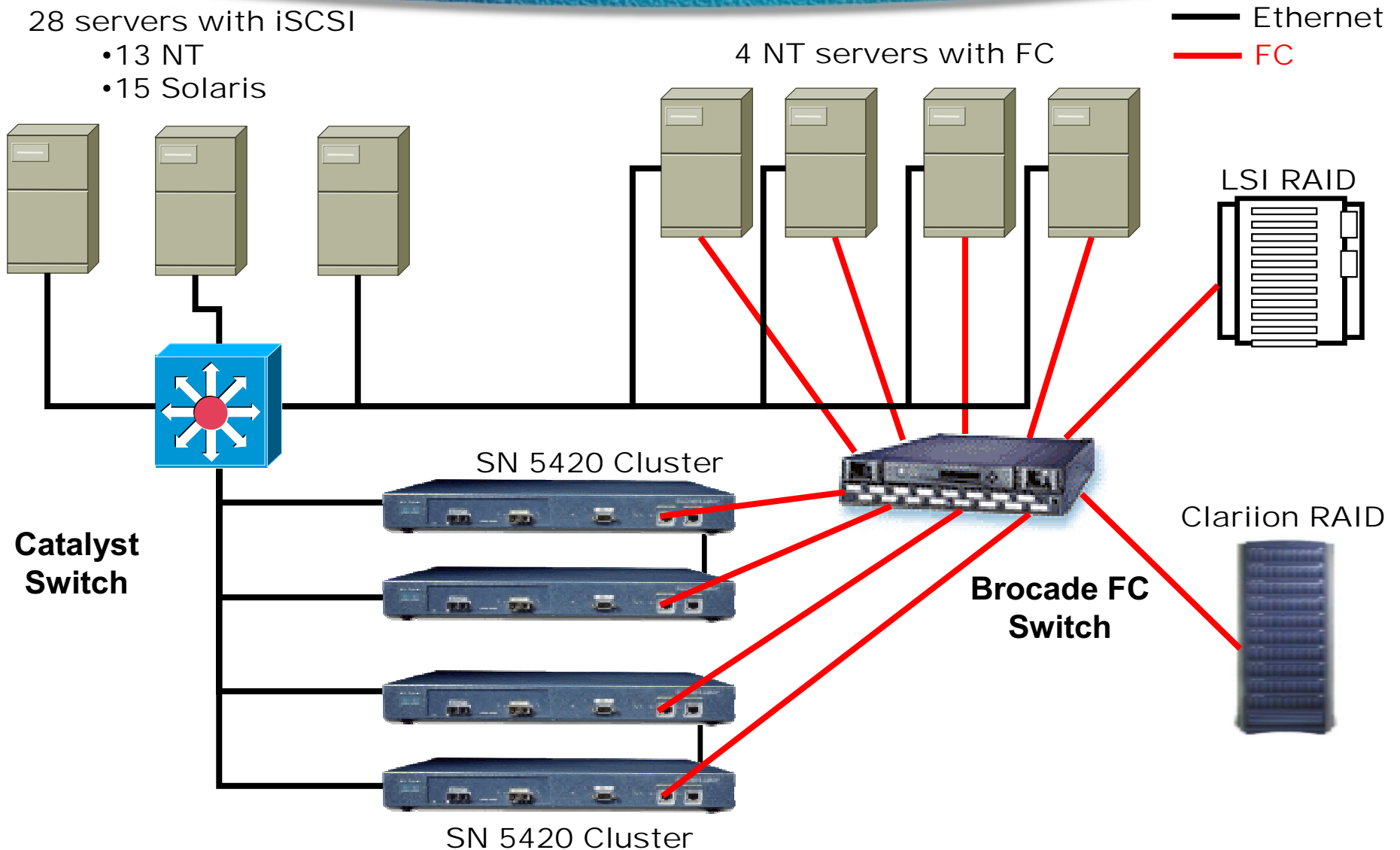
- 13 NT
- 15 Solaris

4 NT servers with FC RAID

— Ethernet
— FC
— SCSI



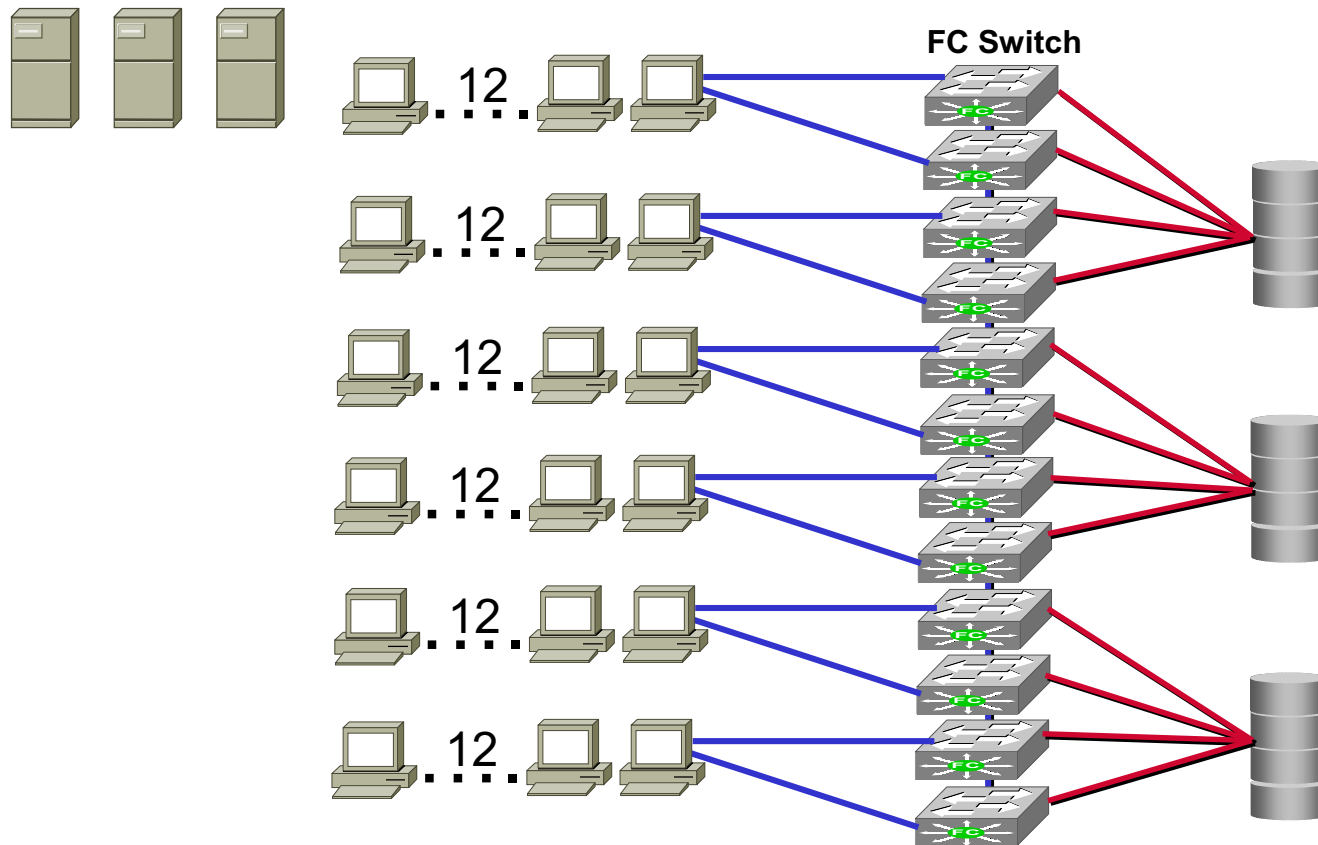
University - After



University Benefits

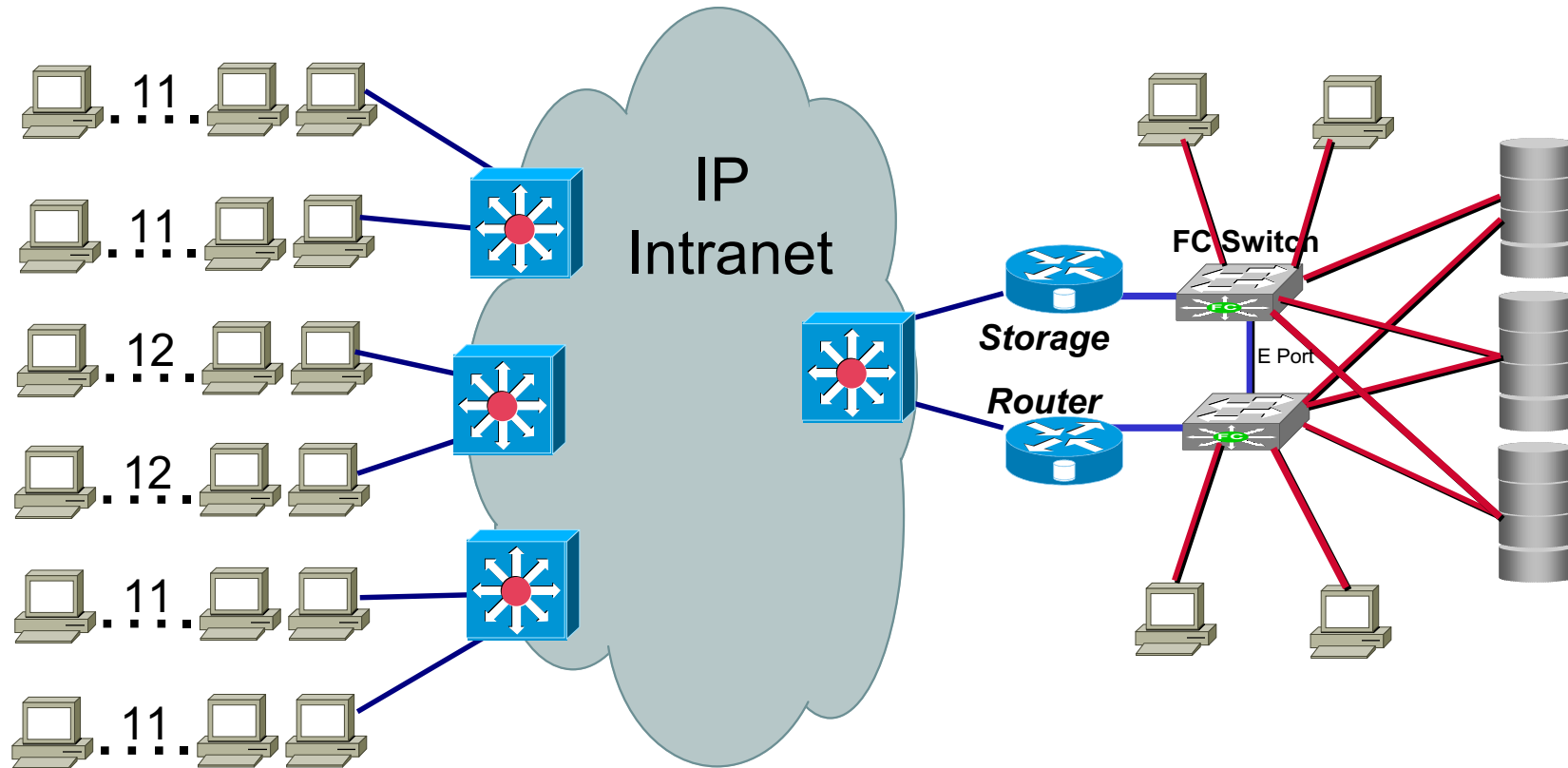
- Consolidated Disk Storage – Leverage Cost per Megabyte
- Reduce Total Cost of Ownership by leveraging IP infrastructure
- Provide faster ROI of Gigabit Ethernet Infrastructure
- Allow for more Scalable solution than DAS

Medical Research – Competition offering



- 72 NT Servers
- Compaq StorageWorks – 4 TB Disk
- 12 Brocade Switches
- Dual path between all devices

Medical Research - After



- 72 NT Servers
- Compaq StorageWorks – 4 TB Disk
- 2 Brocade Switches
- Dual path between all devices

Medical Research Firm

Case Study

Problem	<ul style="list-style-type: none">• Required inexpensive access to pooled storage• Adding storage to existing servers too expensive to manage• Low levels of storage utilization
Solution	<ul style="list-style-type: none">• Redundant Cisco SN5420 Storage Router• Pooled storage• Centralized backup and recovery
Financial Impact	<ul style="list-style-type: none">• Initial capital cost reduction of over \$600,000• Reduced cost of data management by 80 %
Operations Impact	<ul style="list-style-type: none">• Met performance requirements of 94% server utilization• Centralized storage management• Improved security for users• Flexible access for remote locations

Networking + Storage + Partners

AVVID Partner Program for Storage Networking

<http://www.cisco.com/go/avvidpartners>

Interoperability Testing In Process With
Over 25 Technology Partners

For Up To Date Testing Status:

<http://wwwsrbu.cisco.com/ent/srbu/Sales/Certification/index1.shtml>





SN5420 DEMO

