

Cisco SN 5420 Storage Router—Extending Your Storage Network with iSCSI

The Cisco SN 5420 Storage Router implements the Internet Small Computer Systems Interface (iSCSI) protocol to extend access of your Fibre Channel fabric and attached storage devices to IP servers. iSCSI combines the benefits of the TCP/IP protocol suite with SCSI, the universal standard for storage access. By utilizing iSCSI, the Cisco SN 5420 extends your Fibre Channel storage network to lower-priced/lower-performance servers in your data center and departmental servers located throughout your campus and enterprise. With the Cisco SN 5420, you can access your Fibre Channel storage area network (SAN) from anywhere on an IP network as easily as accessing direct-attached storage (refer to Figure 1). By taking advantage of the cost advantages of 10/100 Ethernet networks or the performance advantages of Gigabit Ethernet, the Cisco SN 5420 Storage Router can connect servers to your shared Fibre Channel storage pool that would have previously been cost-prohibitive. The Cisco SN 5420 provides other advanced features, including network boot, which allows servers to be booted from an external storage device across an iSCSI network.

Storage Consolidation

As companies grow, traditional direct-attached storage systems can become increasingly expensive to manage and maintain. Consolidation of data onto an intelligent centralized storage system offers significant benefits in resilience, manageability, and scalability. A consolidated storage solution can significantly increase disk utilization by decreasing data duplication and increasing disk space efficiency. An effective consolidation strategy enables the sharing of a storage subsystem accessible to every platform your company uses. It can also simplify backup and restore procedures, increase reliability and fault tolerance, and reduce management costs. iSCSI is the ideal technology to extend the reach of your storage pool to reduce management costs.

Cisco SN 5420 Storage Router Primary Features

- Provides access to Fibre Channel storage across IP networks through iSCSI technology
- Designed for high availability, providing continuous access to critical data
- Extensive security features protect valuable storage resources
- Uniquely provides standard IP networking capabilities to storage environments
- Provides network boot capability, which allows a server to boot from a network drive on an IP network
- Offers full breadth of iSCSI drivers
- Offers fully integrated management tools
- Offers ease of use through standard Cisco user interfaces and configuration tools
- Provides global 24 x 7 technical support

Figure 1
 Cisco SN 5420 Storage Router





Key Benefits

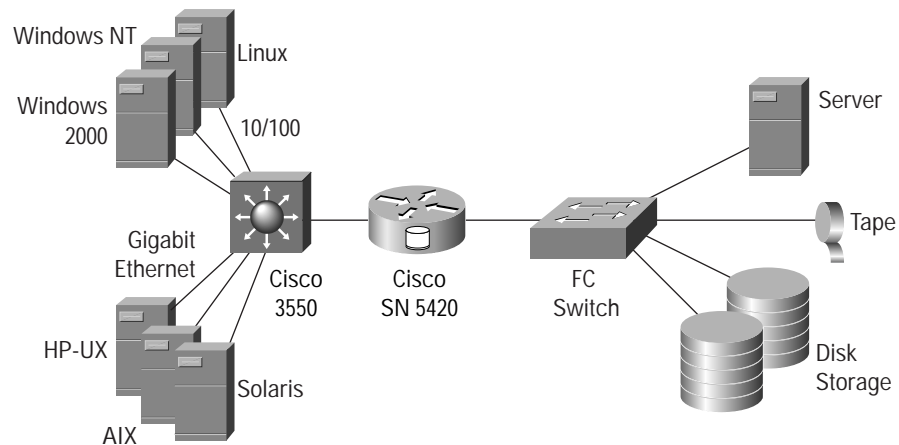
Extending the Storage Network to IP

The Cisco SN 5420 Storage Router fits seamlessly into existing storage and data networks. The Cisco SN 5420 is based on both IP and Fibre Channel standards, providing interoperability with existing local-area network (LAN), metropolitan-area network (MAN), wide-area network (WAN), optical, and SAN equipment. Network administrators familiar with IP networking will be instantly familiar with the Cisco SN 5420 and its management interfaces.

The Cisco SN 5420 interconnects Ethernet networks to Fibre Channel-connected storage (Figure 2), for both disk and tape storage devices. You can use the entire base of IP network management, performance, and quality of service (QoS) tools to optimize an IP storage network.

Figure 2

Cisco SN 5420 supports multiple operating systems access across 10/100 or Gigabit Ethernet to Fibre Channel storage.



iSCSI Drivers

Cisco iSCSI drivers, which reside on the server, are a key component of the Cisco SN 5420. These iSCSI drivers intercept SCSI commands, encapsulate them as IP commands, and redirect them to the Cisco SN 5420. These drivers are supported on an industry-leading number of operating systems and are fully compatible with the latest version of the iSCSI draft standard. Cisco provides drivers for the following environments:

- Windows NT
- Windows 2000
- Solaris
- Linux
- HP-UX
- AIX



Block-Level Access

The Cisco SN 5420 makes storage systems accessible at a block level across all leading operating systems. With the Cisco SN 5420, storage connected through the Cisco SN 5420 will appear the same as a locally attached disk. Your existing application software suites will operate without modification.

Security

In addition to providing easy access to storage, the Cisco SN 5420 provides extensive security capabilities that are critical for controlling access to your valuable storage resources. Although these security features are a regular component of most IP networks, they are new to the world of networked storage. The Cisco SN 5420 brings these advanced security features to storage networking to protect your valuable storage resources.

By taking advantage of standard IP technology for storage access, the Cisco SN 5420 allows you to use:

- Existing security infrastructure (firewalls, access control lists, and others)
- Networking QoS and prioritization—This provides service-level agreements (SLAs) for your storage.
- Logical unit number (LUN) mapping—This allows servers to gain access only to specific LUNs.
- Access lists—Access lists provide Layer 3 protection to the LUNs that have been mapped.
- Password protection—This provides further security to restrict access based on controls set by the administrator.
- Virtual LAN (VLAN) 802.1Q technology—VLANs are a common LAN network that can be logically segmented on an organizational basis by functions, project teams, or applications to restrict access across Layer 2. See Figure 3.
- VLAN Trunking Protocol (VTP)—This protocol is used for managing and controlling VLANs.
- Remote Access Dial-In User Service (RADIUS) and TACACS+—These protocols provide authentication for the iSCSI login process. A server must complete the authentication process during iSCSI login to be granted access to the storage resources. See Figure 4.

Figure 3

VLAN Diagram (Although servers are on the same Ethernet switch, they can access storage devices only on their specific VLAN.)

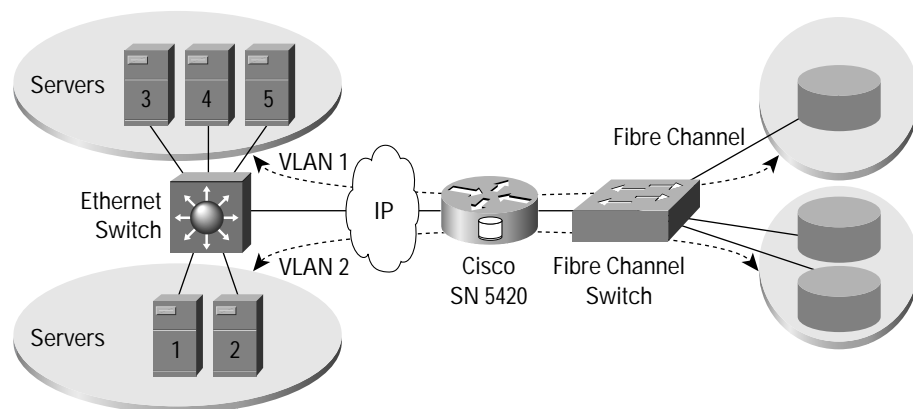
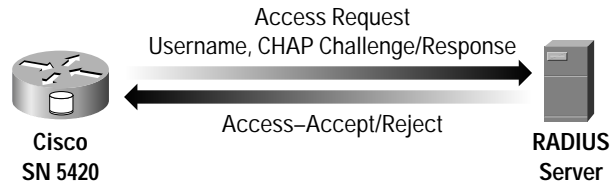




Figure 4
RADIUS Authentication During the iSCSI Login Sequence



Taking Advantage of IP

Total cost of ownership (TCO) is a growing concern for most data center system administrators and their management. These costs arise from all aspects of storage management, including hiring and training of qualified personnel, backup and restoration, equipment upgrade, monitoring, learning new storage protocols, and interoperability. The Cisco SN 5420 is ideal when using both Fibre Channel and TCP/IP protocols. It combines the high-performance data transfer capabilities of Fibre Channel with the interoperable, and widely understood, TCP/IP. Because of its ubiquity, TCP/IP is an ideal protocol for network interoperability and now for storage interoperability.

Scalability

The Cisco SN 5420 provides optimal performance and reliability for your IP network and storage systems. You can add Cisco SN 5420s to match the performance and reliability needs of your network. You can stack up to four Cisco SN 5420s and interconnect them to form logical clusters. This ultra-high-availability architecture enables you to scale performance with availability. If one unit in a cluster fails, you can configure another unit to automatically take over for the failed unit. You can stack Cisco SN 5420s to achieve the level of fault tolerance and reliability you require to support the most demanding applications.

Network Boot with iSCSI

System and network administrators are continuously looking for ways to reduce their costs. This applies to both the management of their networks and the equipment used in these networks. An advanced capability enabled by the Cisco SN 5420 addresses both of these. The network boot feature allows servers or clients to have their boot drive on shared centralized storage accessed over an IP/iSCSI network rather than being internal to the server or client. With network boot, management costs are reduced because “golden” copies of the boot images are centrally maintained and protected. This allows faster deployment of new servers in the event of a hardware failure. Furthermore, lower-cost 1U/2U servers and the emerging blade servers can now be deployed without internal hard drives by using the network boot feature. An additional benefit from network boot is the capability to repurpose servers for different applications and operating systems based on a variety of conditions. Servers no longer have to be dedicated to a specific operating system or application. Because the boot images are managed remotely from the server, the administrator selects which boot image to utilize at a particular time.

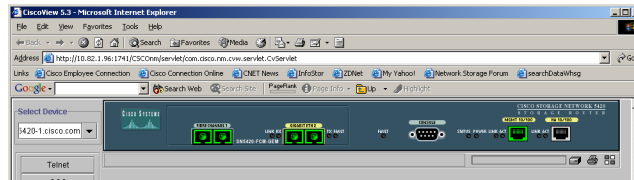
Manageability

The Cisco SN 5420 provides full network management support through the industry-standard Simple Network Management Protocol (SNMP). Standard Management Information Bases (MIBs) are available, ranging from iSCSI MIBs to the Fibre Alliance MIB. By using MIBs that are inherent to TCP/IP networks, the Cisco SN 5420 is



supported by industry-standard SNMP system managers. No new learning curve is necessary. In addition to SNMP management, the Cisco SN 5420 also supports CiscoWorks (Figure 5), Cisco's network management product suite, and Cisco Discovery Protocol. With the Cisco Discovery Protocol, devices interconnected to the Cisco SN 5420 can be discovered and displayed in a variety of standard network topology formats.

Figure 5
CiscoWorks Display



Familiar Configuration and Management Interface

Installing the Cisco SN 5420 is easy. Simply connect it between your Ethernet network and Fibre Channel fabric and use the Cisco SN 5420 configuration wizard to install the router.

With the configuration wizard, IP-accessible storage is only minutes away. After you install the Cisco SN 5420, you can monitor and manage it with existing IP system managers, the Cisco SN 5420 Web-based graphical user interface (GUI), or the Cisco SN 5420 command-line interface that uses familiar Cisco configuration syntax (Figure 6). The configuration file from one Cisco SN 5420 can be exported to additional Cisco SN 5420s, providing very fast configuration in large storage environments.



Figure 6
Cisco SN 5420 GUI

The screenshot displays the Cisco Storage Network 5420 GUI. At the top, it identifies the device as 'SN 5420 Storage Router techpubs-2'. A navigation menu includes 'Monitor', 'Configuration', 'Maintenance', 'Troubleshooting', 'Support', 'Home', and 'Help'. A status bar shows 'OK' for various components like 'CPU', 'Memory', and 'HA'. Below this, there are buttons for 'Auto Reload' and 'Update every 5 seconds'. The main content area is titled 'Processor and Software Information' and contains the following data:

System Name	techpubs-2	Software Version	2.1.1.2
System Model	SN5420-FCM-GEM	System Deployed For	SCSI routing
System Part Number	800-12299-03	Current Date	06 Mar 2002 14:20 GMT+6
System Serial Number	SAD05030PB3	Last Configuration Change	06 Mar 2002 09:57 GMT+6
		Last Reset	06 Mar 2002 09:30 GMT+6
PCA Part Number	74-2026-02		
PCA Rev Number	01	Reason for Reset	System Reset
PCA Serial Number	SAP0504SATB		
Avg CPU Usage	5 sec: 0 %	Diagnostic Status	Passed
	1 min: 0 %		
	5 min: 0 %		
Buffer Memory Size	114 MB	Flash Disk Size	63424 blocks (block=512)

Investment Protection

Including the Cisco SN 5420 in your network allows you to use your existing TCP/IP networking infrastructure while maintaining your current and near-term investments in storage systems. The Cisco SN 5420 helps to reduce the costly management, deployment, and support issues faced by all storage administrators by extending your existing Fibre Channel SAN to additional servers.



Summary

The Cisco SN 5420 Storage Router, based on iSCSI technology, successfully combines IP intelligence with storage networking technology to extend your Fibre Channel fabric and attached storage devices to IP servers. The Cisco SN 5420 provides several crucial capabilities for today's storage networks, including:

- By connecting directly to either Fibre Channel storage devices or Fibre Channel switches, it extends your existing Fibre Channel SAN to more servers through cost-effective 10/100 Ethernet or higher-performance Gigabit Ethernet networks.
- iSCSI-attached storage over an IP network is accessed the same as locally attached storage.
- The Cisco SN 5420 provides levels of security and access control beyond those currently available in traditional SANs by including Layer 2 and Layer 3 protection to resist against unauthorized access to your storage resources.
- The Cisco SN 5420 uses the TCP/IP protocol suite for storage networking, thereby protecting your existing investment in storage and networking infrastructure.
- The Cisco SN 5420 provides flexibility by allowing boot images to be managed independently of the server.
- The Cisco SN 5420 takes advantage of existing management and configuration tools that are already well known and understood.
- Based on industry standards, the Cisco SN 5420 maximizes your investment and enables you to reduce TCO for the increasing storage demands on your network.

Technical Specifications of the Cisco SN 5420

Interface Specifications

Gigabit Ethernet

One port

Media type

Fixed SC connector

Optical standards

100BASE-SX

Cable distances, short-wave optical

500m (1640 ft)

Fibre Channel

Fibre Channel

One N_port or NL_port

Media type

Fixed SC connector

Optical standards

100-M5-SN-I with SC connector

100-M6-SN-I with SC connector

Cable distances, short-wave optical



Data rate	Cable	Distance
1 Gbps	50	500m (1640 ft)
1 Gbps	62.5	300m (984 ft)

Management Interfaces

- In-band management through Gigabit Ethernet
- EIA/TIA-232 console, RJ-45 connector
- Ethernet 10/100 management, RJ-45 connector
- Ethernet 10/100 high availability, RJ-45 connector

Cisco iSCSI Drivers

- Windows NT 4.0 Server and Workstation (SP6A)
- Windows 2000 Server and Professional (SP2)
- Linux Redhat
- Solaris
- AIX
- HP-UX

Protocols and Standards

Internet Standards

- RFC 791 IPv4
- RFC 793, 1323 TCP
- RFC 894 IP/Ethernet
- RFC 1041 IP/802
- RFC 1812 IPv4 Route
- RFC 1517 CIDR
- RFC 792, 950, 1256 ICMP

Ethernet Standards

- IEEE 802.3z Gigabit Ethernet
- IEEE 802.1q VLAN
- Fibre Channel Standards
 - FC-AI-2
 - FC-FLA
 - FC-GS-3
 - FC-PH
 - FC-PH-2
 - FC-PH-3



Management Standards

- RFC 1157 SNMP v1
- RFC 1901 through 1908 SNMP v2c
- RFC 1213 MIB II
- iSCSI MIB
- Fibre Channel Management MIB
- RFC 2665 Ethernet-like MIB
- RFC 2668 MAU MIB
- Cisco CDP MIB
- RFC 2737 Entity MIB
- RFC 2863 Interface Extensions MIB

Network Boot Requirements

Client system requirements

- Preboot Execution Environment Protocol (PXE) Version 2.1 or higher
- Minimum 24K upper memory
- Cisco Network Boot Program
- Dynamic Host Configuration Protocol/Trivial File Transfer Protocol (DHCP/TFTP) server

Servers OS supported

- Windows 2000 Server or Advanced Server
- Cisco iSCSI drivers
- Windows 2000

Mechanical

Enclosure type

- 19-inch rack-mountable
- Secure stacking with optional feet
- Optional front or rear rack-mounting

Dimensions

- Width: 17.5 in. (444 mm)
- Height: 1.75 in. (44.4 mm) 1 rack unit
- Depth: 15.5 in. (394 mm)
- Weight 7.5 lb (3.4 kg)

Environmental

Operating temperature: 23° to 113°F (-5° to 45°C)

Humidity: 15 to 80%, noncondensing

Altitude: 0 to 9843 ft (3000m)

Nonoperating temperature: -13° to 158°F (-25° to +70°C)

Humidity: 5 to 90% noncondensing

Altitude: 0 to 15,000 ft (4570m)

Vibration: IEC 68-2

Shock: IEC 68-2

Electrical

Operating voltage:

100 to 120 VAC, 50 to 60 Hz autosensing

200 to 240 VAC, 50 to 60 Hz autosensing

Power source loading

1.0 amps maximum at 100 to 120 VAC

0.5 amps maximum at 200 to 240 VAC

Regulatory Agency

Product safety:

UL 1650: (U.S.)

CSA C22.2 No. 60950: (Canada)

EN 60950: (European Union)

IEC 60950: (International)

AS/NZS 3260, TS001: (Australia and New Zealand)

Emissions



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Cisco Service and Support for Cisco Storage Networking

The Cisco SN 5420 is supported by a service portfolio designed to align your unique business strategies and goals with a high-performance, high-availability storage networking system. Technical Support Services and Advanced Services covering the entire product life cycle are delivered by Cisco and via its ecosystem of best-in-class partners.