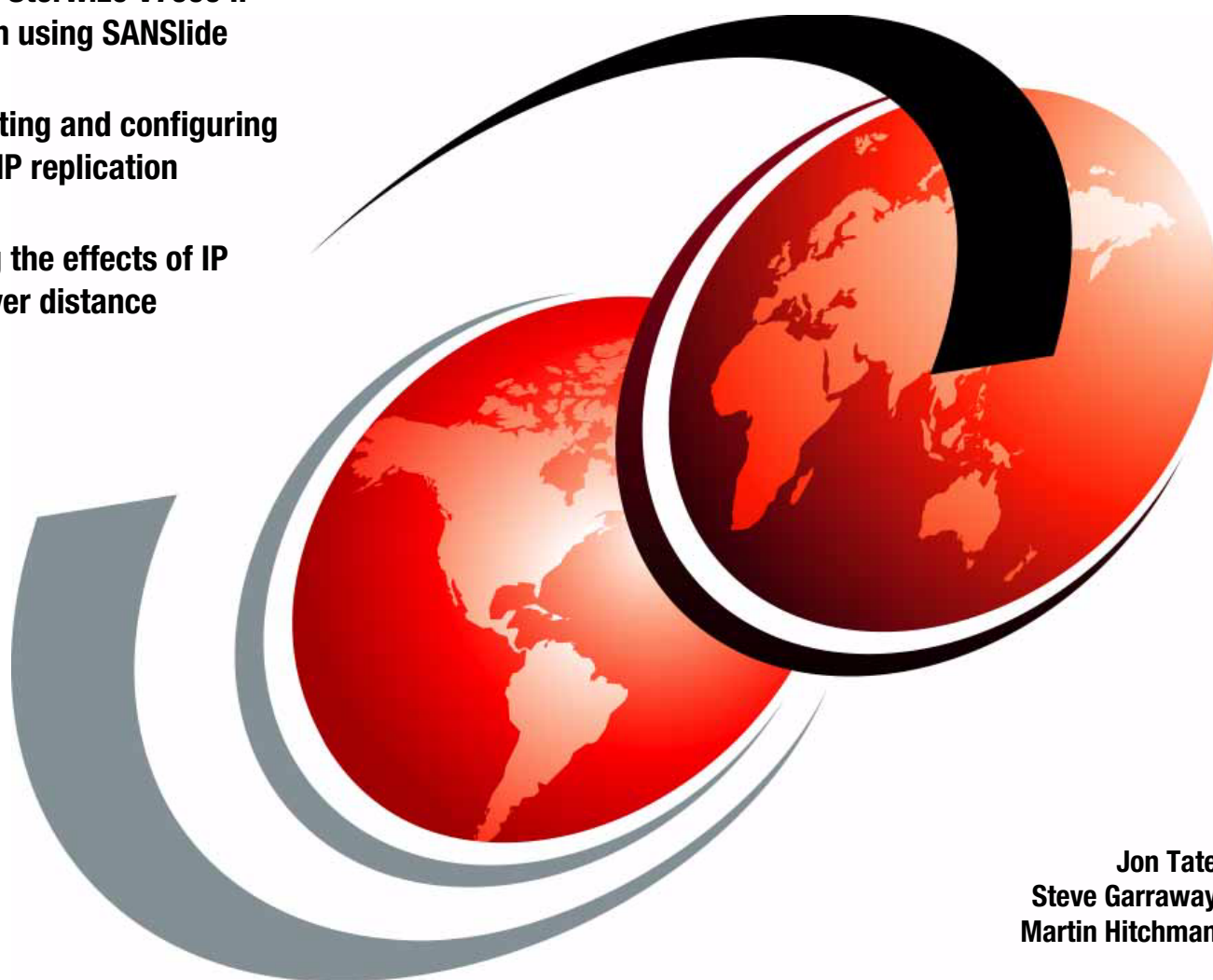


IBM Storwize V7000 and SANSlide Implementation

Extending Storwize V7000 IP
replication using SANSlide

Implementing and configuring
SANSlide IP replication

Mitigating the effects of IP
latency over distance



Jon Tate
Steve Garraway
Martin Hitchman



International Technical Support Organization

IBM Storwize V7000 and SANSlide Implementation

July 2013

Note: Before using this information and the product it supports, read the information in “Notices” on page v.

First Edition (July 2013)

This edition applies to IBM System Storage SAN Volume Controller, IBM Storwize V7000, and Storwize V3700 when running at supported interoperability levels connected to the Storwize V7000 SANSlide Series 150 V7KSVC (SANSlide 150).

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Preface

IBM® has announced certification of the Bridgeworks SANSlide Series 150 V7KSVC with its IBM System Storage® SAN Volume Controller, IBM Storwize® V7000, and Storwize V3700 virtualized storage systems. This combination of SANSlide and the Storwize V7000 system provides a powerful solution for clients who require efficient, IP-based replication over long distances.

This certification gives IBM Storwize V7000 clients a fully supported, transparent technology that includes unmatched levels of performance and reliability. With the SANSlide protocol acceleration technology, it is now possible to replicate data across continents in a cost-efficient way, with little or no loss in performance. At the same time, bandwidth utilization can improve to over 95%, instead of the 1% - 5% normally achieved in long-distance IP networks.

This IBM Redpaper™ publication shows the steps required to implement this solution efficiently and speedily.

Authors

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Tony Price
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Introduction to the SANSlide Series 150 V7KSVC

This chapter describes the SANSlide Series 150 V7KSVC (SANSlide 150) Storage Protocol Accelerator, which can be used to improve performance of long-distance replication when using Global Mirror with Change Volumes (GM/CV) on the IBM Storwize V7000. The functionality of the SANSlide 150 product is covered, along with a summary of the Storwize V7000 remote mirror technologies.

Important: Although this paper provides information about the Storwize V7000, it also applies to the IBM System Storage SAN Volume Controller (SVC) and the IBM Storwize V3700 (Storwize V3700).

1.1 SANSlide 150 overview

The SANSlide 150 is a device developed by Bridgeworks Limited of Christchurch, UK. They specialize in products that can bridge storage protocols and accelerate data transfer over long distances.

A recent partnership with IBM resulted in the launch of the SANSlide 150, which is designed to work with the Storwize V7000 and SVC family.

Adding a SANSlide 150 at each end of a wide area network (WAN) Transmission Control Protocol/Internet Protocol (TCP/IP) link significantly improves the utilization of the link. Therefore, doing so can greatly improve the performance of GM/CV over long distances. It does this by applying patented artificial intelligence (AI) to hide latency normally associated with WANs, and has these design goals:

- ▶ Simple to use
- ▶ Simple to install
- ▶ Self-managing

More details are provided in 1.4, “SANSlide 150 in more detail” on page 6.

1.2 Metro Mirror and Global Mirror overview

Metro Mirror (MM) and Global Mirror (GM) are technologies that enable you to keep a real-time or near-real-time copy of a disk at a remote site that contains another SVC cluster or Storwize V7000 system. GM/CV, a variant of Global Mirror, is best suited for use with SANSlide 150.

1.2.1 Metro Mirror

MM makes *synchronous* copies, which means that the original writes are not considered complete until the write to the destination disk has been confirmed. The distance between your two sites is usually determined by how much latency your applications can handle. Therefore, MM is typically used within metropolitan distances in conjunction with a zero Recovery Point Objective (RPO), that is, zero data loss.

Figure 1-1 on page 3 shows the order of MM write operations.

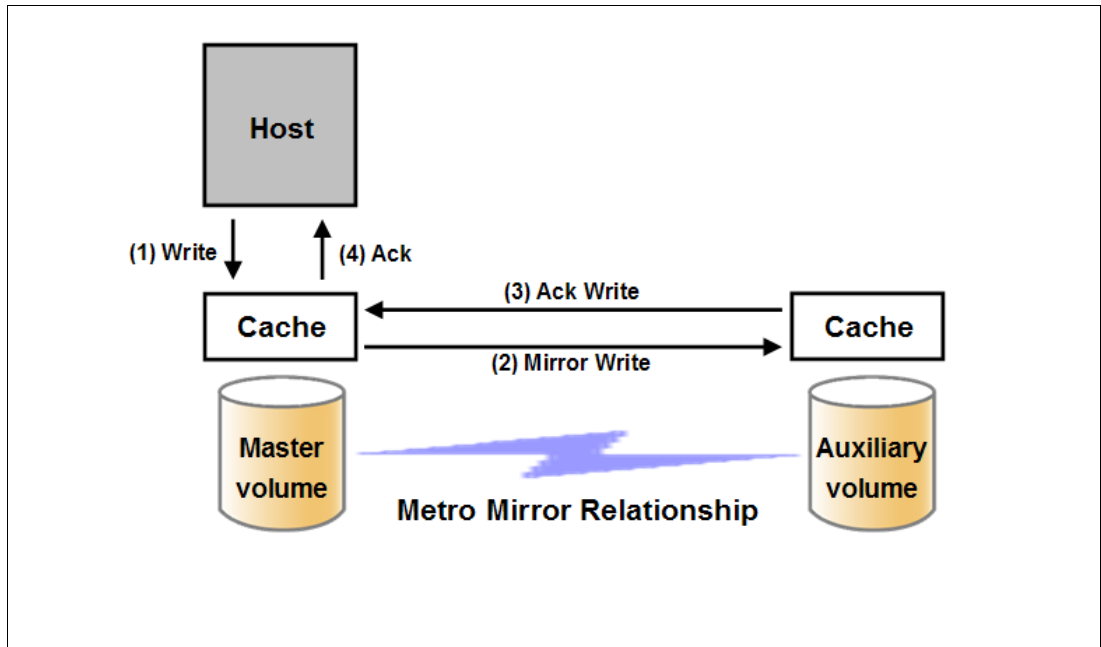


Figure 1-1 Metro Mirror write sequence

1.2.2 Global Mirror

GM makes *asynchronous* copies of your disk. This means that the write is considered complete after it is complete at the local disk; it does not wait for the write to be confirmed at the remote cluster like MM does. This greatly reduces the latency experienced by your applications if the other cluster is far away. However, it also means that, during a failure, the data on the remote copy might not have the most recent changes committed to the local disk.

Figure 1-2 shows the order of GM write operations.

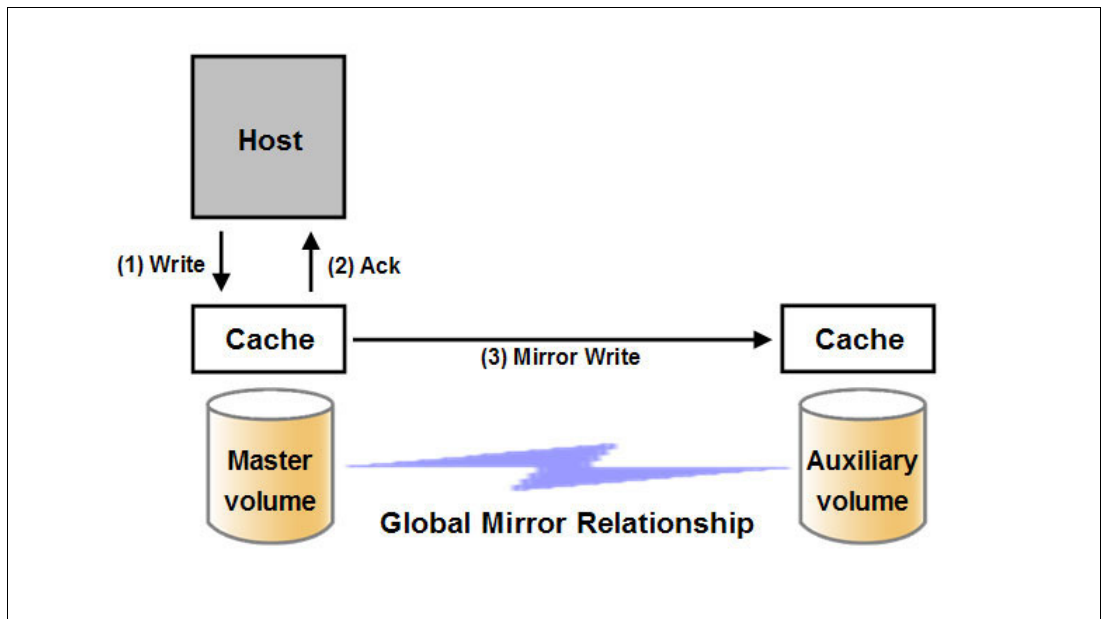


Figure 1-2 Global Mirror write sequence

1.2.3 Global Mirror with Change Volumes

This function (also known as *Cycle-Mode Global Mirror*), was introduced in Storwize V7000 V6.3, and can best be described as *Continuous Remote IBM FlashCopy®*. If you use this feature, the Storwize V7000 will essentially take periodic FlashCopies of a disk, and write them to your remote destination.

This feature completely isolates the local copy from WAN issues, and from sudden spikes in workload that might occur. Bear in mind that your remote copy might lag behind the original, depending on how you have set up the cycle time.

Figure 1-3 shows a high-level conceptual view of GM/CV. GM/CV uses FlashCopy to maintain image consistency, and to isolate host volumes from the replication process.

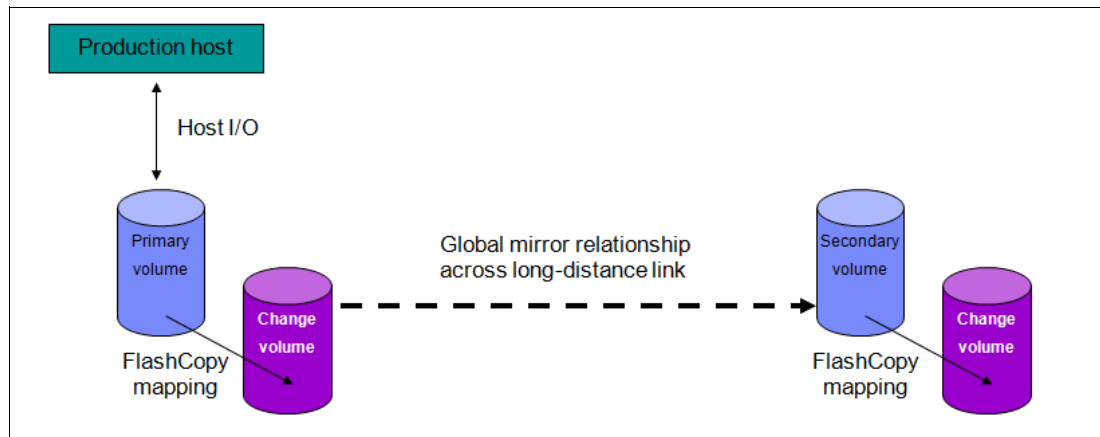


Figure 1-3 Global Mirror with Change Volumes

The SANSlide 150 improves GM/CV by significantly improving the streaming of the periodic updates from the primary change volume to the secondary volume.

Tip: For more information about SVC and Storwize V7000 replication, see *IBM System Storage SAN Volume Controller and Storwize V7000 Replication Family Services*, SG24-7574.

For more information about the SVC, see *Implementing the IBM System Storage SAN Volume Controller V6.3*, SG24-7933.

For more information about the Storwize V7000, see *Implementing the IBM Storwize V7000 V6.3*, SG24-7938.

1.3 Example scenarios

A Storwize V7000 cluster in one location can be connected to another Storwize V7000 cluster at a remote location using one or two pairs of SANSlide 150s (a pair is formed of one SANSlide at each location connected over a WAN). For better availability and redundancy, use two pairs, because this protects against the failure of a single SANSlide 150, and of the WAN link, if you use separate WAN routes.

The following sections show two example connectivity designs, but other designs are possible, subject to the rules shown in 1.5, “Support position” on page 9.

1.3.1 Single pair of SANSlide 150s

Figure 1-4 shows a single pair of SANSlide 150s connecting two Storwize V7000 clusters. In this design, there is a redundant connection from the Storwize V7000 to the SANSlide 150, which protects against a Fibre Channel (FC) connection failure or a Storwize V7000 node canister outage (for example, for a code upgrade). However, it does not protect against a SANSlide 150 failure (or code upgrade) or a WAN connection failure.

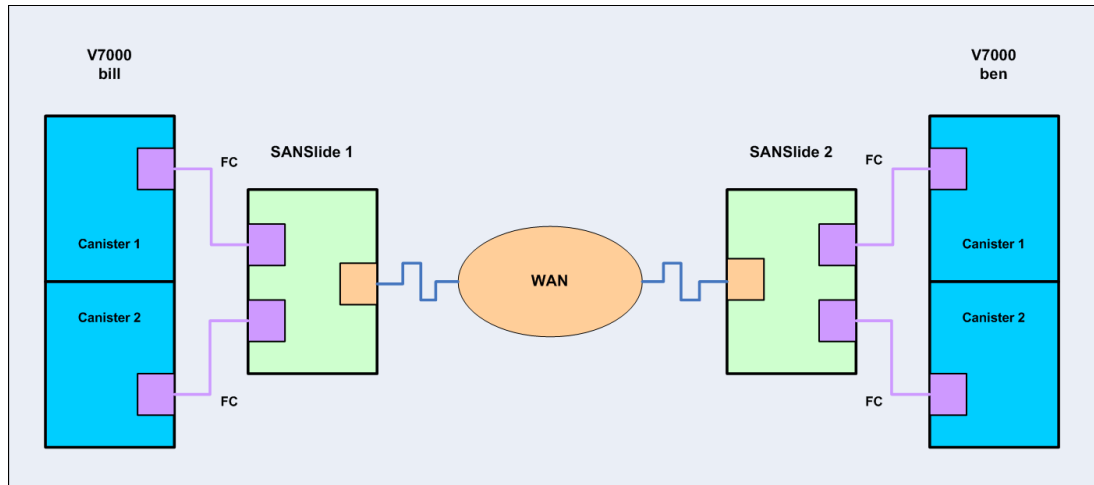


Figure 1-4 Single pair of SANSlide 150s between Storwize V7000 clusters

1.3.2 Dual pair of SANSlide 150s with one node canister FC link

Figure 1-5 shows a dual pair of SANSlide 150s providing separate connections between two Storwize V7000 clusters. This provides additional redundancy by protecting against a SANSlide 150 outage or a WAN connection failure.

It also allows for code upgrades to be performed on a SANSlide 150 while replication traffic continues using the other link. Because this normally only takes a few minutes, any backlog in replicating data should soon be cleared after the upgrade has completed.

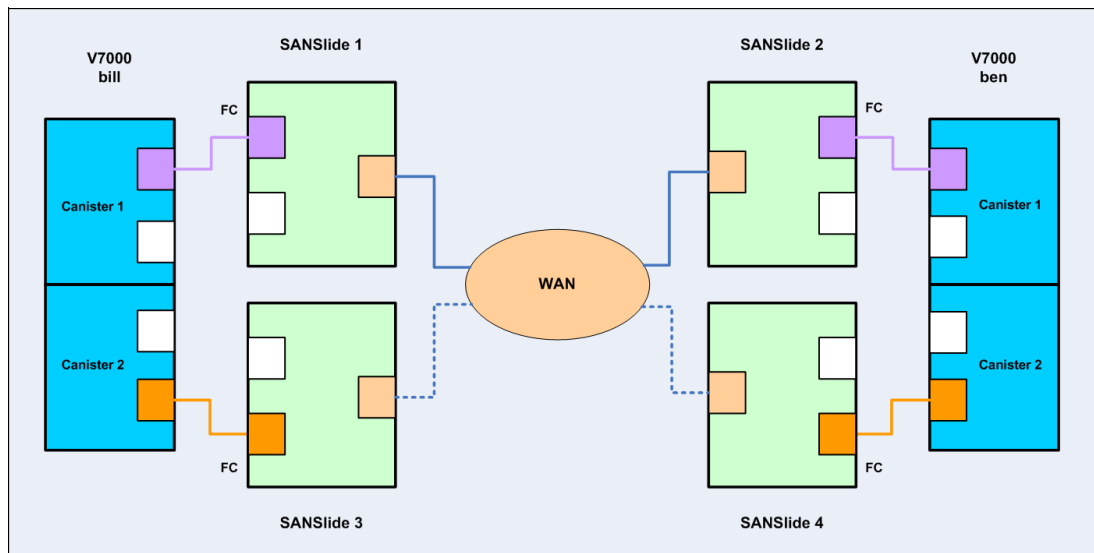


Figure 1-5 Dual pair of SANSlide 150s between Storwize V7000 clusters

1.3.3 Dual pair of SANSlide 150s with two node canister FC links

The design shown in Figure 1-6 improves the availability characteristics of the previous design by adding a second FC connection from each Storwize V7000 node canister to the alternate SANSlide 150. It therefore provides a path to the alternate node canister in the remote Storwize V7000 cluster. This means that all four Storwize V7000 node canisters can still communicate in the event of a single SANSlide 150 failure.

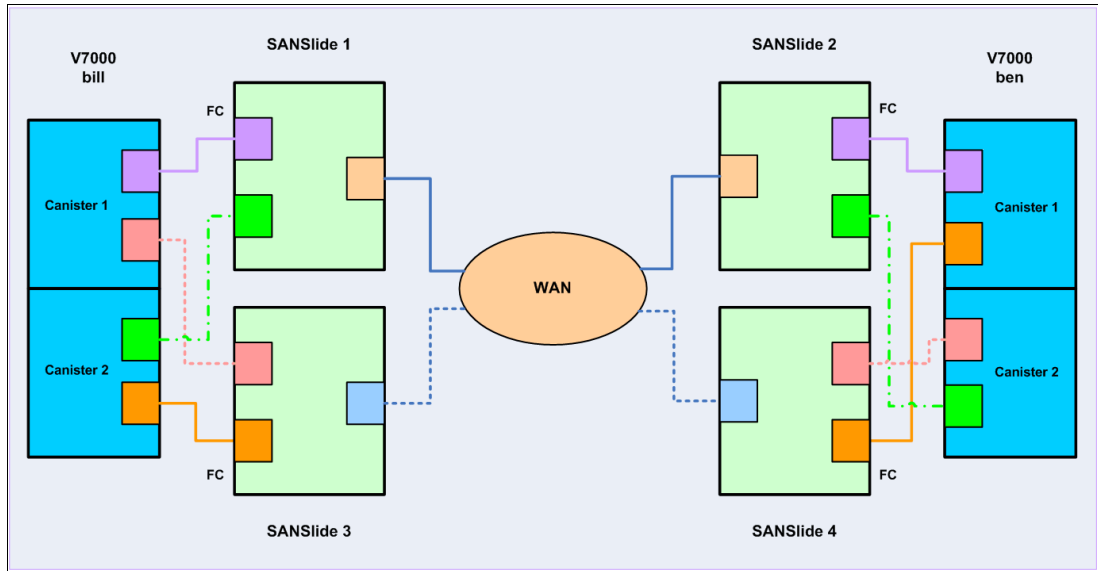


Figure 1-6 Dual pair of SANSlide 150s between Storwize V7000 clusters with a second path

Note: The Fibre Channel connections in Figure 1-6 show direct connections between the node canister port and the SANSlide 150 port. These connections can also be provided via a local storage area network (SAN) fabric, in which case appropriate SAN zones will need to be defined for each connection.

1.4 SANSlide 150 in more detail

A pair of SANSlide 150 nodes can connect two Storwize V7000 clusters using GM/CV across a WAN. This is an alternative to the traditional use of a pair of Fibre Channel over IP (FCIP) routers, or wave division multiplexors (WDMs).

1.4.1 The SANSlide 150 node

The SANSlide 150 node is a stand-alone appliance that sits at either end of the Internet Protocol network and interfaces to the SAN switch or Storwize V7000. It is transparent to the attached Storwize V7000, and self-managing after it is configured. It is unaffected by the compression, deduplication, or encryption of the data being replicated, because it effectively just connects two FC ports together over a distance.

1.4.2 Performance degradation with TCP/IP

Put simply, with TCP/IP, information transfer slows the further you go. This is because of the latency caused by waiting for acknowledgement of each set of packets sent, because the next packet set cannot be sent until the previous one has been acknowledged:

Latency = Round Trip Time (RTT) for a single packet set

Figure 1-7 illustrates this packet flow without a SANSlide 150 unit.

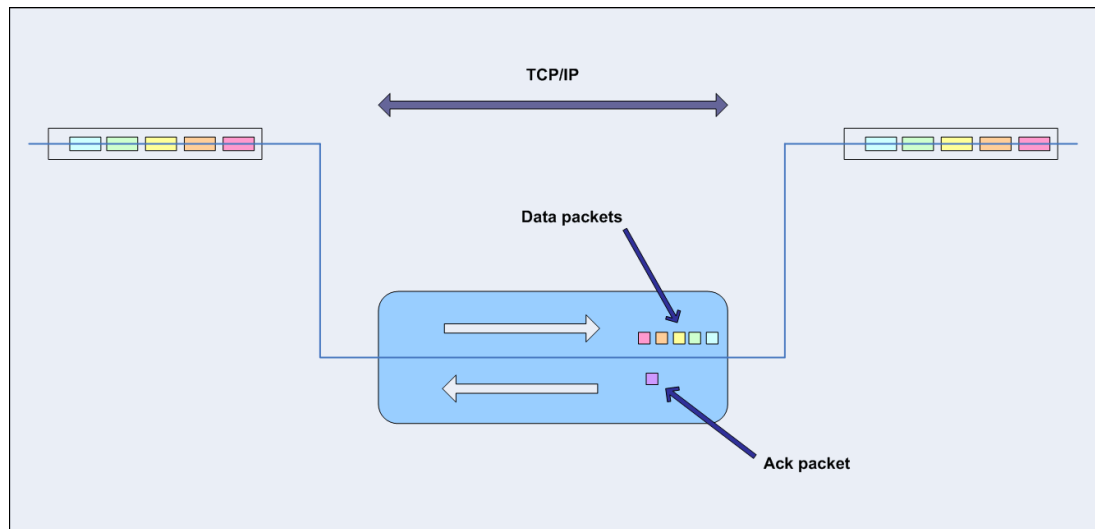


Figure 1-7 Link utilization without SANSlide 150

Figure 1-8 shows how throughput drops off as latency increases.

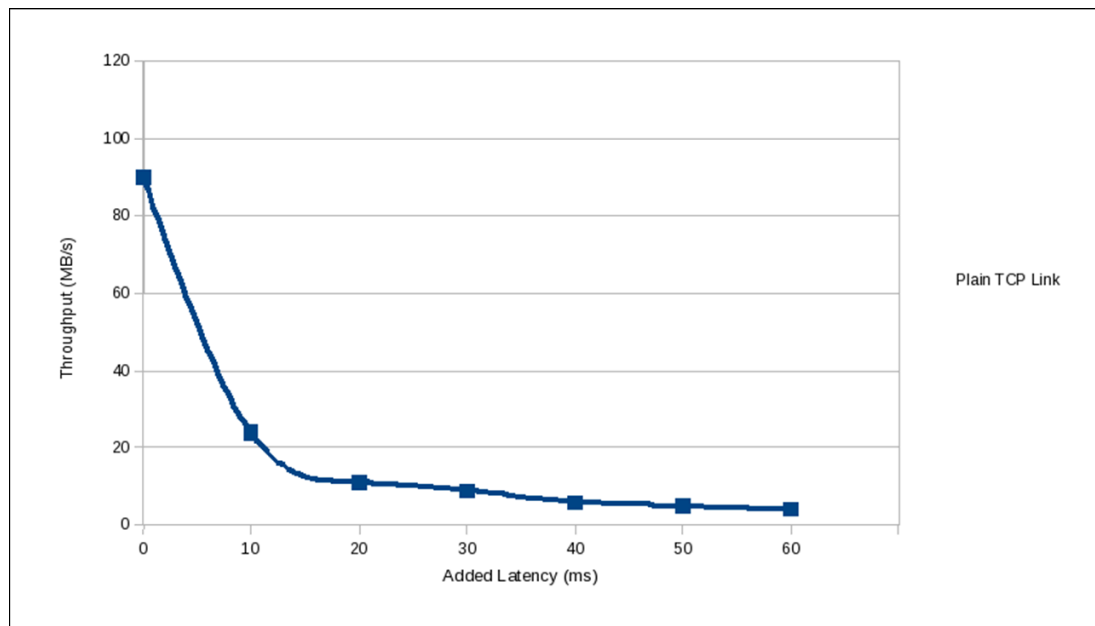


Figure 1-8 Effect of latency on performance

1.4.3 How SANSlide 150 improves performance

The SANSlide 150 uses TCP/IP latency to its advantage. Rather than wait for the acknowledgement to come back, it sends more sets of packets across other *virtual connections*. The number of virtual connections is controlled by the AI engine. This improves WAN connection use, which results in a data transfer rate approaching full line speed.

If packets are lost from any virtual connection, the data will be retransmitted, and the remote unit will wait for it. Presuming that this is not a frequent problem, overall performance is only marginally affected because of the delay of an extra round trip for the data that is resent.

Figure 1-9 illustrates data flow with multiple virtual connections.

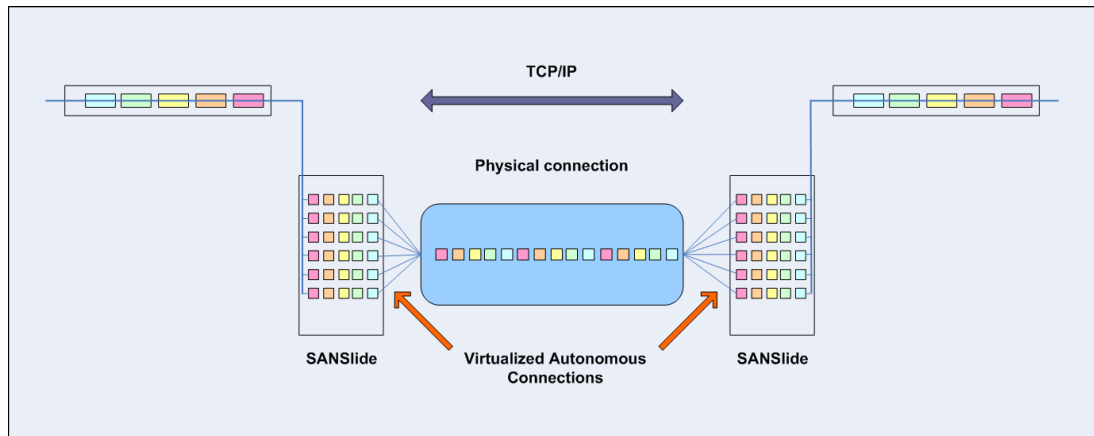


Figure 1-9 Link utilization with SANSlide 150

The AI monitors the link performance during data transfer, in addition to the memory and CPU use of the node. It can adjust the number of virtual connections, the receive window size, and the packet size as appropriate to maintain optimum performance. This information is retained within the SANSlide 150 node so that, if the link is stopped and started again, it will restart with the previously learned settings.

What SANSlide 150 does not do

SANSlide 150 does not manipulate the data in any way:

- ▶ Compress data
- ▶ Use deduplication
- ▶ Use User Datagram Protocol (UDP)
- ▶ Modify TCP/IP
- ▶ Use hard-disk-drive caching

What SANSlide 150 does do

SANSlide 150 improves performance in a number of ways:

- ▶ Uses patented artificial intelligence
- ▶ Fills the pipe
- ▶ Operates below the operating system, so you do not need to modify attached devices
- ▶ Uses standard TCP/IP
- ▶ Is not affected by compressed and encrypted files

In summary, the SANSlide 150 solution is designed around the principle of using all of the pipe instead of changing the data.

1.4.4 Performance benefit

Figure 1-10 shows how the SANSlide 150 maintains near-line-speed performance by masking the latency of the line. If the raw line latency is too great due to distance, the performance can start to degrade. This is because of the line latency exceeding the internal resources available from one SANSlide 150 unit.

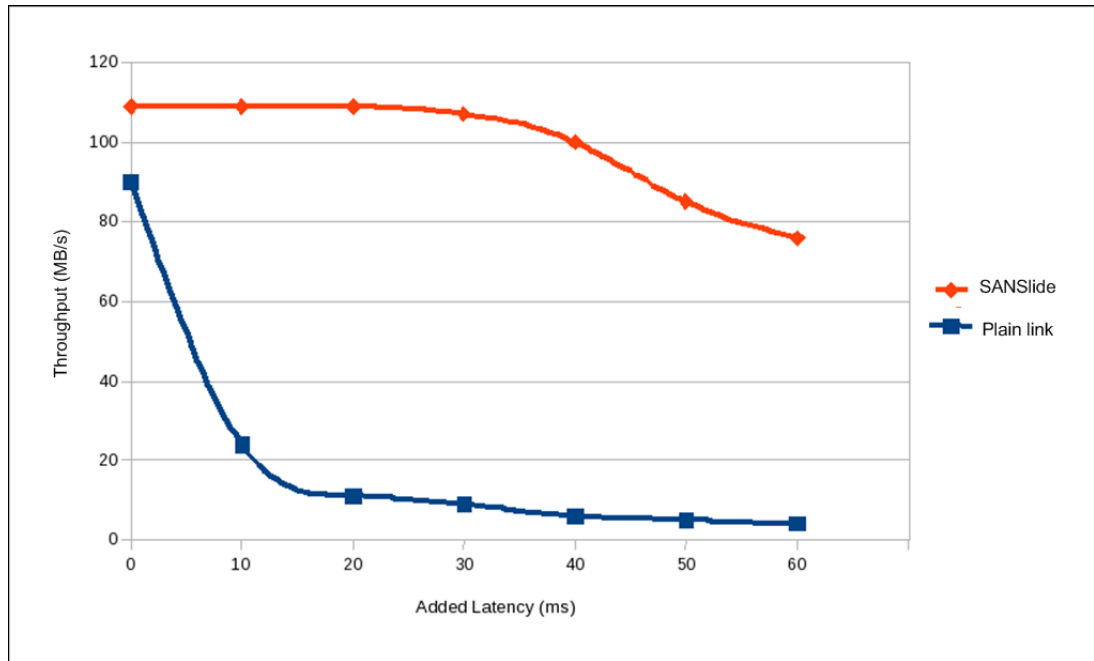


Figure 1-10 Storwize V7000 transfer rate comparison

1.5 Support position

Configurations must comply with the following rules:

- ▶ A single Storwize V7000 node canister can have at most two connections to SANSlide 150 units.
- ▶ A single Storwize V7000 node canister can have at most one connection to the same SANSlide 150 unit.
- ▶ A single Storwize V7000 node canister can have at most one connection through SANSlide 150 units to the same remote Storwize V7000 node canister.
- ▶ Storwize V7000 node canisters can be connected to SANSlide 150 via FC using either a direct connection or switched fabric attachment.
- ▶ Storwize V7000 systems connected through SANSlide 150 must not be connected at the same time through any other means (for example, local FC or Fibre Channel over Ethernet, also known as *FCoE*).
- ▶ The following platforms are supported:
 - SVC
 - Storwize V7000
 - Storwize V3700

- ▶ Support is aimed at GM/CV, because this provides a workload that the SANSlide 150 is better able to optimize.
- ▶ Inter-cluster link latencies of up to 80 milliseconds (ms) are supported via a request for price quotation (RPQ), with 35 ms as the standard rate.
- ▶ Only one GM partnership is allowed to be connected via SANSlide 150.

1.6 Planning

As part of your planning, consider the following items before installation:

- ▶ Performance required:
 - Daily data volume change
 - RPO requirements: This affects the GM/CV cycle time
- ▶ Network:
 - Line capacity: Is the full 1 GbE available?
 - Line latency: Is it within the supported maximum?
 - Network connection type: Is it at least the 1 GbE RJ45 Cat5E minimum?
- ▶ Configuration:
 - Management address and WAN address per SANSlide 150
 - Direct or switch FC connectivity between the Storwize V7000 port and the SANSlide 150 port
 - Worldwide port names (WWPNs) of the Storwize V7000 ports that will connect to the SANSlide 150
 - Volume node canister allegiance: Each Storwize V7000 volume has an associated preferred node, which is responsible for performing the remote mirror I/O



Installation and configuration

This chapter uses the example configuration shown in Figure 2-1 on page 12 to demonstrate the physical connectivity between the IBM Storwize V7000 and the SANSlide 150 nodes. It also documents the necessary steps to configure the SANSlide 150 nodes to implement Global Mirror with Change Volumes (GM/CV).

For the purposes of this example, the two SANSlide 150 nodes were available locally, and in the same IP subnet, to perform the configuration steps.

To check supported configurations go to the following web page:

http://www.ibm.com/support/docview.wss?uid=ssg1S1004392#_SANSlide

2.1 Physical setup

The example configuration in Figure 2-1 shows the Storwize V7000 with the SANSlide 150 node. This configuration will be used to demonstrate the SANSlide 150 configuration steps in this chapter.

This example highlights the following elements of the configuration:

- ▶ Two Storwize V7000s named Ben and Bill, with IP addresses 10.0.0.45 and 10.0.0.42, and the worldwide port name (WWPN) for particular ports in each canister
- ▶ Two SANSlide 150 nodes named x3250d and x3250c, with Dynamic Host Configuration Protocol (DHCP) management IP addresses and static wide area network (WAN) IP addresses configured for each node
- ▶ The physical Fibre Channel (FC) connectivity between the Storwize V7000 canister ports and the SANSlide 150-node FC ports

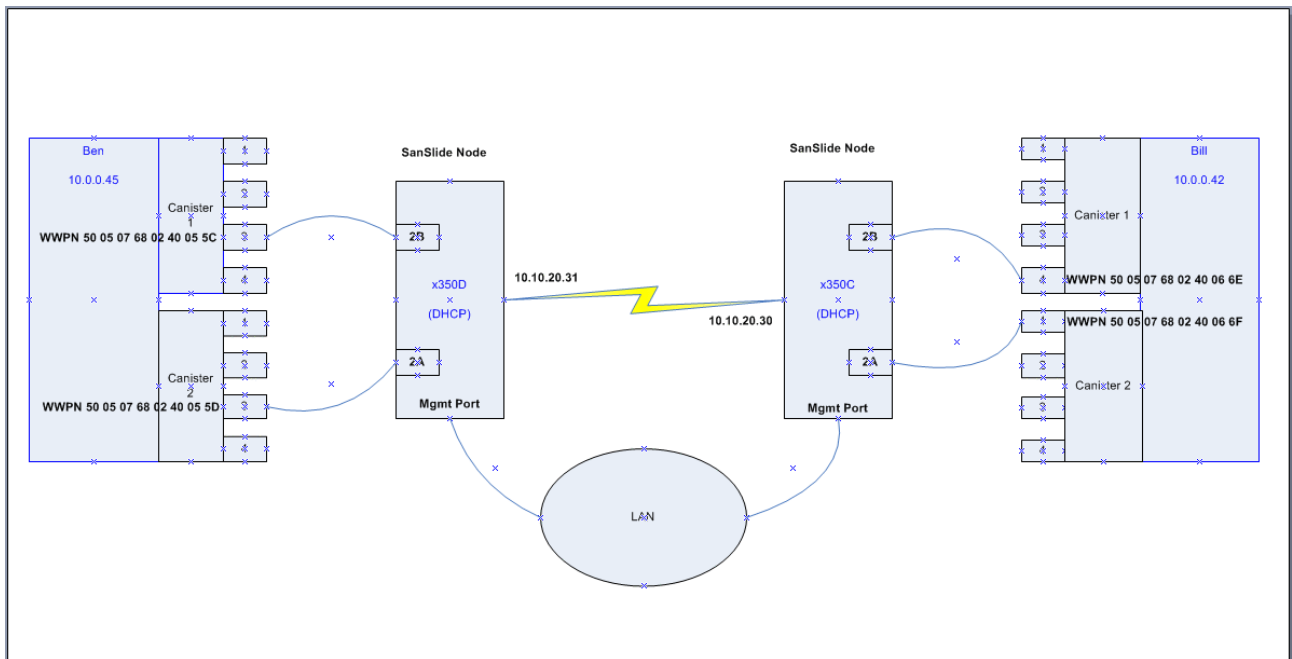


Figure 2-1 Example configuration

2.1.1 Storwize V7000

The Storwize V7000 controller in Figure 2-2 shows the FC port number locations for each canister.

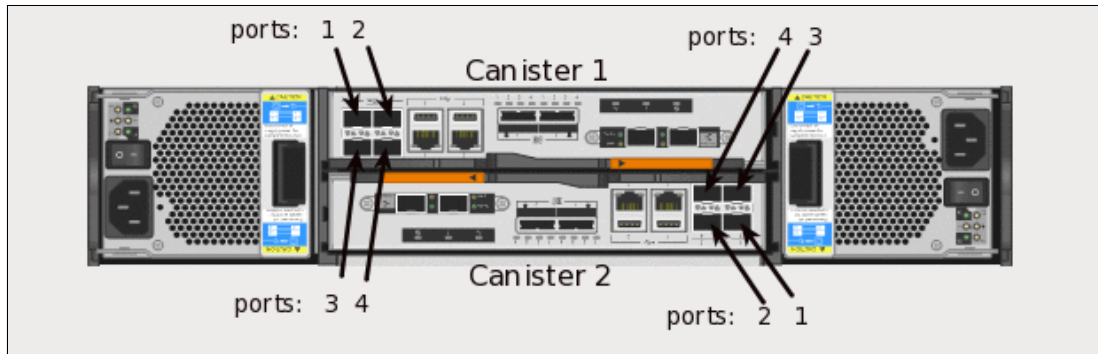


Figure 2-2 IBM Storwize V7000 controller

2.1.2 Storwize V7000 WWPN identification

Follow these steps to identify the Storwize V7000 WWPNs:

1. Identify the WWPN of the Storwize V7000 FC ports that are physically connected to the SANSlide 150 nodes:
 - a. Log in to the Storwize V7000.
 - b. Select **Monitoring** → **System Details**.
 - c. Select **Canister 1** to display the WWPNs of the FC ports.
2. Note that the Storwize V7000 is Bill, and Port 4 in Canister 1 is highlighted (Figure 2-3).

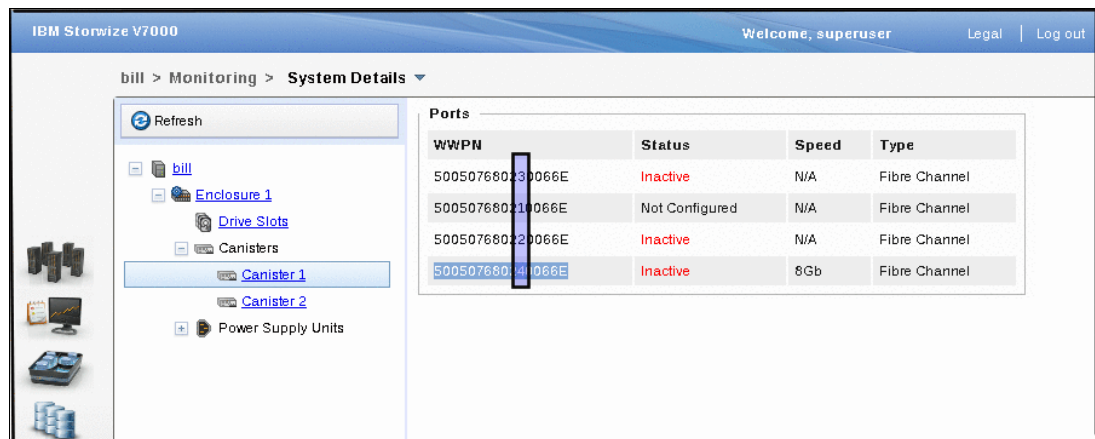


Figure 2-3 Storwize V7000 System Details

2.2 SANSlide 150 configuration

The configuration steps performed are based on the example configuration in Figure 2-1 on page 12, and in particular the screen captures in the following figures relate to the customization of the x3250d SANSlide 150 node.

Note: Perform the following steps on each of the SANSlide 150 nodes.

2.2.1 Set up the computer

Connect your computer to the management interface port of the SANSlide 150 node.

Note: Depending on your current network parameters, it might be necessary to change the network settings on your computer:

1. Make a note of your current TCP/IP settings.
2. Modify your computer TCP/IP settings for initial setup by configuring your computer with an IP address of 10.10.10.11 and a subnet mask of 255.255.255.0.

2.2.2 Access the SANSlide 150

Follow these steps to access the SANSlide 150:

1. From your web browser, connect to the SANSlide 150 node web interface using the default IP address:

<http://10.10.10.10/>

2. Log in using the default Username of admin and the default Password of admin (Figure 2-4).

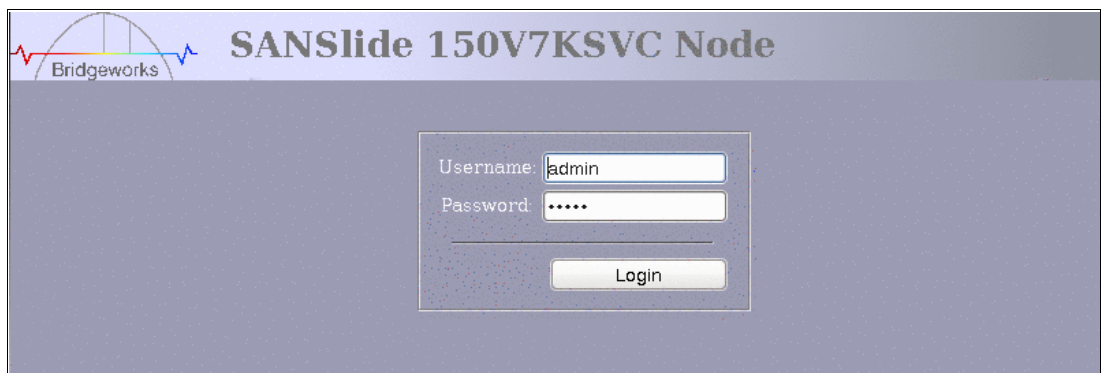


Figure 2-4 SANSlide 150 node login

Note: Change the password for this account from its default value before putting the unit into production. Be sure to securely record the new password, because if it is lost, you will need to contact Bridgeworks to recover system access.

3. Make your selection from the SANSlide 150 node main menu (Figure 2-5).

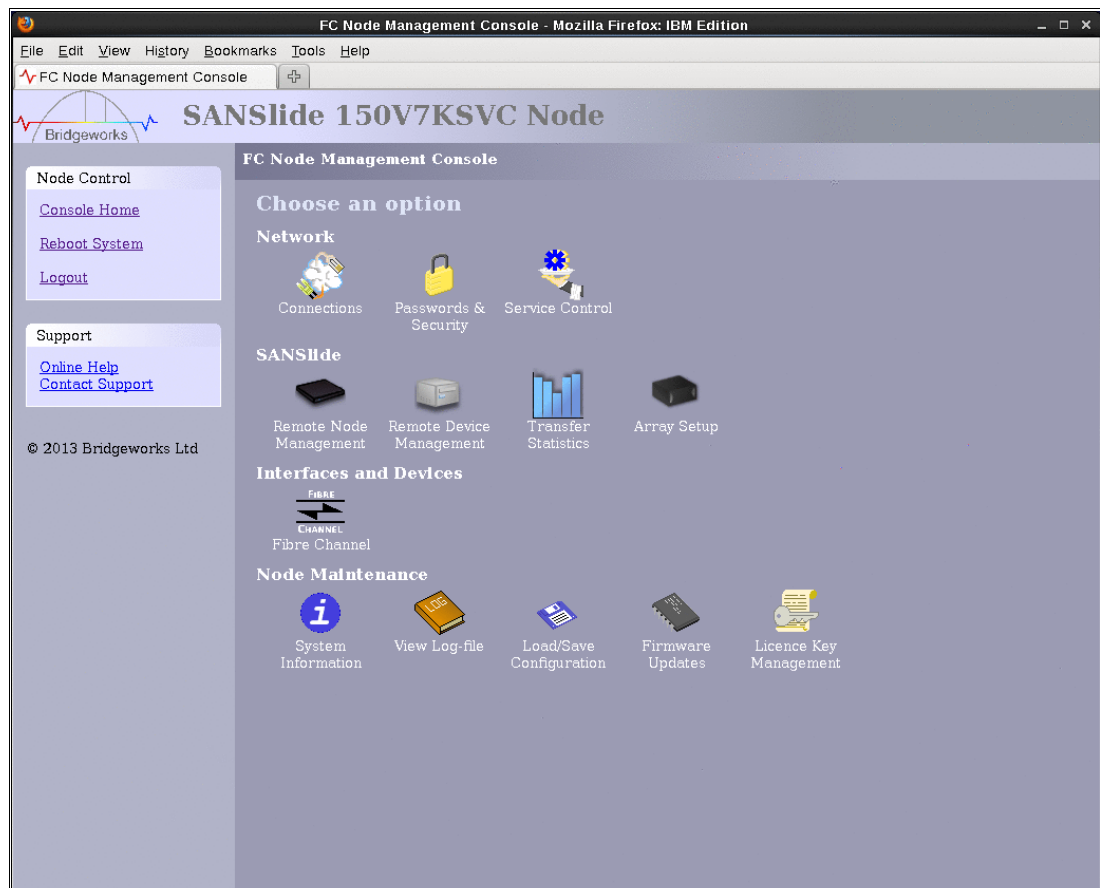


Figure 2-5 SANSlide 150 node main menu

2.2.3 Configure the SANSlide 150 host name

Follow these steps to configure the SANSlide 150 host name:

1. Select the **Connections** icon under the Network section of the SANSlide 150 node main menu.

2. In the Network Connections panel (Figure 2-6), enter the host name. For example, enter x3250d for this SANSlide 150 node. Click **Save**.

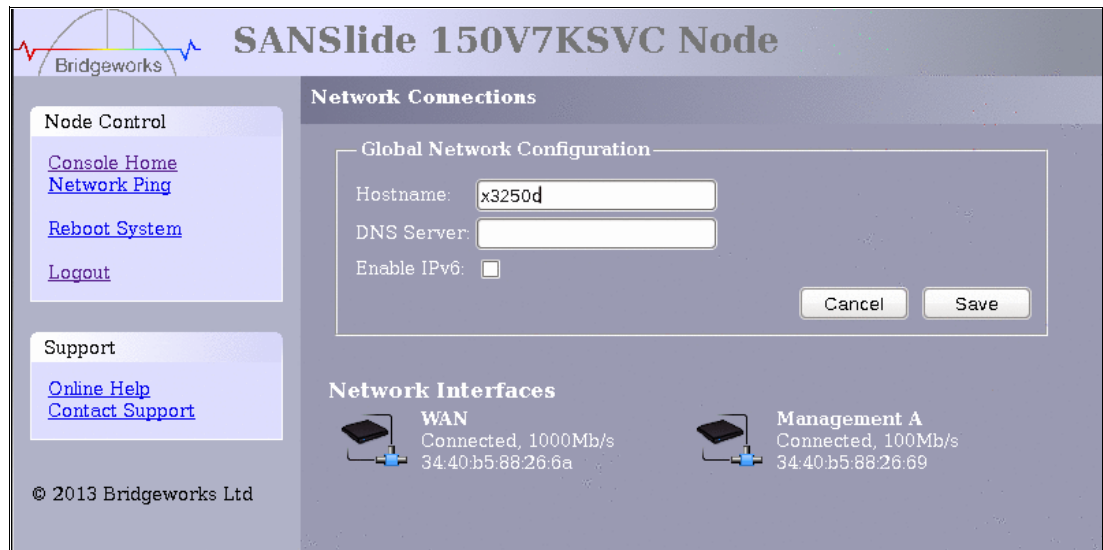


Figure 2-6 Network connection

2.2.4 Configure the management port

Follow these steps to configure the management port:

1. Select the **Management A** icon in the Network Interfaces section.
2. In the Network Port: Management A panel (Figure 2-7 on page 17), select **Use DHCP to assign an IP address automatically**. Click **Save**.

The screenshot shows the management interface for a SANSlide 150V7KSVC Node. The interface has a sidebar on the left with links for Node Control (Console Home, Connections, Network Ping, Reboot System, Logout) and Support (Online Help, Contact Support). The main area is titled 'Network Port: Management A' and contains 'Port Settings'. Under 'Port Settings', the MTU Size is set to 1500. There are two radio button options: 'Use DHCP to assign an IP address automatically' (which is selected) and 'Use the following IP address:'. Below these are input fields for IP Address (10.0.0.186), Netmask (255.255.255.0), and Gateway. There are also radio button options for IPv6: 'Use automatic IPv6 address assignment' (selected) and 'Use the following IPv6 address:'. Below these are input fields for IPv6 address and IPv6 gateway.

Figure 2-7 Management port using DHCP

Note: For production use, allocate a static IP address, netmask, and gateway, not DHCP.

2.2.5 Configure the WAN port

Follow these steps to configure the WAN port:

1. Select the **WAN** icon in the Network Interfaces section.

2. In the Network Port: WAN panel (Figure 2-8), select **Use the following IP address**. Enter the static IP address, Netmask, and Gateway for the WAN interface on this SANSlide 150 node. Click **Save**.

The screenshot shows the 'Network Port: WAN' configuration page for a 'SANSlide 150V7KSVC Node'. On the left is a sidebar with 'Node Control' (Console Home, Connections, Network Ping, Reboot System, Logout) and 'Support' (Online Help, Contact Support) links, along with a copyright notice for Bridgeworks Ltd. The main area is titled 'Network Port: WAN' and contains 'Port Settings' with an MTU Size of 1500. Under 'Use the following IP address:', the IP Address is 10.10.20.31, Netmask is 255.255.255.0, and the Gateway field is blank. There are also options for IPv6, with 'Use automatic IPv6 address assignment' selected.

Figure 2-8 WAN port

Note: The Gateway field is blank in Figure 2-8 because, in this example, both of the SANSlide 150 nodes are in the same subnet.

2.2.6 Reboot and repeat for other SANSlide 150 nodes

Follow these steps to reboot the system, then repeat for other nodes:

1. Click **Reboot System** in the Node Control panel. This will take a minute or two to complete.
2. Remove the cable from the SANSlide 150 management interface port.
3. Repeat these steps for any additional SANSlide 150 nodes.

2.2.7 Relocate the SANSlide 150 nodes

Follow these steps to relocate the SANSlide 150 nodes:

1. Return your computer to its original TCP/IP settings. This enables relocation.
2. Relocate the SANSlide 150 nodes to their remote locations for the remaining configuration steps.

2.2.8 Verify network connectivity

Perform these steps to verify connectivity:

1. Connect the management interface port and the WAN port of the SANSlide 150 nodes to the local area network.
2. From your web browser, connect to the SANSlide 150 node web interface using the host name x3250d defined in 2.2.3, "Configure the SANSlide 150 host name" on page 15.
3. Log in to the web interface using the default Username of admin and the default Password of admin.
4. Select **Connections** in the Network section.
5. Click **Network Ping** in the Node Control section.
6. Confirm that you can successfully ping the management interface and WAN interface of the other SANSlide 150 nodes in your setup.

See Figure 2-9 for an example of pinging the SANSlide 150 x3250c node from the SANSlide 150 x3250d node.

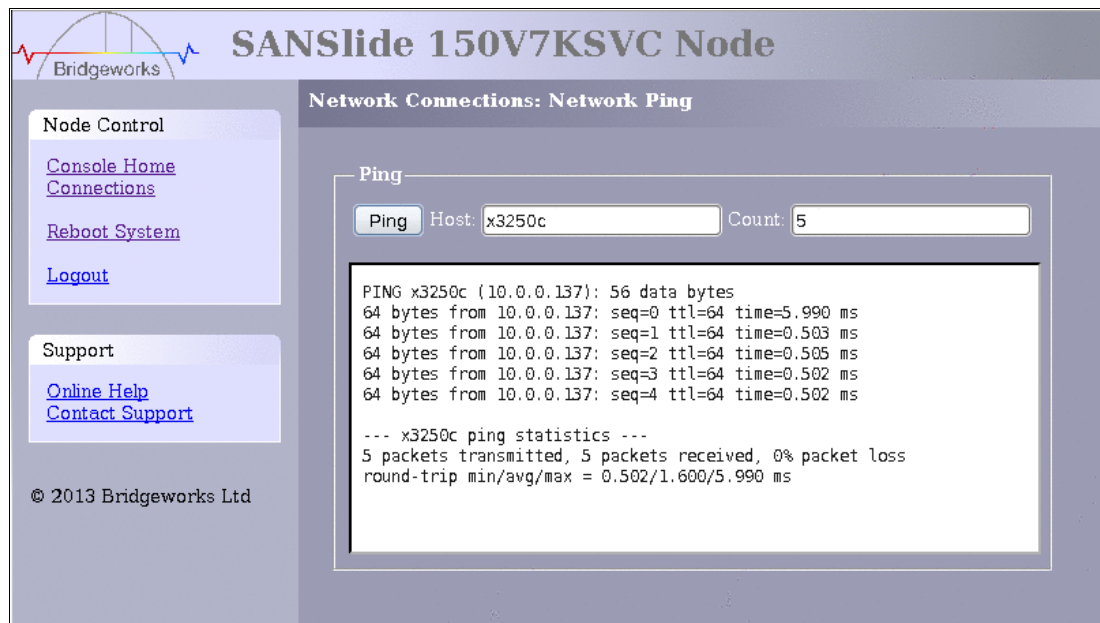


Figure 2-9 Network ping result

2.2.9 Link SANSlide 150 nodes

Perform these steps to link the SANSlide 150 nodes:

1. From the main menu, click the **Remote Node Management** icon in the SANSlide panel (Figure 2-10).

The screenshot shows the 'Remote Node Management' interface for a 'SANSlide 150V7KSVC Node'. The interface has a left sidebar with 'Node Control' (Console Home, Reboot System, Logout) and 'Support' (Online Help, Contact Support) links. The main area is titled 'Remote Node Management' and contains a 'Home Node' section with fields for 'Node Alias' (x3250d) and 'Enable Remote Administration' (checked), with 'Cancel' and 'Save' buttons. Below this is a 'List of Remote Nodes' section with 'Add Node', 'Remove Node', 'Configure Node', and 'Learn' buttons. A table with columns 'IP Address', 'Host Name', and 'No. of devices' is shown, but it is empty. At the bottom are 'Start Remote Control' and 'Stop Remote Control' buttons.

SANSlide 150V7KSVC Node

Remote Node Management

Home Node

Node Alias: x3250d

Enable Remote Administration: ☒

Cancel Save

List of Remote Nodes

Add Node Remove Node Configure Node Learn

IP Address	Host Name	No. of devices
------------	-----------	----------------

Start Remote Control Stop Remote Control

Figure 2-10 Remote node management

2. Click **Add Node**.

3. In the Add Remote Node window, enter the static IP Address of the WAN interface for the partner SANSlide 150 node (Figure 2-11).

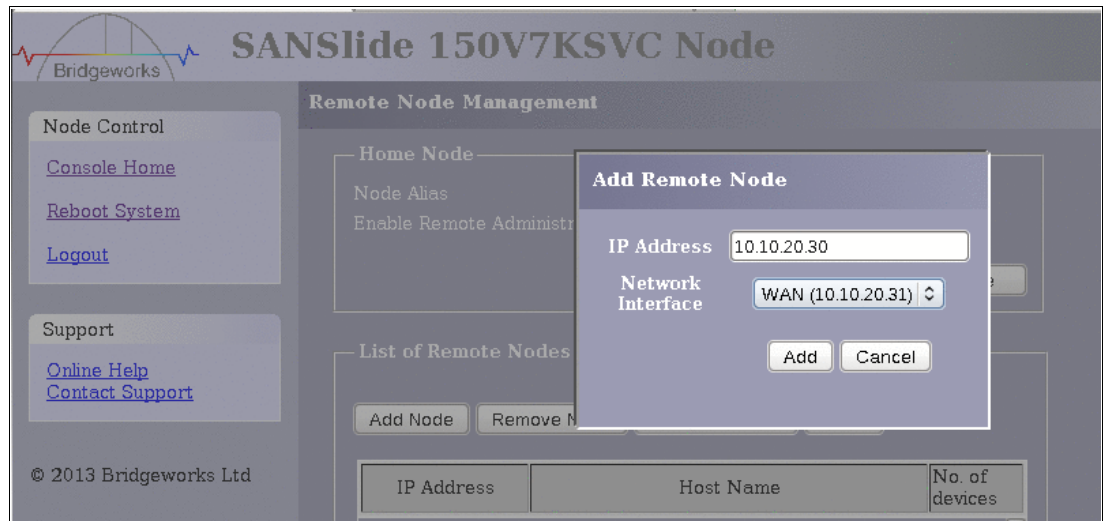


Figure 2-11 Adding the remote node

4. Click **Add** to start discovery.

The SANSlide 150 node will now begin to establish a connection to the remote node, as shown in Figure 2-12.

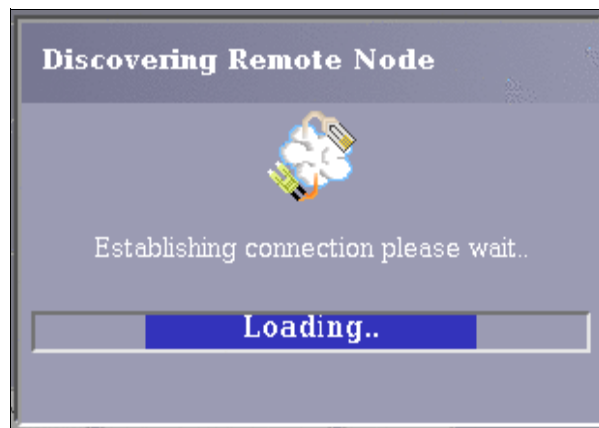


Figure 2-12 Discovering the remote node

- Click **OK** to confirm that the discovery operation is complete (Figure 2-13).



Figure 2-13 Discovery complete

- Note that the Remote Node Management panel (Figure 2-14) now shows this defined connection.

This example shows the SANSlide 150 x3250d node linking to the remote SANSlide 150 x3250c node with its static WAN IP address of 10.10.20.30.

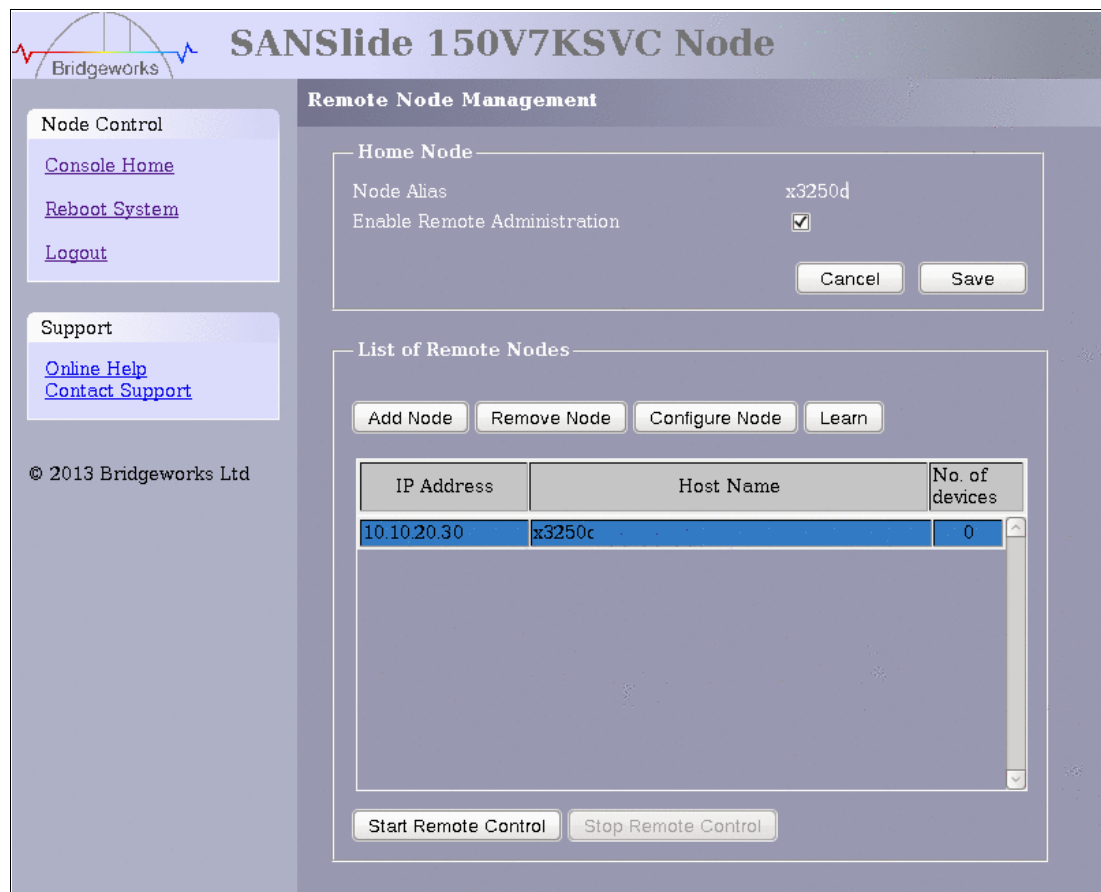


Figure 2-14 Discovered remote nodes

- Repeat this step for all nodes.

2.2.10 Array setup

Follow these steps to set up the array:

1. Click the **Array Setup** icon in the SANSlide 150 Node main menu.
2. In the SANSlide Arrays Setup panel (Figure 2-15), click **Add** to be prompted for a new array (Figure 2-16 on page 24).

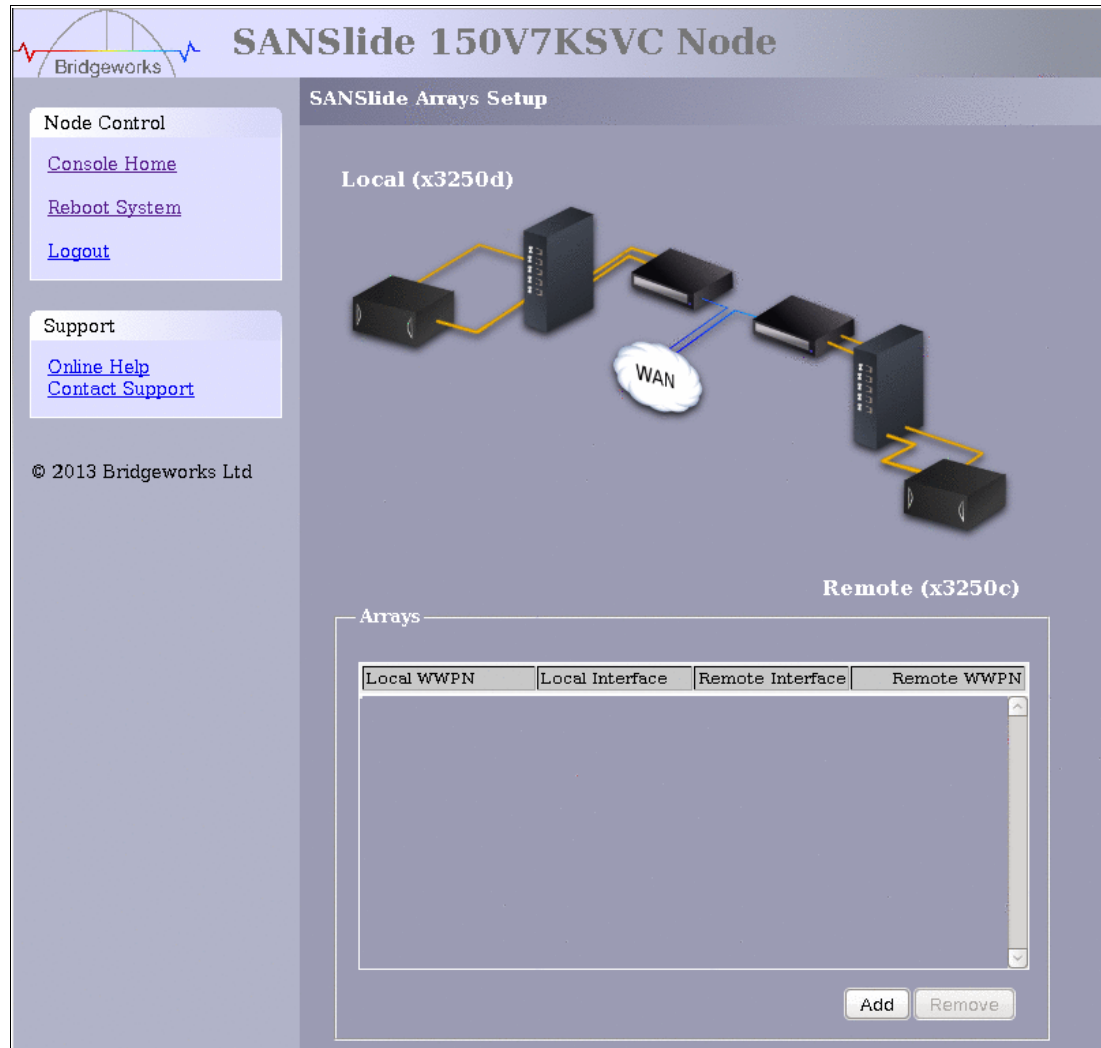


Figure 2-15 SANSlide 150 array setup

Add Array

Local WWPN	Local Port	Remote Port	Remote WWPN
Local WWPN here	FCTPORT2A	FCTPORT2A	Remote WWPN here

Cancel Save

Figure 2-16 Add Array

Tip: See Figure 2-1 on page 12 for details of the example configuration.

3. Enter 500507680230055C as the Local WWPN and 500507680240066E as the Remote WWPN of the storage arrays, and then select **FCTPORT2B** as the FC ports used on the SANSlide 150 node, as shown in Figure 2-17. Click **Save**.

Add Array

Local WWPN	Local Port	Remote Port	Remote WWPN
500507680230055C	FCTPORT2B	FCTPORT2B	500507680240066E

Cancel Save

Figure 2-17 Add Array completed

Figure 2-18 shows the arrays from the viewpoint of node x3250d.

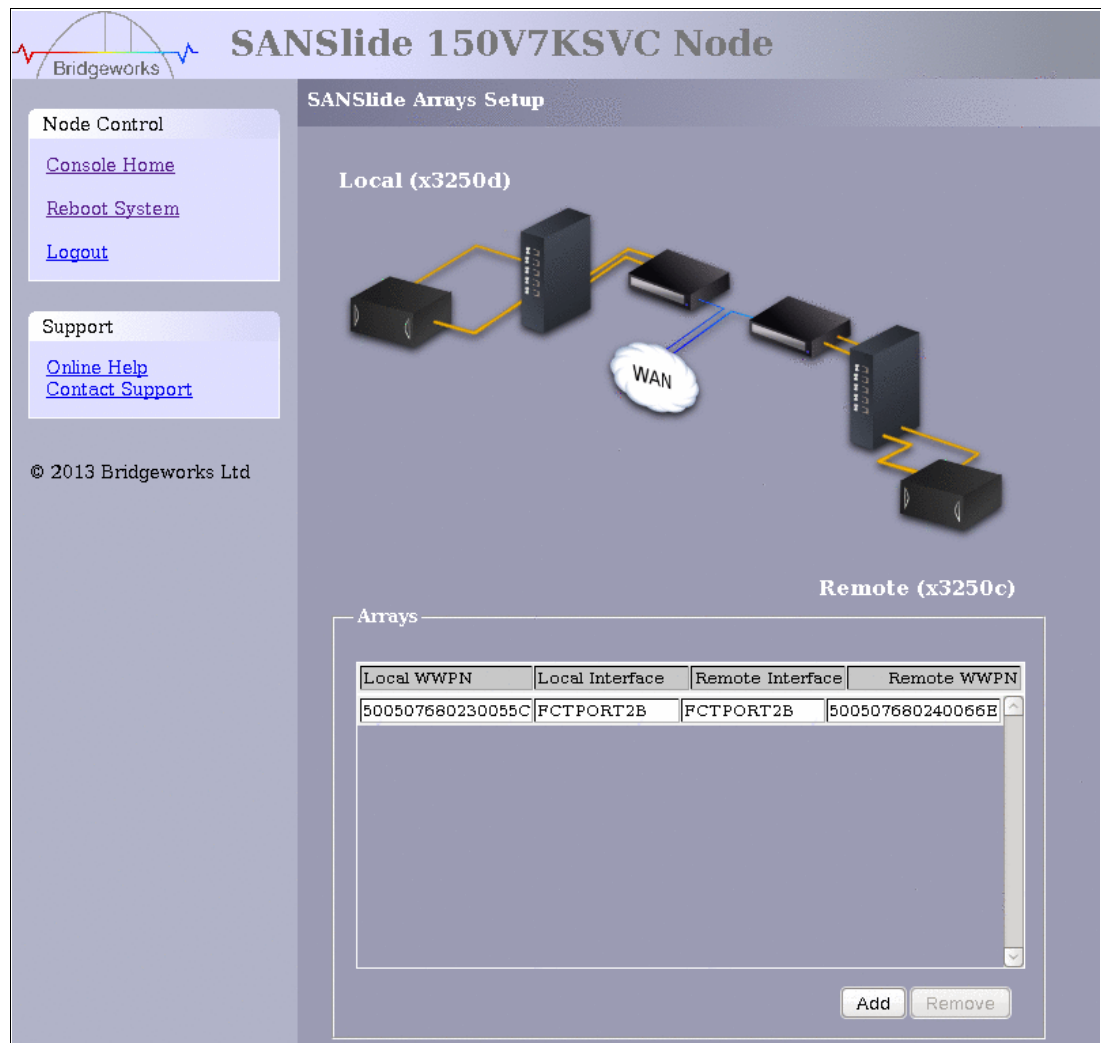


Figure 2-18 Array Setup

4. Repeat for the additional connections.

After you complete the SANSlide Arrays Setup for both nodes, each will have two entries, as shown in Figure 2-19 and Figure 2-20 on page 27.

SANSlide 150V7KSVC Node

SANSlide Arrays Setup

Local (x3250d)

Remote (x3250c)

Arrays

Local WWPN	Local Interface	Remote Interface	Remote WWPN
500507680230055D	FCTPORT2A	FCTPORT2A	500507680210066F
500507680230055C	FCTPORT2B	FCTPORT2B	500507680240066E

Add **Remove**

Figure 2-19 x3250d Array Setup

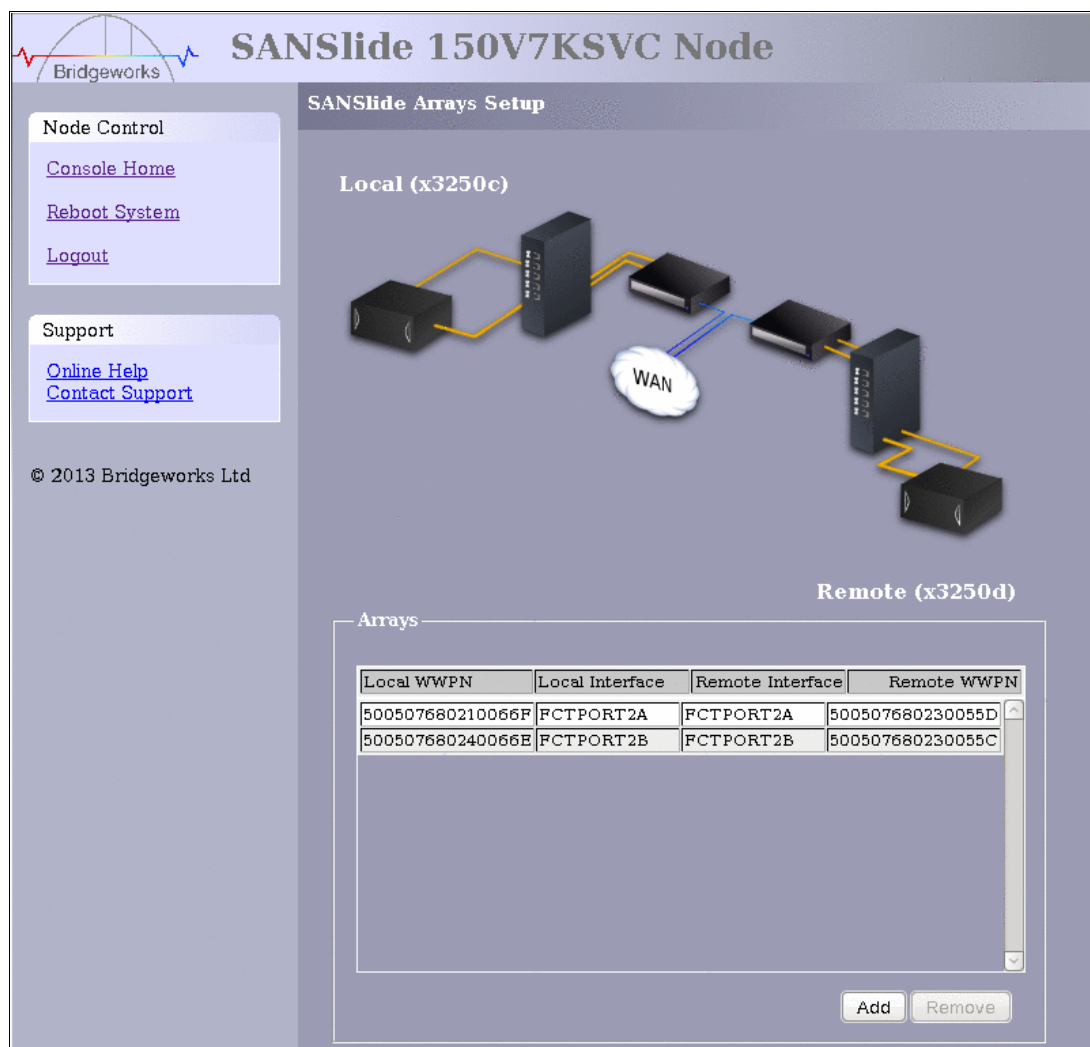


Figure 2-20 x3250c Array Setup

The SANSlide 150 array setup is now complete.

2.2.11 Set up Global Mirror relationships on Storwize V7000

Establishing Global Mirror Relationships on a Storwize V7000 is already covered in a number of existing publications that are available from IBM.

For example, see *IBM System Storage SAN Volume Controller and Storwize V7000 Replication Family Services*, SG24-7574, available from this link:

<http://www.redbooks.ibm.com/redbooks/pdfs/sg247574.pdf>

Figure 2-21 represents a high-level conceptual view of GM/CV. GM/CV uses FC to maintain image consistency, and to isolate host volumes from the replication process.

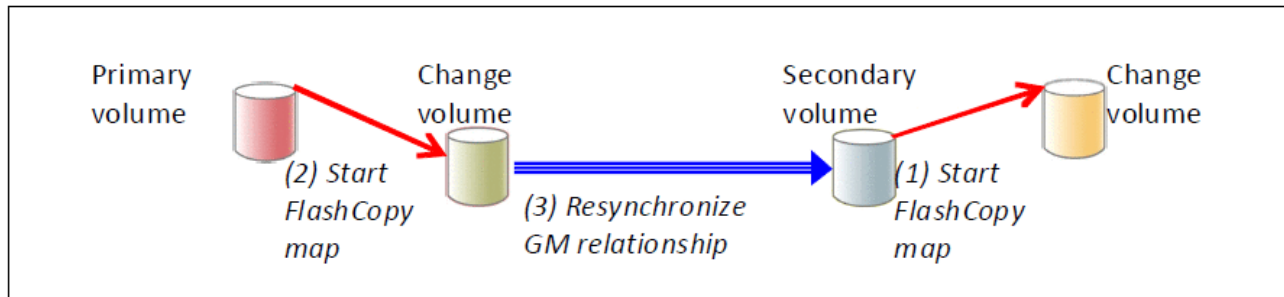


Figure 2-21 Global Mirror with Change Volumes concept

2.2.12 Device management

1. After the GM/CV have been established, verify that the SANSlide 150 has visibility to every defined target device:
 - a. From the home menu page, click the **Remote Device Management** icon.
 - b. Click the Host Name and verify that the devices listed are accurate.
 - c. If they are not, click **Refresh Devices** at the bottom of the window.
2. Repeat for each SANSlide 150 node.

SANSlide 150 installation with IBM Storwize V7000 is now complete.



Additional information

This chapter covers various additional topics that are not necessarily part of the core configuration of the SANSlide 150, but that you might still need to consider.

3.1 System information window

From the main menu, if you select the **System Information** icon from the Node Maintenance section, you will see the following information.

The top of the window in Figure 3-1 shows these details:

- ▶ Firmware Revision
- ▶ Serial Number of the node

The lower part of the window shows three bar graphs, which provide an approximation of the following performance parameters:

Data throughput This indicates the current performance in megabytes per second (MBps).

CPU Utilization This indicates the percentage of time that the CPU is occupied undertaking data management, and scheduling data transfers between the two interfaces.

Memory Usage This indicates the percentage of memory used by all processes.

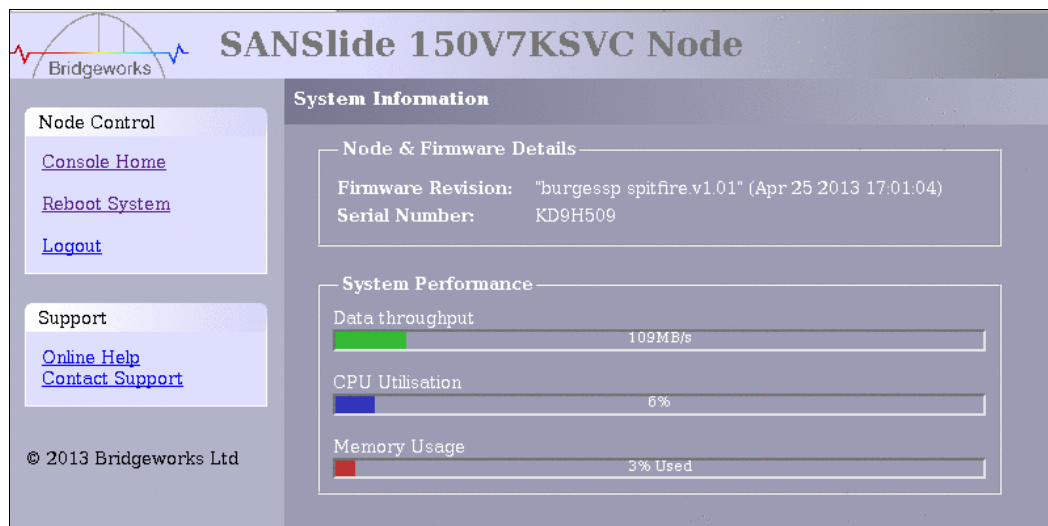


Figure 3-1 System Information

3.2 Fibre Channel port status

Follow these steps to determine the FC port status:

1. From the home window, click the **Fibre Channel** icon in the Interfaces and Devices section to see the Fibre Channel Management Console panel (Figure 3-2).

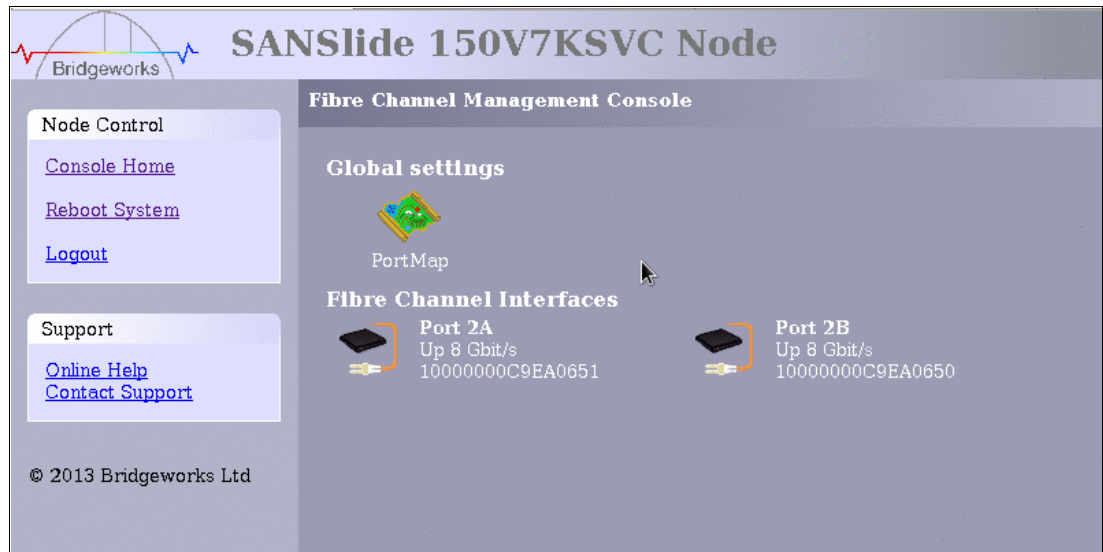


Figure 3-2 Fibre Channel Management Console window

This shows the WWPNs for the two Fibre Channel ports of the SANSlide 150 unit.

2. Click either of the port icons, and you will see further details (Figure 3-3).

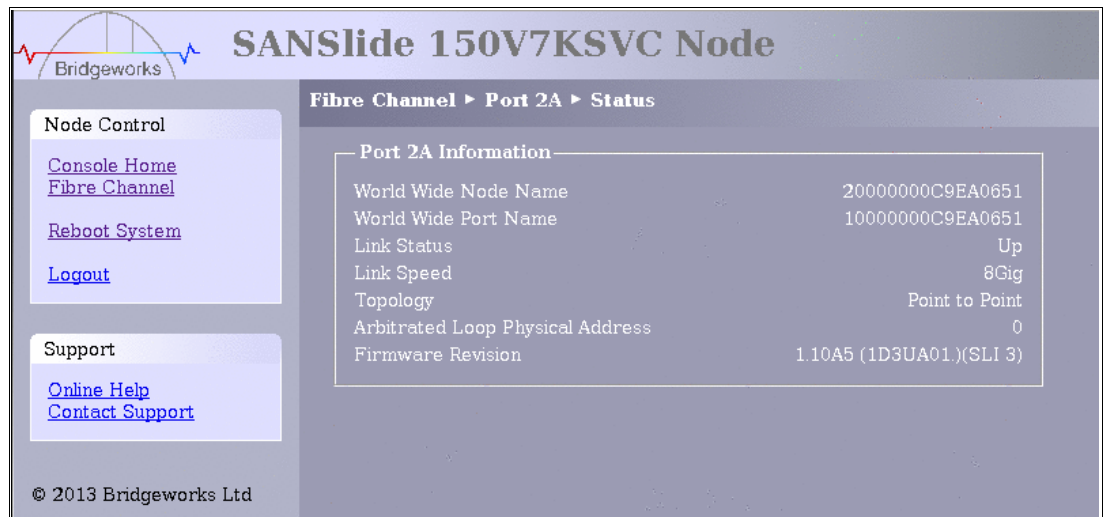


Figure 3-3 Fibre Channel port status

3.3 Log messages

From the home window, you can click the **View Log File** icon from the Node Maintenance section to view the system log. This records various events as they happen, and you can use

it to help determine the cause of problems. The log can also be saved to a file and sent to support if requested.

3.4 Changing passwords

The SANSlide 150 only supports one account, named admin. Change the password for this account from its default value before putting the unit into production:

1. From the home window, click the **Passwords & Security** icon in the Network section to view the Passwords & Security panel (Figure 3-4).
2. You can select **Enable HTTPS** in the Secure Web Connection section to use https rather than http for web communication. Changing this value will force you to log out and log in again.

Important: Be sure to securely record the new password, because if it is lost, you will need to contact Bridgeworks to recover system access.

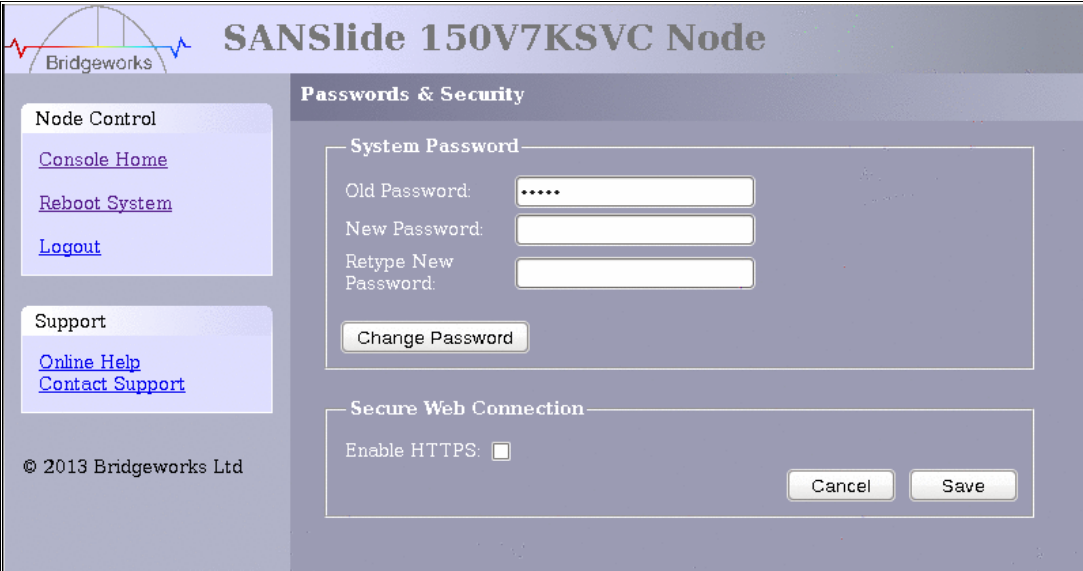
The screenshot shows the 'SANSlide 150V7KSVC Node' web interface. On the left is a sidebar with 'Node Control' (Console Home, Reboot System, Logout) and 'Support' (Online Help, Contact Support) links, along with a copyright notice for Bridgeworks Ltd. The main area is titled 'Passwords & Security'. It contains two sections: 'System Password' with fields for 'Old Password', 'New Password', and 'Retype New Password', followed by a 'Change Password' button; and 'Secure Web Connection' with an 'Enable HTTPS' checkbox. 'Cancel' and 'Save' buttons are at the bottom right.

Figure 3-4 Passwords & Security settings

3.5 Firmware upgrades

Upgrading firmware on the SANSlide 150 will interrupt traffic flow for roughly two minutes, because it requires the unit to be restarted to activate the new code.

If you can tolerate a short outage, you can suspend traffic while the upgrade of both SANSlide 150 nodes is performed, and then resume traffic. If an outage cannot be tolerated, a second WAN link made up of an extra pair of SANSlide 150 units can provide a redundant link and avoid traffic interruption.

Both nodes in a connected pair should be running the same firmware level.

New levels of firmware can be found on the Bridgeworks website:

http://www.4bridgeworks.com/software_downloads.phtml

3.6 Network services

The following sections provide information about various supported network services. To access them, click the **Service Control** icon in the Network section of the home window.

3.6.1 Network Time Protocol

A Network Time Protocol (NTP) server can be defined to ensure that the SANSlide 150 uses correct time stamps for its log messages.

3.6.2 Simple Network Management Protocol

The SANSlide 150 supports basic Simple Network Management Protocol (SNMP) notifications.

3.6.3 Email alerts

The SANSlide 150 can send email notifications when log events of a certain level occur. Select the check box and complete the following fields:

Recipient Email Address	The email address to which the emails will be sent.
Senders Email Address	The email address that emails will be sent from.
Trigger Event Log Level	The level that the user specifies to indicate what severity of event will trigger the log to be mailed. Critical Events is the most severe level, and Warning Events is the least severe level. For each level selected, the higher-level logs will also be mailed. For example, selecting Error Events will also send all Critical Events.
SMTP Server	The IP address of the Mail Server that will handle the transport of the event emails.
SMTP Username	If required, the username that allows the use of the SMTP Server.
SMTP Password	The password required to allow the use of the SMTP Server.

3.7 Tuning the Storwize V7000

By default, the Storwize V7000 will limit the bandwidth of a single remote-copy relationship to 25 MBps.

3.7.1 Tuning bandwidth for a limited number of relationships

When multiple relationships are sharing the WAN link, the bandwidth limit is not normally an issue. However, if only a few relationships are defined, or if the link is being tested with a

single relationship, the bandwidth setting can limit throughput to less than the capability of the link.

To verify the current setting using the command-line interface (CLI), issue the **lssystem** command and look for the value of the `relationship_bandwidth_limit` field.

To change the relationship bandwidth limit of the clustered system, use this CLI command:

```
chsystem -relationshipbandwidthlimit system_relationship_bandwidth_limit
```

The `system_relationship_bandwidth_limit` variable is the new limit for the cluster.

Important: Remember to issue the command on both clusters in a relationship.

3.7.2 Tuning bandwidth for testing

If you raise this value from the default to a high value to fully exercise the WAN link using a low number of relationships, consider resetting it back to the default value after testing has been completed, because this value is normally sufficient.

3.8 Verifying connectivity

If you suspect a connectivity issue, check the following two communications channels.

3.8.1 Storwize V7000 to SANSlide 150

SANSlide 150 WWPNs will be listed in the output of the **lshbaportcandidate** command. This is normal and expected.

SANSlide 150 WWPNs will also be listed in the output of the **lsfabric** command, with a type reported as **unknown**.

During configuration, you can use either **lshbaportcandidate** or **lsfabric** to verify that FC logins between Storwize V7000 and the SANSlide 150 units have been successfully established.

3.8.2 SANSlide 150 to SANSlide 150

Use the **ping** test, described in 2.2.8, “Verify network connectivity” on page 19, to test that the SANSlide 150 units are able to communicate with each other across the WAN link.

3.9 Traffic flow graphs

Link performance for the last minute can be displayed:

1. From the main menu, select the **Remote Node Management** icon under the Network section.
2. Select the node that you want to monitor from the list presented.

The transmit rate is shown in blue and the receive rate is shown in red.

Figure 3-5 shows the changed data being sent to the remote node, and illustrates how the sending of the updates completed within the one minute window. The small amount of data shown in red illustrates the acknowledgements and heartbeats being sent back.

An equivalently shaped graph can be seen on the receiving node with the colors reversed.

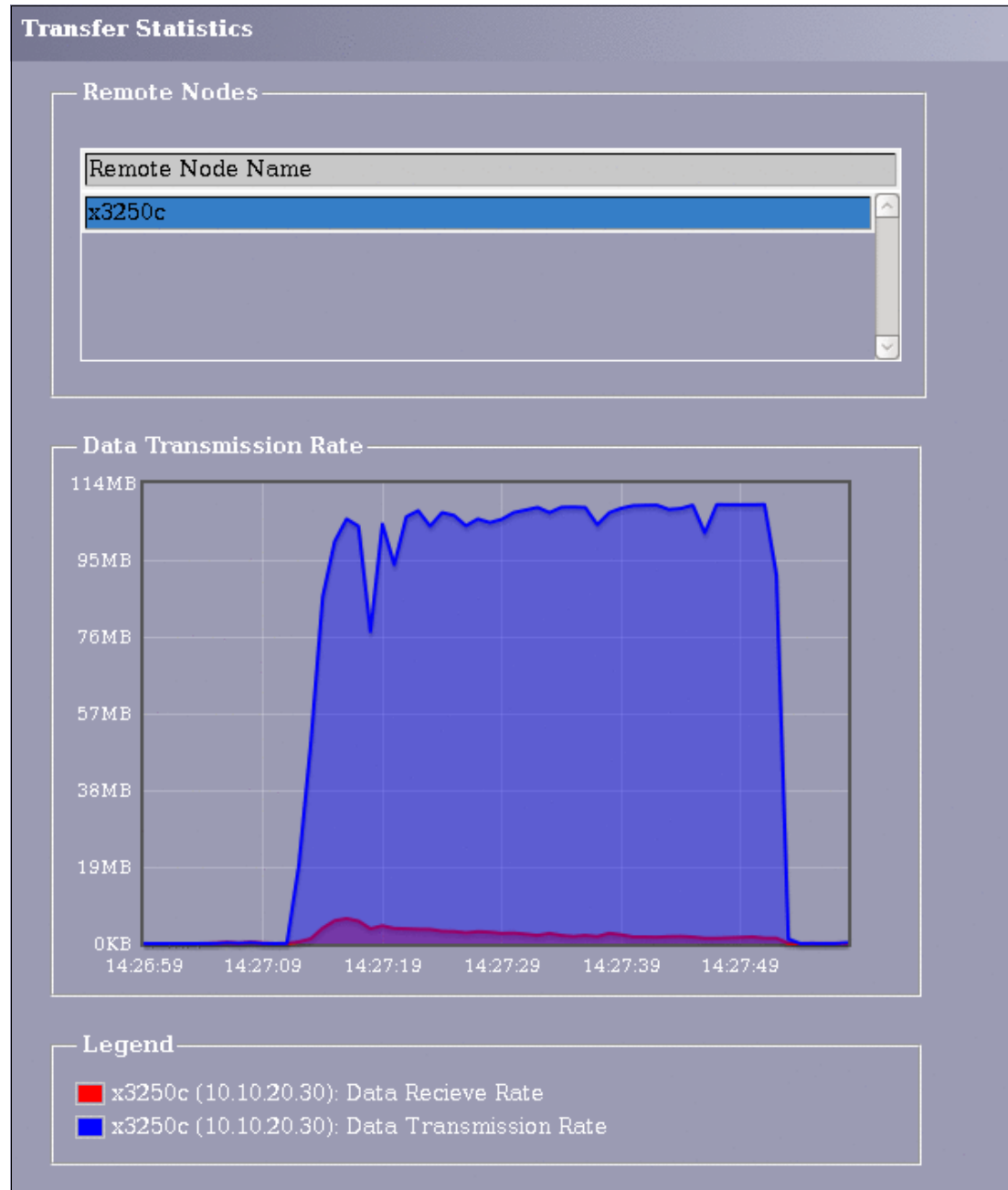


Figure 3-5 Change volume data being transmitted

The Performance chart of the receiving Storwize V7000 will show a similar pattern, but remember that the time interval shown on the Storwize V7000 is five minutes rather than the one minute of the SANSlide 150.

3.10 Limiting bandwidth used by the SANSlide 150

By default, the SANSlide 150 will always attempt to get the best performance possible for the data it is transferring. Therefore, if there will be other traffic that needs to share the WAN link, the node must be configured to limit the bandwidth that the SANSlide 150 can use.

To limit the bandwidth, follow these steps:

1. From the home window, select the **Remote Node Management** icon.
2. Select a node from the Remote Nodes list:
 - a. Select the **Set Node transfer limit** check box.
 - b. Enter the **Limit Value** in MiB/s.
 - c. Click **OK** to start the limit.

Note: The bandwidth limit will become effective immediately.

Related publications

The publications listed in this section are considered particularly suitable to provide more detailed information about the topics covered in this paper.

IBM Redbooks

The following IBM Redbooks publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only:

- ▶ *IBM Tivoli Storage Manager for Advanced Copy Services*, SG24-7474
- ▶ *Implementing the IBM Storwize V7000 V6.3*, SG24-7938
- ▶ *Implementing the IBM System Storage SAN Volume Controller V6.3*, SG24-7933
- ▶ *Implementing the IBM Storwize V3700*, SG24-8107

You can search for, view, download, or order these documents and other Redbooks, Redpapers, WebDocs, drafts, and additional materials at the following website:

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IBM Storwize V7000 and SANSlide Implementation



Redpaper™

Extending Storwize V7000 IP replication using SANSlide

Implementing and configuring SANSlide IP replication

Mitigating the effects of IP latency over distance

IBM has announced certification of the Bridgeworks SANSlide Series 150 V7KSVC with its IBM System Storage SAN Volume Controller, IBM Storwize V7000, and Storwize V3700 virtualized storage systems. This combination of SANSlide and the Storwize V7000 provides a powerful solution for clients who require efficient, IP-based replication over long distances.

This certification gives IBM Storwize V7000 clients a fully supported, transparent technology that includes unmatched levels of performance and reliability. With the SANSlide protocol acceleration technology, it is now possible to replicate data across continents in a cost-efficient way, with little or no loss in performance. At the same time, bandwidth utilization can improve to over 95%, instead of the 1% - 5% normally achieved in long-distance IP networks.

This IBM Redpaper publication shows the steps required to implement this solution efficiently and speedily.

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