
Application Note

Remote Data Migration for iSR6200

Products Affected

QLogic Storage Router
iSR6240
iSR6250
iSR6260

1 Introduction

This application note provides instructions for performing remote data migration using the QLogic iSR6200 Series of intelligent Storage Routers listed in the *Products Affected* table. These routers are collectively referred to as the *iSR6200* throughout this application note. The iSR6200 command line interface is referred to as the *CLI*, and the SANsurfer[®] Router Manager utility is referred to as the *GUI* throughout this document.

Remote data migration jobs are run as asynchronous mirror operations. During the initial copying phase of remote online migration, the iSR6200 tracks I/Os occurring in the already copied blocks by creating dirty region logs (DRLs). Remote online migration also keeps track of the I/Os after the initial copying phase and creates DRLs. The DRLs are stored in the data management LUN (DML). After the initial copying phase is complete, the DRLs are flushed continually.

2 Prerequisites

Before configuring remote data online migration jobs, you must configure the DML on the iSR6200. If you choose to migrate to a remote array in the offline mode, you need not create a DML. DMLs created on one blade are available for remote migration jobs across both blades. You can configure up to eight LUNs as DMLs. The maximum supported DML capacity is 2TB. For more information, see the *Data Migration Service for iSR6200 User's Guide*.

3 Remote Migration Use Cases

The iSR6200 supports the following use cases for remote migration. [Section 4 Configuration](#) provides details on setting up the iSR6200 for these use cases:

- **Use Case 1:** The source array is at the local site, and the destination array is at a remote site.

Use Case 1 typically applies to scenarios where the servers in a data center at Site A (the local site) are moved to a data center at Site B (the remote site) and the data storage associated with the servers are consolidated with existing or new storage arrays at Site B.

- **Use Case 2:** The source and destination arrays are at the local site initially.

For Use Case 2, after the initial copying operation, the remote migration is moved to the remote site. The iSR6200 supports a maximum of eight paths per array. When using the topology described in [Section 6.1](#) to connect to the remote array, the array on the local site supports a maximum of four paths if the destination array is a Fibre Channel array. The iSCSI presented targets are added as additional paths to the existing array when the local Fibre Channel array is moved to the remote site.

[Table 3-1](#) summarizes the remote device connectivity topology for various combinations of supported source and destination array types.

Table 3-1. Remote Device Connectivity Topology

Topology	Source Array	Destination Array	Remote Migration Method	Remote Device Connectivity Topology
1	Fibre Channel or Fibre Channel over Ethernet (FCoE)	Fibre Channel or FCoE	Online or offline	iSCSI presented targets (see Section 6.1) or Fibre Channel over IP (FCIP) (see Section 6.2)
2	Fibre Channel or FCoE	iSCSI	Online or offline	Native iSCSI (see Section 6.3)
3	iSCSI	Fibre Channel or FCoE	Offline	iSCSI presented targets or FCIP (see Section 6.4)
4	iSCSI	iSCSI	Offline	Native iSCSI

4 Configuration

The following sections describe the configuration for remote data migration:

- [4.1 Performing Remote Migration](#)
- [4.2 Configuring Local and Remote iSR6200 Routers for iSCSI Presentation](#)
- [4.3 Discovering Remote Devices Through FCIP](#)

4.1 Performing Remote Migration

To perform remote data migration, follow the steps in the *Data Migration Service for iSR6200 User's Guide's* chapter on performing data migration, except for discovering the destination LUNs for migration. This exception applies to the following topologies:

- If you are using Topology 1 (see [Section 6.1](#)) or Topology 3 (see [Section 6.3](#)), follow the steps in [Section 4.2](#) for discovering your destination migration LUNs.
- If you are using FCIP (see [Section 6.2](#)), establish the FCIP link, and then follow the steps in the *Data Migration Service for iSR6200 User's Guide's* chapter on performing data migration.

4.2 Configuring Local and Remote iSR6200 Routers for iSCSI Presentation

To configure local and remote iSR6200 routers for iSCSI presentation, follow these steps:

1. Identify the destination array ports to use for remote migration.
2. Zone the destination array controller ports with remote iSR6200 Fibre Channel ports.
3. Register the remote iSR6200 Fibre Channel ports and provide access to the LUNs on the destination array.
4. Rescan the targets on the remote iSR6200 to discover the LUNs that were mapped to iSR6200 Fibre Channel ports on the array.

NOTE:

Some arrays do not allow an iSR6200 Fibre Channel port to port log in (PLOGI) to its Fibre Channel ports if there are no LUNs mapped to the Fibre Channel port that is logging in. You must generate a registered state change notification (RSCN) to iSR6200 Fibre Channel ports by disabling and then re-enabling all connected Fibre Channel ports on iSR6200 blades.

5. Ensure that the destination LUNs are mapped to the remote iSR6200 by issuing the `show luns` command on the CLI, or by selecting the FC Discovered Targets or the iSCSI Discovered Targets node in the GUI's router tree to see the LUNs.
6. Configure the IP addresses, gateway, and subnet mask in the iSCSI interface(s) on the remote iSR6200.
7. Configure the iSCSI interface(s) on the local iSR6200 as follows:
 - a. Configure the IP addresses, gateway, and subnet mask.
 - b. Set the iSCSI maximum first burst to 64K.
 - c. Configure the TCP window size for the round-trip time (RTT) and bandwidth to the remote iSR6200.
8. On the local iSR6200, issue the `iscsi discover` command in the CLI, or use the Discover iSCSI Target Wizard in the GUI to discover the remote iSR6200 iSCSI port IP address.
9. Verify that the remote iSR6200 shows the local iSR6200 router's iSCSI qualified name (IQN) by issuing the `show initiators iSCSI` command in the CLI, or by viewing the Discovered iSCSI Initiator node in the GUI.
10. Provide the destination LUN access to the local iSR6200 by following one of these options:
 - Disable LUN masking on the remote router using the `set system` command in the CLI (a reboot of the remote iSR6200 blades is required).
 - Mask LUNs using the Target Presentation/LUN Mapping Wizard (on both blades) of the remote iSR6200, presenting the destination LUNs to the local iSR6200 iSCSI initiator IQN.
11. On the local iSR6200, log in to the remote iSR6200 iSCSI targets by issuing the `iscsi login` command in the CLI, or by selecting the targets in the iSCSI Discovered Targets node on the router tree in the GUI.
12. Repeat the login using multiple local and remote iSR6200 iSCSI ports to enable multipathing between the local and remote iSR6200s.

13. After successfully logging in, you see the LUNs on the logged-in target as follows:

- ❑ For Use Case 1, a new array object is formed. Issue the `set array` command to set the array type and license the array if required.
- ❑ For Use Case 2, the discovered iSCSI target paths appear on the previously existing array with Fibre Channel paths. The Fibre Channel paths are offline, and the iSCSI paths are online. The local router can now access the LUNs through the iSCSI paths.

4.3 Discovering Remote Devices Through FCIP

The iSR6200 also provides an FCIP feature to discover remote devices. You can use one iSR6200 on each site to create FCIP links and an additional router for migration. After Fibre Channel switches are linked using FCIP, the remote Fibre Channel devices are available, just like any other Fibre Channel device. The iSR6200 used for migration cannot differentiate between a remote or local Fibre Channel device.

5 Best Practices

For more information on general data migration best practices, see the *Data Migration Service for iSR6200 User's Guide*. The following guidelines describe the best practices:

- Start online remote migration jobs during off-peak hours.
- If the destination LUN is a thin-provisioned LUN, do the following:
 - ❑ Create new LUNs on the destination site.
 - ❑ In the GUI's Data Migration Jobs Options dialog box, select the **TP Setting** option of "Yes without TP Validation," which does not copy zero blocks.
- When using two iSR6200 routers (one at a local site and one at a remote site), set the migration I/O size to 64kB. This setting accelerates writes by reducing the latencies involved with the `write` command.
- Use the bandwidth-limiting feature on the source array to throttle the migration, which in turn limits the WAN link use.
- When using two iSR6200 routers, issue the `set iscsi` command to manage the RTT and available bandwidth. Tuning TCP window size based on the RTT is critical to enhanced migration performance. You can calculate the typical window size in kB as follows:

$$\frac{\text{WAN link bandwidth in MBps} \times \text{RTT in ms}}{\text{Number of iSCSI connections between the iSR6200 and iSCSI target port of the storage array}}$$

For example, suppose the available WAN link bandwidth is 100MBps (1000Mbps), the RTT is 20ms, and there are two iSCSI connections between the iSR6200 blade and the iSCSI target ports on the storage array:

$$\frac{100 \times 20}{2} = 1000\text{kB TCP window size}$$

Configure a 1MB window size on the iSR6200 and iSCSI target port. The iSR6200 supports a maximum TCP window size of 16MB. An iSCSI target array port may support larger TCP window sizes.

- Refer to the attached `Timeline for Remote Migration Project.xlsx` spreadsheet to estimate the amount of data that can be transferred weekly based on the available bandwidth and change rate at the source.

NOTE:

The `Timeline for Remote Migration Project.xlsx` file is a Microsoft® Excel® spreadsheet that is attached to this PDF.

Remote migration projects depend on the available bandwidth, RTT, and change rate for data under migration. This spreadsheet provides an estimate of how much data can be migrated online remotely per week, using the available WAN bandwidth and specified change rate. It also indicates a timetable on when to start migrations. This method assumes that the application cut-over to the destination starts on Day 6 and Day 7 of the week.

In the spreadsheet, you must enter the following highlighted values:

- **Dedicated Bandwidth (Mbps)** (the bandwidth of the WAN link used to connect the source and destination in Mbps).
- **Change Rate for Data Under Migration (%)** (the rate at which the source LUN changes).

The calculation is:

$$((B4/10\%) \times 3600 \times 24 \times 85\%) / 1000$$

where:

- **B4** is equal to the dedicated bandwidth of the configuration (whatever is available).
- **10%** is the change of rate for data under migration.
- **3600** is the number of seconds in an hour (60 seconds per minute × 60 minutes per hour).
- **24** is the number of hours per day.
- **85%** is the percentage of bandwidth efficiency.
- Dividing by **1000** gives a result in GB.

The result is the weekly total GB migrated.

In the example depicted in [Figure 5-1](#), you start with 3,305GB of migration on Day 1, 3,342GB of migration on Day 2, and so on. Assuming that the 500Mbps bandwidth entered is available, the cut-over to the destination is possible on Day 6 or Day 7.

Timeline for Remote Migration Project.xlsx

Remote data migration projects depend on the available bandwidth, round-trip time (RTT), and change rate for data under migration. This worksheet uses the available bandwidth and change rate to provide an estimate for how much data can be migrated online remotely. This calculation assumes that application cut-over starts on Day 6 and Day 7 of the week.

To calculate the weekly total GB of data migrated, type the appropriate values in the "Dedicated Bandwidth (Mbps)" and "Change Rate for Data Under Migration" cells. The results are shown in the "Available Bandwidth per Day (GB/Day)" and "Weekly Total GB" cells.

	A	B	C	D	E	F	G	H	I
1	Remote data migration projects depend on the available bandwidth, round-trip time (RTT), and change rate for data under migration. This worksheet uses the available bandwidth and change rate to provide an estimate for how much data can be migrated online remotely. This calculation assumes that application cut-over starts on Day 6 and Day 7 of the week.								
2	To calculate the weekly total GB of data migrated, type the appropriate values in the "Dedicated Bandwidth (Mbps)" and "Change Rate for Data Under Migration" cells. The results are shown in the "Available Bandwidth per Day (GB/Day)" and "Weekly Total GB" cells.								
3		Dedicated Bandwidth (Mbps)	Change Rate for Data Under Migration (%)			Available Bandwidth per Day (GB/Day)			
4		500	10%			3672			
5		Migration schedule for one week	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Weekly Total GB
6		Base migration to be scheduled (GB)	3,305	3,342	3,007	2,707	2,436		14,796
7		Changes GB/day		330	665	965	1,236	1,480	
8		Available bandwidth GB/Day	3,672	3,672	3,672	3,672	3,672	3,672	

Figure 5-1. Example Time Line for Remote Migration Project

6 Remote Migration Topology Examples

The following sections illustrate various remote migration topologies:

- 6.1 Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using iSCSI Presented Targets
- 6.2 Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using FCIP
- 6.3 Fibre Channel-to-iSCSI Remote Online and Offline Migration
- 6.4 iSCSI-to-Fibre Channel Remote Offline Migration

6.1 Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using iSCSI Presented Targets

The Fibre Channel-to-Fibre Channel topology shown in [Figure 6-1](#) supports both online and offline remote migration. For offline migration, the servers accessing the source LUN must be shut down and do not require a DML.

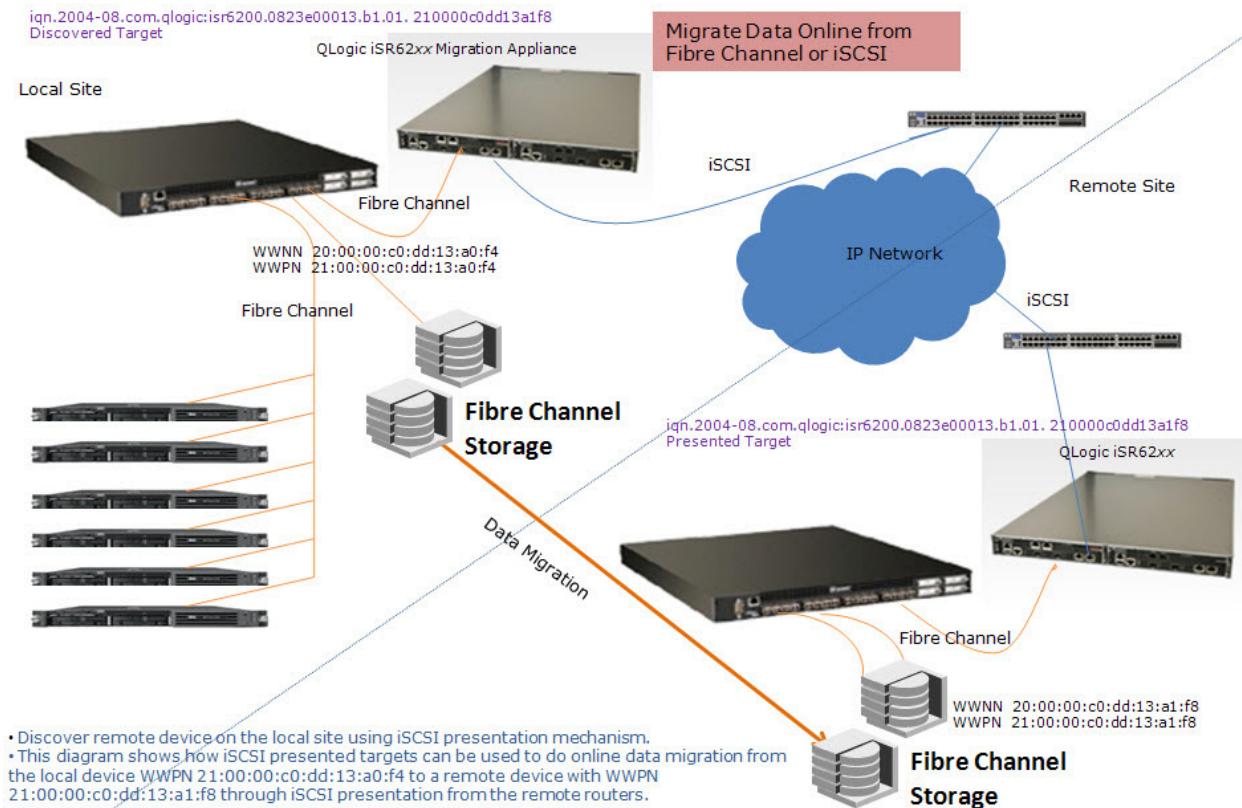


Figure 6-1. Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using iSCSI Presented Targets

6.2 Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using FCIP

The Fibre Channel-to-Fibre Channel topology shown in [Figure 6-2](#) supports both online and offline remote migration. For offline migration, the servers accessing the source LUN must be shut down and do not require a DML.

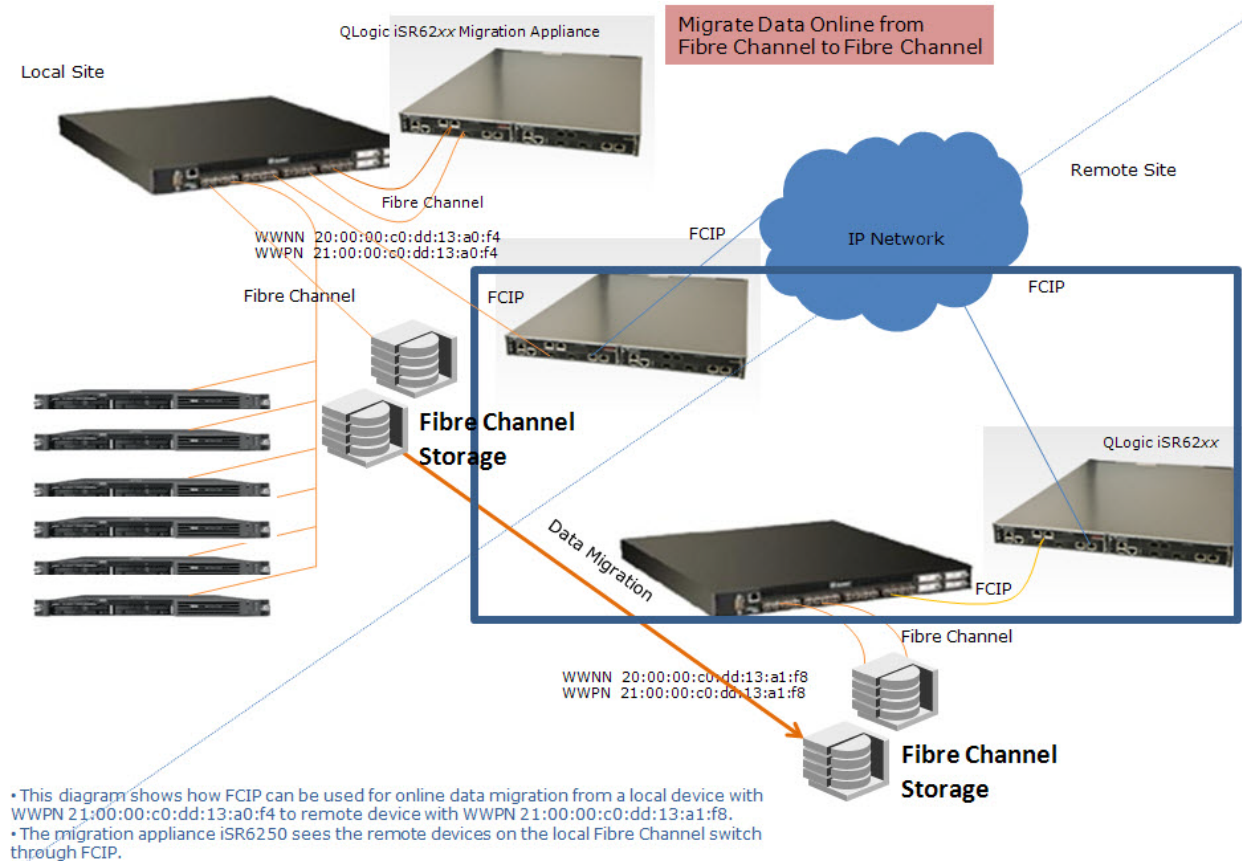


Figure 6-2. Fibre Channel-to-Fibre Channel Remote Online and Offline Migration Using FCIP

6.3 Fibre Channel-to-iSCSI Remote Online and Offline Migration

The Fibre Channel-to-iSCSI topology shown in [Figure 6-3](#) supports both online and offline remote migration. For offline migration, the servers accessing the source LUN must be shut down and do not require a DML.

`iqn.2001-05.com.vendor:0-8a0906-e7f879f09-1b921083d6e4d55a-migration-100gb-x` - Discovered Target

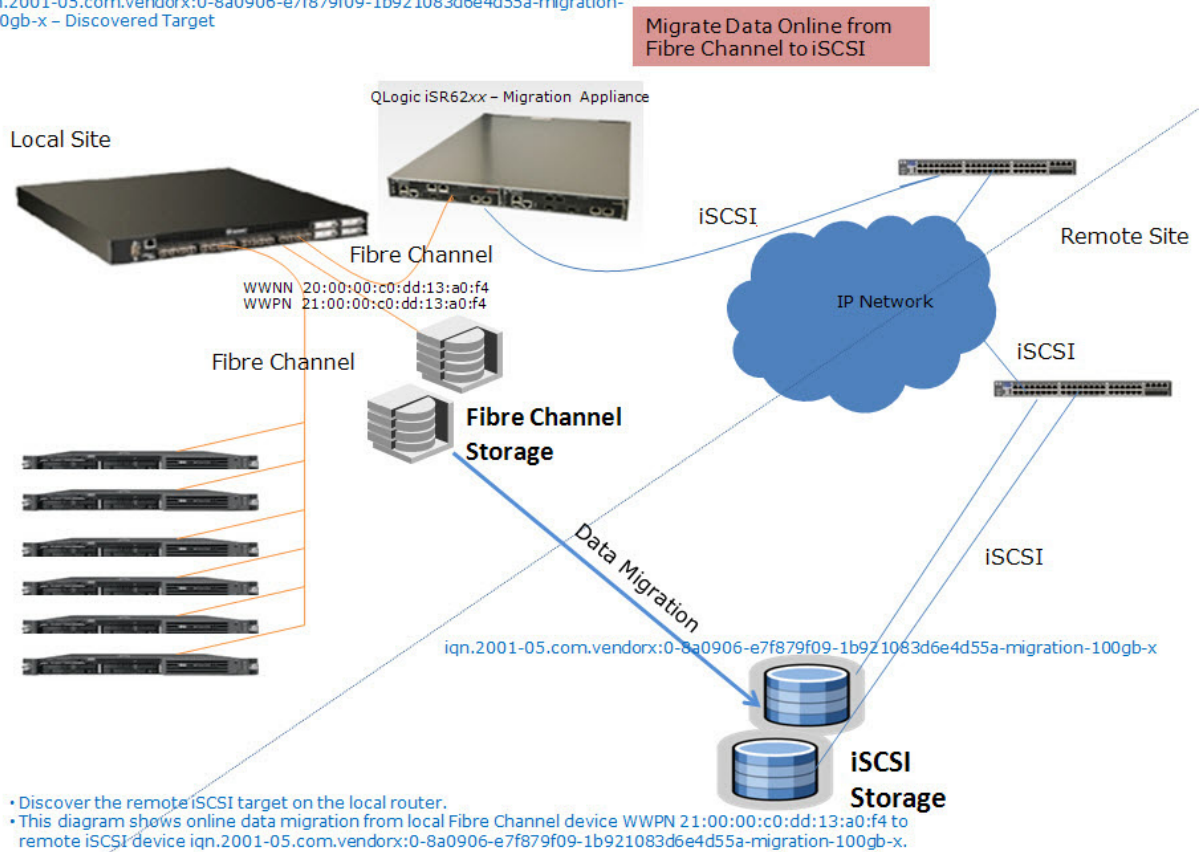


Figure 6-3. Fibre Channel-to-iSCSI Remote Online and Offline Migration

6.4 iSCSI-to-Fibre Channel Remote Offline Migration

The iSCSI-to-Fibre Channel topology shown in [Figure 6-4](#) supports only offline migration. The iSR6200 does not currently support online data migration when the source LUN is from an iSCSI target.

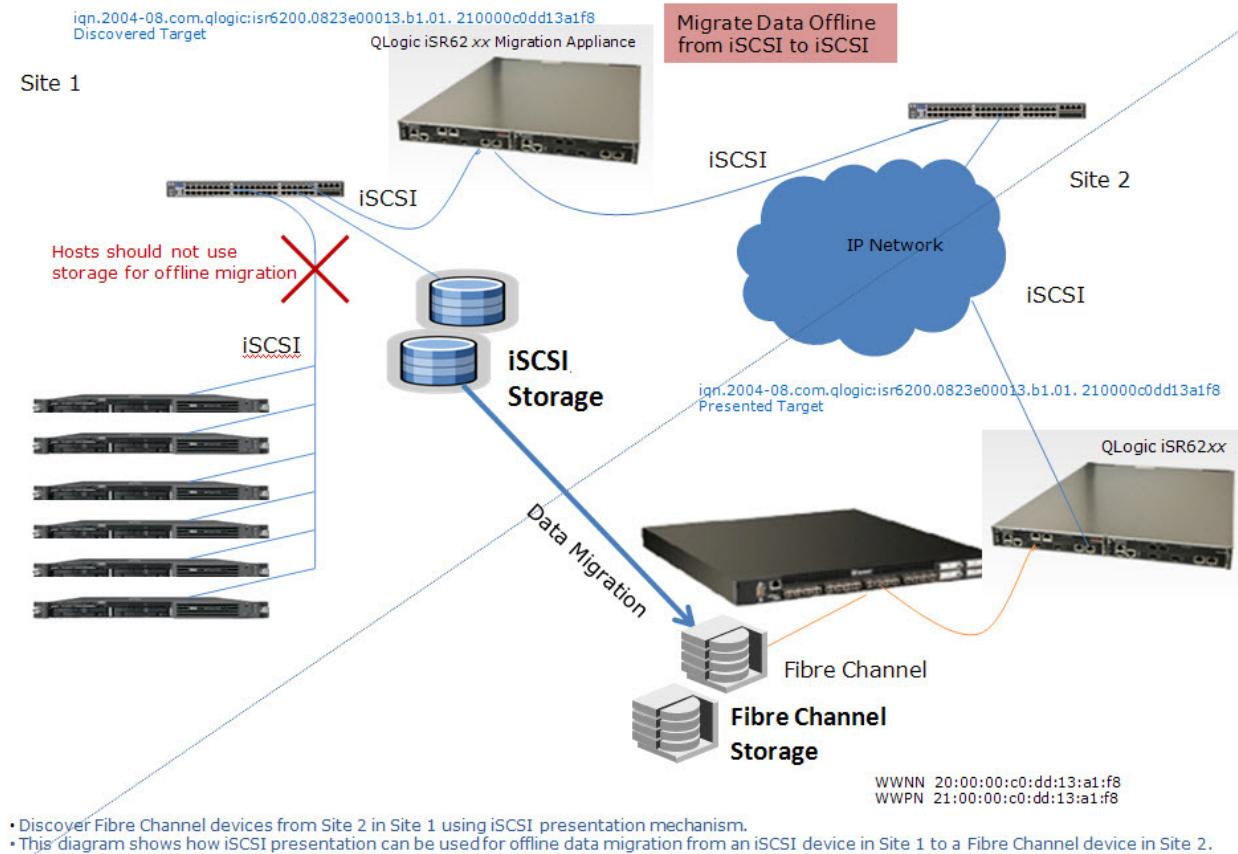


Figure 6-4. iSCSI-to-Fibre Channel Remote Offline Migration



Document Revision History
Revision A, November 14, 2011
Revision B, December 6, 2011
Changes
Made minor edits to improve readability.
Modified and attached the bandwidth calculation spreadsheet, and updated the Figure 5-1 screen shot of the spreadsheet.
Updated the 6 Remote Migration Topology Examples graphics.



Corporate Headquarters QLogic Corporation 26650 Aliso Viejo Parkway Aliso Viejo, CA 92656 949.389.6000 www.qlogic.com
International Offices UK | Ireland | Germany | France | India | Japan | China | Hong Kong | Singapore | Taiwan

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