
Using ControlCenter and SYMCLI to Manage Symmetrix Arrays in Multihop Configurations

Abstract

This white paper describes how ControlCenter and SYMCLI operations are supported across multihop Symmetrix configurations. This material applies to ControlCenter 5.1.2 and 5.2.

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Configuring Symmetrix Arrays Across Multihop Environments

It is a commonly held misconception that management operations can only be performed on directly connected Symmetrix® arrays. The truth is that most monitoring and management operations can be executed on Symmetrix arrays one and two hops away.

This document describes:

- How the number of hops influences your ability to manage Symmetrix arrays from within ControlCenter™
- How Symmetrix arrays are paired with instances of the Storage Agent for Symmetrix
- A variety of SRDF® configuration scenarios and their implications for agent management.

Purpose and Scope

This document describes features of ControlCenter 5.2, and SYMCLI included in EMC® Solutions Enabler Version 5.4.0. Symmetrix arrays are assumed to have Enginuity™ Version 5670 or higher.

What is SRDF Multihop?

By combining TimeFinder™ and SRDF configurations across multiple Symmetrix arrays, data can be periodically migrated from one array to the next, using split and establish operations. When Symmetrix arrays are configured in this manner, each step away from the initial Symmetrix array is considered a "hop". For purposes of this document, *multihop* refers to two-hop configurations. Figure 1 summarizes these configurations.

A host or ControlCenter can discover or monitor arrays in such a multihop configuration. In addition, most management operations used in SYMCLI can also be performed on a given array.

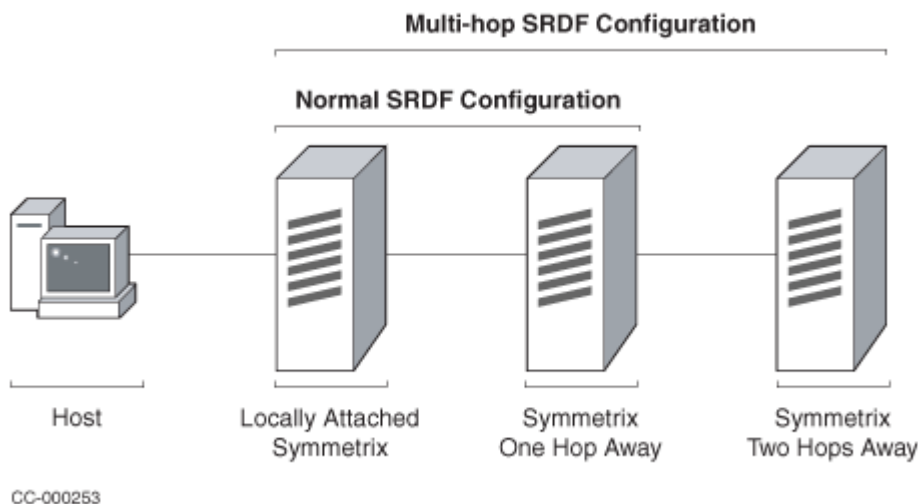


Figure 1. Common Host-to-Symmetrix Configurations

General Rules for Symmetrix Management

The following rules summarize how the number of hops influence device group/device pair operations:

- You can perform management operations on a directly connected or single-hop Symmetrix array.
- You can monitor a Symmetrix array up to two hops away.
- Per-device operations for TimeFinder and SRDF can only be done on directly connected Symmetrix arrays.
- Device group operations for TimeFinder and SRDF can be performed on Symmetrix arrays up to two hops away (specifically for SRDF multihop operations).

Table 1 describes common Symmetrix operations, and indicates if they are supported for a Symmetrix array one or two hops away.

Table 1. Symmetrix Operations and Multihop Support

Symmetrix Operation	ControlCenter One Hop Away	ControlCenter Two Hops Away	SYMCLI One Hop Away	SYMCLI Two Hops Away
Symmetrix device masking	No	No	No	No
SDR device mapping	Yes	No	Yes	No
Port flag configuration	Yes	No	Yes	No
Meta device configuration	Yes	No	Yes	No
Logical device configuration	Yes	No	Yes	No
SRDF Device Definition and Pairing	No	No	No	No
TimeFinder operations on device pairs	Yes	Yes	Put the device names in a text file and use -f device_file parameter.	Put the device names in a text file and use -f device_file parameter.
TimeFinder operations on device groups	Yes	Yes	Yes	Yes
TimeFinder Clone operations	No	No	No	No
EMC Snap operations	No	No	No	No
SRDF operations on device pairs	No	No	Put the device names in a text file and use -f device_file parameter.	Put the device names in a text file and use -f device_file parameter.
SRDF operations on device groups	Yes	Yes	Yes	Yes
Data Protection -> Controls -> Device W Disable	Yes for FA and SA No for EA	Yes for FA and SA No for EA	Yes for FA and SA No for EA	Yes for FA and SA No for EA
Data Protection -> Controls -> Device RW Enable	Yes	Yes	Yes	Yes
Data Protection -> Controls -> Device Not Ready	Yes	Yes	Yes	Yes

Table 1. Symmetrix Operations and Multihop Support (continued)

Symmetrix Operation	ControlCenter One Hop Away	ControlCenter Two Hops Away	SYMCLI One Hop Away	SYMCLI Two Hops Away
Data Protection -> Controls -> Device Ready	Yes	Yes	Yes	Yes
Data Protection -> Controls -> FE Port	No	No	No	No
Data Protection -> Controls -> SRDF Director	Yes	No	Yes	No
Properties view	Yes	Yes	Yes	Yes
Performance view	Yes	Yes	Yes	Yes
QoS	Yes	Yes	Yes	Yes
Visual Storage	Yes	Yes	na	na
Physical View	Yes	Yes	na	na
Optimizer	No. While technically possible, this should be avoided due to bandwidth considerations.	No	No. While technically possible, this should be avoided due to bandwidth considerations.	No
Symmetrix Activity Log (called <i>Symmetrix Audit Log in CLI</i>)	Yes	Yes	Yes	Yes
Symmetrix alerts	Yes	Yes	na	na

Note: Performance Manager (Workload Analyzer) collects statistical data across one and two hop configurations, if you have at least Solutions Enabler 5.2 and Enginuity 5668.

Important: If a Symmetrix array can only be discovered by a Storage Agent for Symmetrix that is two hops away, then that agent will be paired with the Symmetrix array. This pairing will only provide limited functionality, as most configuration operations will fail. You should install another Storage Agent for Symmetrix on a host closer to the target Symmetrix array.

Refer to *Appendix A: SYMCLI Commands and Multiple Hops* on page 14 for a detailed listing of all SYMCLI commands and the impact of one- and two-hop configurations.

Agent Management and SRDF Scenarios

This section discusses the role of the Agent Manager, how agents are paired with a managed object, and the discovery process. Following this discussion, there are five scenarios that illustrate how a Symmetrix array can be managed.

Agent Manager

Within the ControlCenter Server, the Agent Manager keeps track of all known agents by performing the following functions:

- Controls the heart-beat for agent-alive status
- Determines what agent is paired with a managed object
- Maintains one-way, server-to-agent communication

Note: An agent does not know it has been paired until the Agent Manager tells the agent its new status.

Paired and Available Agents

As of release 5.1.2 of ControlCenter, the following agents were able to be promoted from general availability to being paired with a managed object:

- Storage Agent for Symmetrix
- Symmetrix SDM Agent
- Storage Agent for CLARiiON®
- Fibre Channel Connectivity Agent

Initial Storage Agent for Symmetrix Discovery Process

Each Storage Agent for Symmetrix instance is the same as any other agent. At discovery time, they find whatever Symmetrix arrays they can and send the list to the Agent Manager. The Agent Manager then selects an agent to be paired with each Symmetrix array.

The order of preference in determining the pairing of Symmetrix arrays and Symmetrix agents is as follows:

1. Direct Connected
2. Proxy Connected
3. SRDF Connected

Important: If a Symmetrix can only be discovered by a Storage Agent for Symmetrix that is two hops away, then that agent will be paired with the Symmetrix array. This pairing will only provide limited functionality, as most configuration operations will fail. You should install another Storage Agent for Symmetrix on a host closer to the target Symmetrix array.

For each Symmetrix array, one agent is selected for pairing. All the other agents that can see that array are potentially available to be paired. An agent is paired for some Symmetrix arrays and not paired (commonly called "secondary" or "backup") for others.

The Agent Manager keeps track of all the information. For example, it keeps a list of all Symmetrix arrays that are visible to each of the agents. If the agent associated with a Symmetrix array fails or is stopped, the Agent Manager traverses the list to decide which agent is the next best selection.

What Is a Secondary (or Backup) Agent?

Because large environments can have multiple agents, with a given agent directly managing a Symmetrix array, while other agents are potentially available for use if the original agent were to fail, the terms “primary” and “secondary” found their way into common usage. It is important to understand that ControlCenter and the Agent Manager have no way to assign the state of “secondary” to an agent. The Symmetrix agents should be thought of as being paired to a particular array, or not.

Scenario #1: One Agent Managing Locally Attached and One Hop Symmetrix Arrays

Figure 2 describes a single host and agent directly connected to a Symmetrix array, with an SRDF link to a second Symmetrix array.

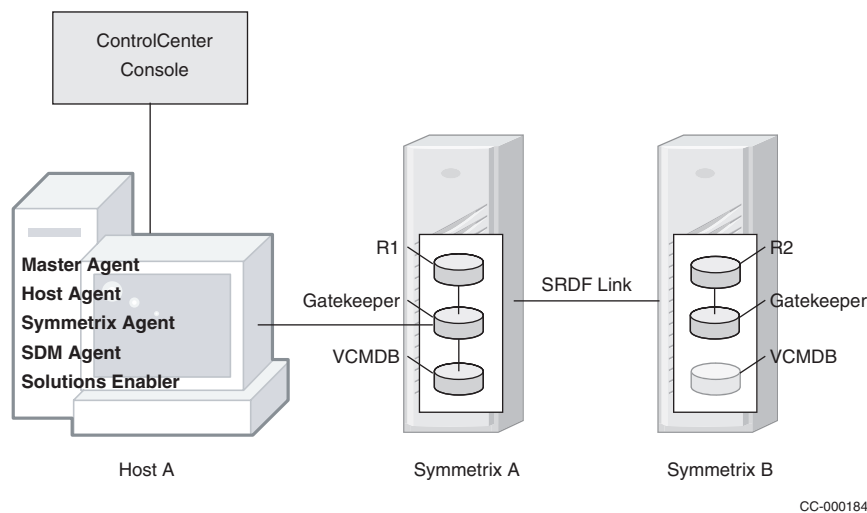


Figure 2. One Agent Managing Locally Attached and One Hop Symmetrix Arrays

Symmetrix Management

- Symmetrix Agent on Host A will fully discover Symmetrix B.
- Symmetrix Agent on Host A will manage Symmetrix A and Symmetrix B.
- Management of Symmetrix B is conducted through the SRDF link between Symmetrix A and B.
- SDM Agent on Host A will not be able to read the VCMDB on Symmetrix B.
- This functionality was introduced with Solutions Enabler 5.1.1

Scenario #2: One Agent Collecting PM Data for Locally Attached and One-Hop Symmetrix Arrays

Figure 3 uses the same configuration as Scenario #1, but addresses the collection characteristics of Performance Manager (WLA).

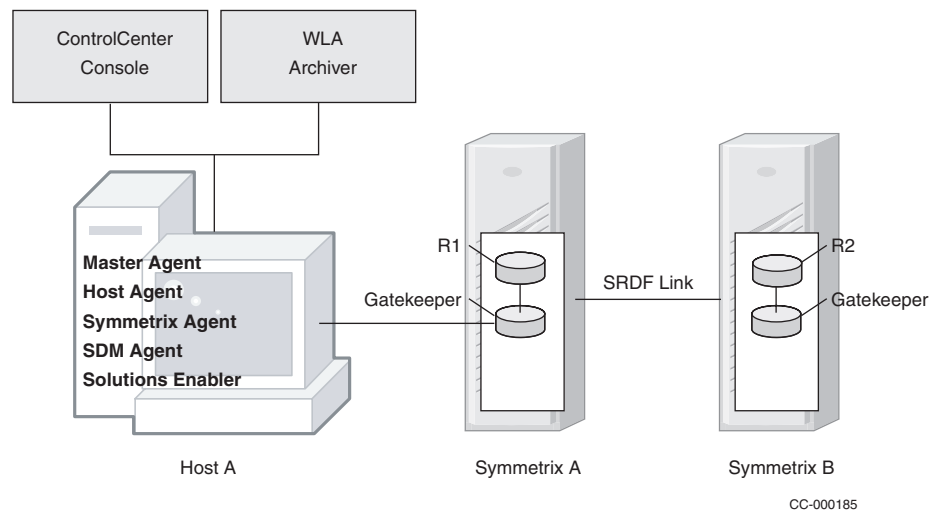


Figure 3. One Agent Collecting PM Data for Locally Attached and One-Hop Symmetrix Arrays

Symmetrix Management

The Symmetrix Agent on Host A will collect Performance Manager (WLA) data for Symmetrix A and Symmetrix B.

Note: Performance Manager (Workload Analyzer) collects statistical data across one and two hop configurations, if you have Solutions Enabler 5.2 or greater.

Caution: Because of the large amount of data involved, collecting Performance Manager (WLA) revolving data for Symmetrix B could have adverse effects on the SRDF link. EMC recommends that you disable the Performance Manager (WLA) revolving data collection policy for Symmetrix B. If you decide to implement this configuration, you should determine the capacity of the SRDF link before implementation.

Scenario #3: Two Agents Managing Locally Attached Symmetrix Arrays

Figure 4 uses the same configuration as Scenario #1, but adds a second host and agent associated with the remote Symmetrix.

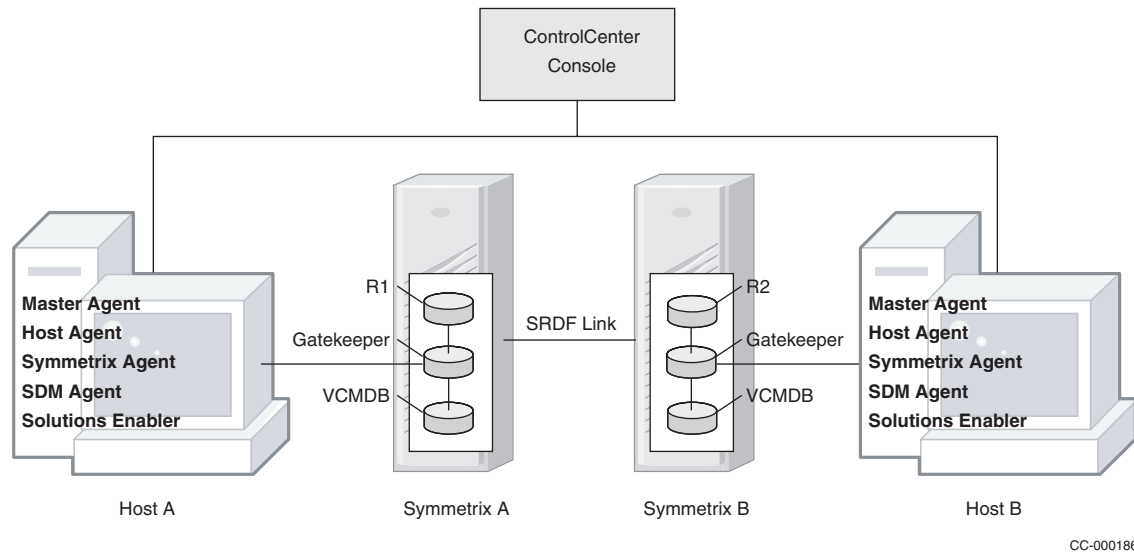


Figure 4. Two Agents Managing Locally Attached Symmetrix Arrays

Symmetrix Management

As the Symmetrix agents start, the Agent Manager makes the following decisions about which agents are paired and which are available:

- Symmetrix Agent on Host A is paired with Symmetrix A and available for Symmetrix B.
- Symmetrix Agent on Host B is paired with Symmetrix B and available for Symmetrix A.

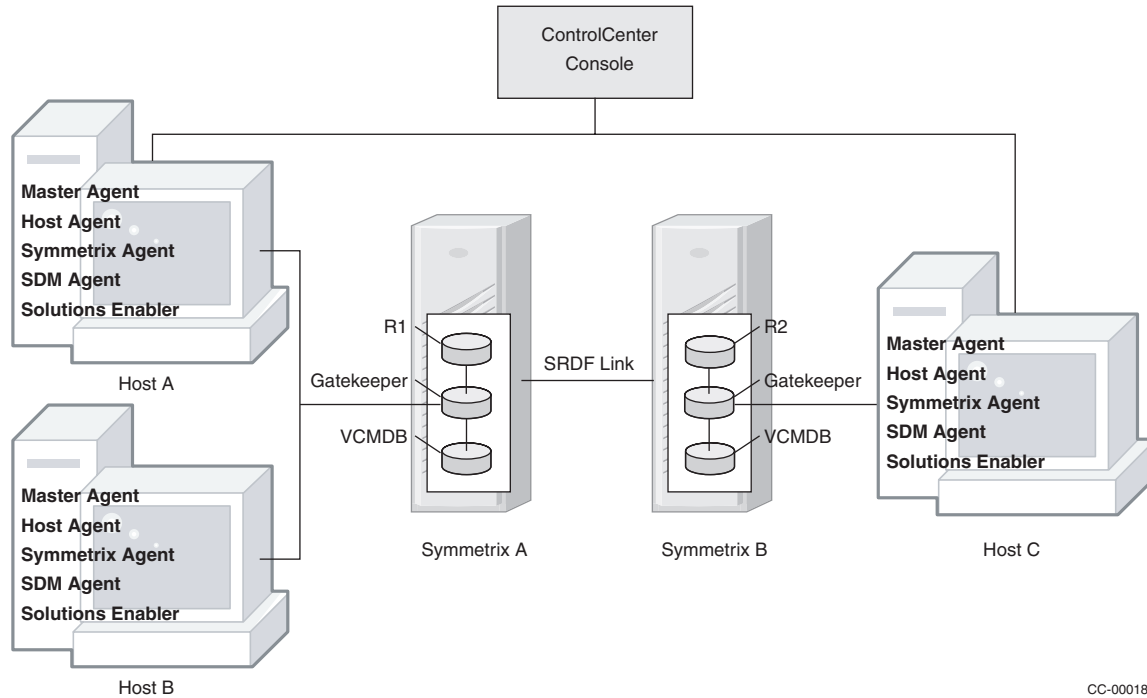
LUN Masking

As the SDM agents start, the Agent Manager makes the following decisions about which agents are paired and which are available:

- SDM agent on Host A is paired with Symmetrix A for LUN masking.
- SDM agent on Host B is paired with Symmetrix B for LUN masking.

Scenario #4: Three Agents Managing Locally Attached Symmetrix Arrays

Figure 5 uses the same configuration as Scenario #3, but adds a third host and agent, so that there are more agents than Symmetrix arrays to manage.



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Figure 5. Three Agents Managing Locally Attached Symmetrix Arrays

Symmetrix Management

As the Symmetrix agents start, the Agent Manager makes the following decisions about which agents are paired and which are available:

After the Symmetrix Agent on Host A is started:

- The Agent Manager assigns it to be the agent for Symmetrix A and Symmetrix B.

After the Symmetrix Agent on Host B has been started:

- The Symmetrix Agent on Host A is the agent for Symmetrix A and Symmetrix B.
- The Symmetrix Agent on Host B is available to become the agent for Symmetrix A and Symmetrix B.

After the Symmetrix Agent on Host C has been started:

- The Symmetrix Agent on Host A is paired with Symmetrix A and available to become the agent for Symmetrix B.
- The Symmetrix Agent on Host B available to become the agent for Symmetrix A and Symmetrix B.
- The Symmetrix Agent on Host C is paired with Symmetrix B and available to become the agent for Symmetrix A.

Once all the agents are operational:

- The Symmetrix Agent on Host A is paired with Symmetrix A and available to become the agent for Symmetrix B.
- The Symmetrix Agent on Host B is available to become the agent for Symmetrix A and Symmetrix B.
- The Symmetrix Agent on Host C is paired with Symmetrix B and available to become the agent for Symmetrix A.

LUN Masking

LUN Masking is handled in the following manner:

- The SDM Agent on Host A is paired with Symmetrix A for LUN masking.
- The SDM Agent on Host C is paired with Symmetrix B for LUN masking.

Scenario #5: Two Agents Managing Locally Attached, One-Hop, and Two-Hop Symmetrix Arrays

Figure 6 uses the same configuration as Scenario #3, but adds a third Symmetrix array, so that there are more arrays (with varying degrees of distance-to-host) than Symmetrix agents.

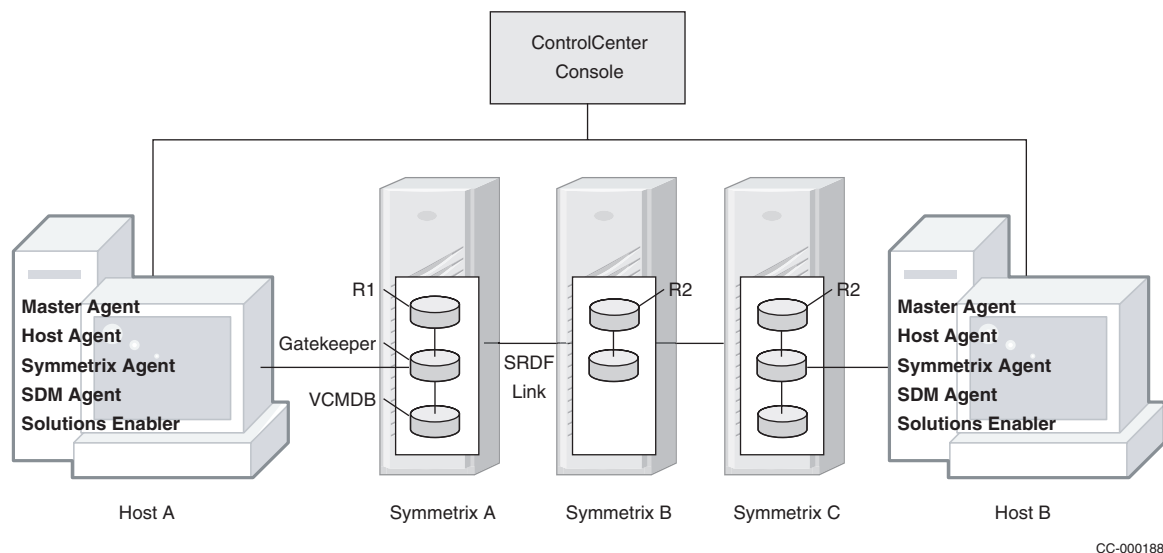


Figure 6. Two Agents Managing Locally Attached, One-Hop, and Two-Hop Symmetrix Arrays

Symmetrix Management

The Symmetrix Agent on Host A is paired with Symmetrix A and Symmetrix B, and available to become the agent for Symmetrix C (two hops).

The Symmetrix Agent on Host B is paired with Symmetrix C, and available to become the agent for Symmetrix A (two hops) and Symmetrix B.

Important: If a Symmetrix can only be discovered by a Storage Agent for Symmetrix that is two hops away, then that agent will be paired with the Symmetrix. This pairing will only provide limited functionality, as most configuration operations will fail. You should install another Storage Agent for Symmetrix on a host closer to the target Symmetrix.

Appendix A: SYMCLI Commands and Multiple Hops

The following table describes SYMCLI commands, and indicates if you can initiate the command directly on a Symmetrix array that is one-hop or two-hop distant from the host.

Table 2. SYMCLI Commands and Multihop Support

SYMCLI Command	Issue on a Symmetrix One Hop Away	Issue on a Symmetrix Two Hops Away	Command Description
symacl	Yes	Yes	Administer Symmetrix access control information.
sympierr	No	No	Translate SYMAPI error code numbers into SYMAPI error messages.
symaudit	Yes	Yes	List records from a Symmetrix audit log file.
symbcv	No	No	Perform TimeFinder support operations on Symmetrix BCV devices.
symcfg	No	No	Discover or display Symmetrix configuration information. Refresh the host's Symmetrix database file or remove Symmetrix data from the file. Can also be used to view or release a hanging Symmetrix exclusive lock.
symcg	No	No	Perform operations on SRDF composite groups (which can be enabled for consistency).
symchksum	No	No	Perform Symmetrix Checksum operations on Symmetrix devices.
symchg	No	No	Monitor changes to Symmetrix devices or to logical objects stored on Symmetrix devices.
symcli	No	No	Provide the version number and a brief description of the commands included in the Symmetrix Command Line Interface.
symclone	No	No	Perform Symmetrix Clone control operations on a device group, devices within the device group, or devices in a device file.
symconfigure	Yes	No	Perform modifications on the Symmetrix configuration.
symdev	Yes	Yes	Perform operations on a device given the device's Symmetrix name.
symdg	No	No	Perform operations on a device group.
symdisk	Yes	Yes	Display information about physical disks within a Symmetrix.
symdrv	Yes	Yes	List DRV devices on a Symmetrix.
symevent	Yes	Yes	Monitor or inspect the history of events in the Symmetrix
symgate	No	No	Perform operations on a Gatekeeper device.
symhost	No	No	Display host configuration information and performance statistics.
symhostfs	No	No	Display information about a host file, directory, or host file system.
syminq	No	No	Issue a SCSI Inquiry command on one or all devices.

Table 2. SYMCLI Commands and Multihop Support

SYMCLI Command	Issue on a Symmetrix One Hop Away	Issue on a Symmetrix Two Hops Away	Command Description
symlabel	No	No	Perform label support operations on a Symmetrix device.
symlid	No	No	Perform operations on a device in a device group.
symlmf	No	No	Register SYMAPI license keys.
symlv	No	No	Display information about a volume in a logical volume group.
symmask	No	No	Set up or modify Symmetrix device masking functionality.
symmaskdb	No	No	Backup, restore, initialize, or show the contents of the device masking database
symmir	Yes	Yes	Perform BCV control operations on a device group or on a device within the device group.
symoptmz	No. While technically possible, this should be avoided due to bandwidth considerations.	No	Set parameters to control the behavior of Symmetrix Optimizer.
sympd	No	No	Perform operations on a physical device given the device's name.
symqos	No	No	Perform Quality of Service operations on Symmetrix logical devices.
symrdb	No	No	Display information about a third-party relational database.
symrdf	Yes	Yes	Perform SRDF control operations on a device group or on a device within the device group.
symrslv	No	No	Display detailed logical-to-physical mapping information about a logical object stored on Symmetrix devices.
symreplicate	No	No	Perform automated, consistent replication of data given a preconfigured SRDF/TimeFinder setup.
symreturn	No	No	Supply return codes in pre-action and post-action script files.
symsnap	No	No	Perform Symmetrix Snap control operations on a device group, devices within the device group, or devices in a device file.
symstat	Yes	Yes	Display statistics information about a Symmetrix, a director, a device group, or a device.
symvg	No	No	Display information about a logical volume group.