EMC® Solutions Enabler Symmetrix® SRDF/Star CLI

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Product Guide

REV 01

EMC²

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

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Purpose

This document is part of the EMC Solutions Enabler documentation set, and describes how to use SRDF/Star.

Audience

This document is for advanced command-line users and script programmers to manage various types of control operations on Symmetrix arrays and devices using the SYMCLI commands of the Solutions Enabler software.

Related documentation

Solutions Enabler supports all VMAX family arrays. Refer to the EMC Symmetrix Product Guide for your specific VMAX series for details about which features are supported with your platform.

The following EMC publications provide additional information:

- *EMC Solutions Enabler Complete Documentation Set*
- *EMC Solutions Enabler Installation Guide*
- *EMC Solutions Enabler Release Notes*
- *EMC Solutions Enabler Security Configuration Guide*
- *EMC Solutions Enabler SYMCLI Command Reference*
- *EMC Solutions Enabler TimeFinder Family CLI Product Guide*
- *EMC Solutions Enabler Symmetrix Array Controls CLI Product Guide*
- *EMC Solutions Enabler Symmetrix Array Management CLI Product Guide*
- *EMC Solutions Enabler Symmetrix Migration CLI Product Guide*
- *EMC Solutions Enabler Symmetrix SRDF Family CLI Product Guide*
- *EMC Solutions Enabler Symmetrix SRM CLI Product Guide*
- EMC Host Connectivity Guides [for your operating system]

For detailed interoperability information, please refer to E-Lab Interoperability Navigator, which can be reached at http://elabnavigator.EMC.com.

Note: Detailed man page descriptions of all SYMCLI commands, environment variables, option file parameters, and error codes are documented in the companion *EMC Solutions Enabler Symmetrix CLI Command Reference*.

Typographical conventions

EMC uses the following type style conventions in this document:

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Bold	Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages Used in procedures for: • Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus • What the user specifically selects, clicks, presses, or types
Italic	Used in all text (including procedures) for: • Full titles of publications referenced in text • Emphasis, for example, a new term • Variables
`Courier`	Used for: • System output, such as an error message or script • URLs, complete paths, filenames, prompts, and syntax when shown outside of running text
`Courier bold`	Used for specific user input, such as commands
`Courier italic`	Used in procedures for: • Variables on the command line • User input variables
< >	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

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CHAPTER 1
Getting Started

This chapter introduces SRDF/Star, describes SRDF/Star concepts, and provides an operational overview.

- Introduction to SRDF/Star 16
- Operational overview 23

Introduction to SRDF/Star

SRDF/Star is a data protection and failure recovery solution that covers three geographically dispersed data centers in a triangular topology. SRDF/Star protects business data against a primary site failure or a regional disaster using concurrent SRDF or cascaded SRDF capability that mirrors the same production data synchronously to a nearby remote site and asynchronously to a distant remote site. This architecture can be expanded to include multiple Symmetrix triangles.

Data protection and recovery

SRDF/Star provides consistent data protection and incremental data recovery between target sites in the event of a workload site failure or transient fault (link failure). If a workload site becomes inoperable, SRDF/Star provides failover capability through SRDF/A recovery links that quickly reestablish data replication between the target sites. One target site resumes data replication for the workload site while the other resumes as a protected secondary target site. SRDF/Star requires SRDF/A recovery links and an additional control host at one of the target sites.

Each Symmetrix array in an SRDF/Star configuration uses dynamic SRDF devices that can function as either an R1 or an R2 device. During failure recovery, the R2 devices at either the synchronous target site or the asynchronous target site are dynamically converted to R1 devices to become production devices at the new workload site.

SRDF/Star data consistency is achieved through a composite group (CG) that leverages MSC or RDF-ECA technology to ensure all members in the CG are either replicating or not replicating at any given point. The CG definition can span cascaded and concurrent SRDF configurations (SRDF/A and SRDF/S) across multiple Symmetrix arrays. A composite group enabled for MSC or RDF-ECA consistency is referred to as an SRDF consistency group. Devices in an SRDF consistency group are protected to preserve the dependent-write consistency of a database, which may be distributed across multiple SRDF platforms.

For more information on SRDF consistency group technology, refer to the SRDF Consistency Group Operations chapter of the *EMC Solutions Enabler Symmetrix SRDF Family CLI Product Guide.*

IMPORTANT

Since SRDF/Star environments are built on SRDF consistency group technology, an SRDF daemon must be running on at least one control host attached locally to each site, and each control host must be connected to only one site in the SRDF/Star triangle. EMC strongly recommends running redundant SRDF daemons on multiple control hosts to ensure that at least one SRDF daemon is available to perform time-critical, consistency monitoring operations. By running redundant SRDF daemons, you avoid service interruptions caused by performance bottlenecks local to a control host, and link failures of the redundant SRDF daemons and control hosts.

Benefits and features

SRDF/Star environments provide advanced multi-site business continuity protection. They combine SRDF technologies to enable concurrent or cascaded SRDF/S and SRDF/A operations from the same source volumes. The SRDF/Star operation is a combination of host software and Enginuity functionality that operates in a concurrent or cascaded SRDF configuration.

SRDF/Star provides the following benefits and features:

- Sites can be geographically dispersed.
- SRDF/Star can span multiple SRDF groups and Symmetrix arrays.
- SRDF consistency groups maintain data consistency across SRDF/Star.
- In the event of a workload site failure, SRDF/Star enables you to failover and resume asynchronous data transfer between the remaining target sites.
- Data is synchronized differentially, so the time to establish remote mirroring and consistency is minimal.
- In the event of a rolling disaster affecting the workload site, you can determine which of the target sites (synchronous or asynchronous) holds the more current data and switch workload operations to that site.

SRDF/Star Restrictions

The following restrictions apply to SRDF groups and devices used with SRDF/Star:

- R22 devices are required in SRDF/Star environments that include VMAX 10K or VMAXe systems.
- Does not support CKD striped metadevices.
- Does not support an R2 device larger than its R1 device.
- Does not support composite groups consisting of device groups.
- BCV device management must be configured separately.

  Note: It is strongly suggested that you have BCV device management available at both the synchronous and asynchronous target sites.

- SRDF groups cannot be shared between separate SRDF/Star configurations.
- Devices cannot be BCV devices.
- Every device must be dynamic SRDF (R1 and R2 capable).
- Enginuity 5874.228.182 and higher supports concurrent and cascaded SRDF/Star environments with thin devices.
- With Enginuity 5876.159.102 and higher, a mixture of thin and (non-diskless) thick devices is supported.

Note: If the thick device is on a Symmetrix DMX array running Enginuity5773.xxx.xxx, thick-to-thin migration is supported if the VMAX array is running Enginuity 5876 Q1 2013 SR and higher.

Concurrent SRDF/Star

Concurrent SRDF/Star environments provide a rapid reestablishment of replication operations in the event of a workload site failure. Rather than performing a full resynchronization between the asynchronous and synchronous target sites, concurrent SRDF/Star performs a differential synchronization, which dramatically reduces the time it takes to remotely protect the new workload site after the primary site failure. With concurrent SRDF/Star you can determine which site contains the most current data in the event of a rolling disaster that affects the workload site.

Figure 1 illustrates a concurrent SRDF/Star configuration. The workload site (NewYork) transfers data synchronously to the target site (NewJersey) and asynchronously to the distant target site (London). The recovery links are between London and NewJersey, and if an outage happens at NewYork, an SRDF/A session can be established between these two target sites.

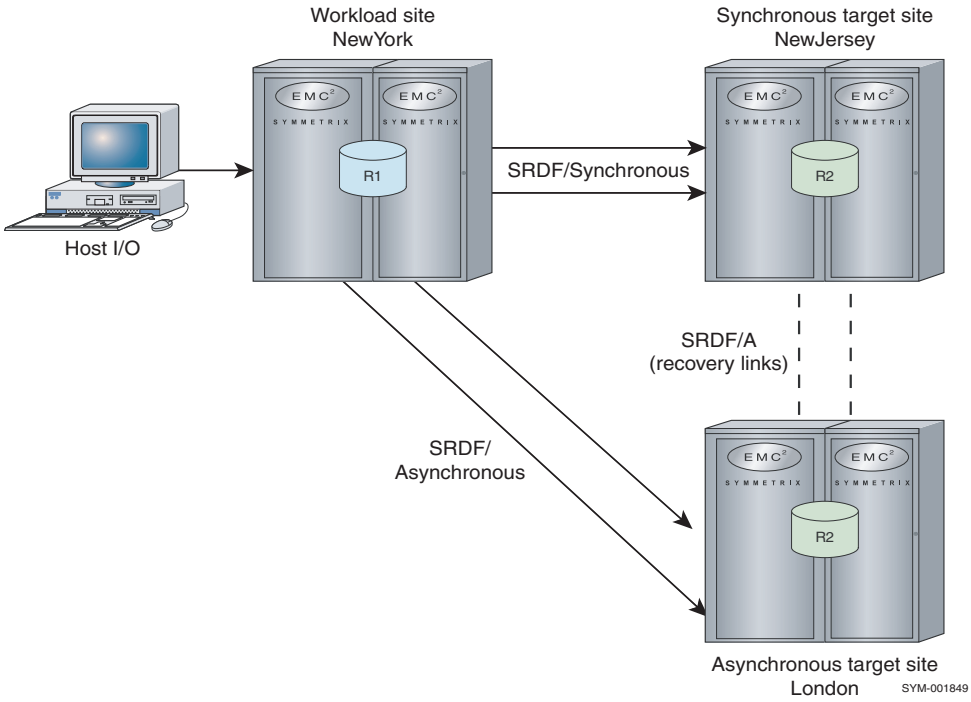

Figure 1 Concurrent SRDF/Star configuration

Cascaded SRDF/Star

Figure 2 illustrates a cascaded SRDF/Star configuration. In the event of a synchronous target site loss, a differential data resynchronization can be performed between the workload site and the asynchronous target site. In the case of cascaded SRDF/Star, the synchronous target site is always more current than the asynchronous target site. In all cases, the choice of which site to use in the event of a failure is left to the discretion of the customer.

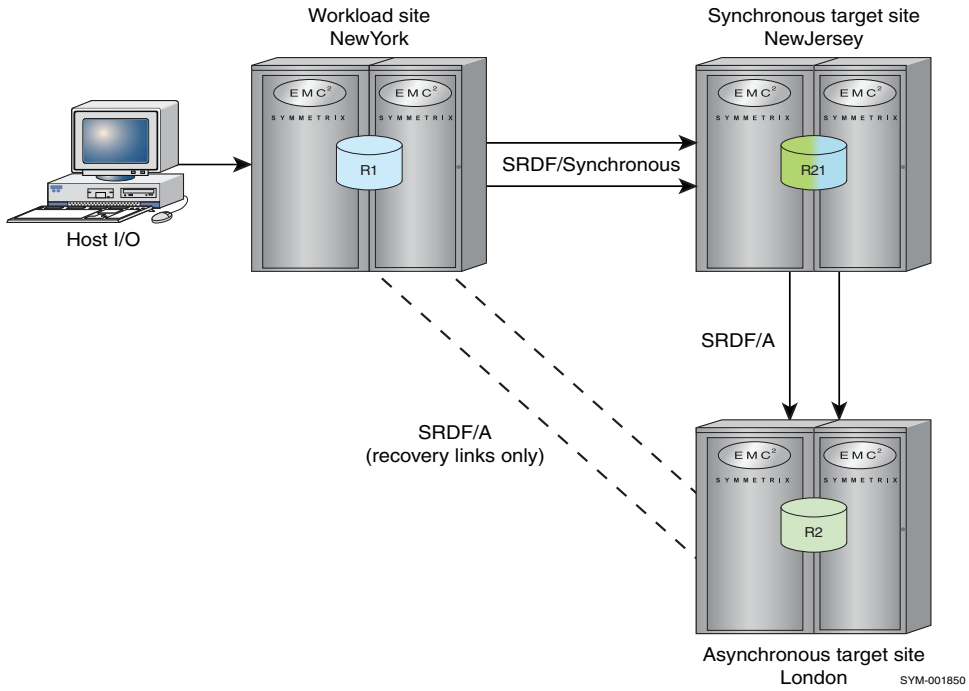

Figure 2 Cascaded SRDF/Star configuration

SRDF/Star with concurrent devices

Concurrent R2 (R22) devices are specifically designed for SRDF/Star configurations to simplify failover situations and improve the resiliency of SRDF/Star applications. R22 devices significantly reduce the number of steps needed for some commands (such as, `reconfigure`, `switch`, and `connect`).

Figure 3 on page 20 shows a typical concurrent SRDF/Star using R22 devices. Like the concurrent R1 (R11) device, an R22 device has two mirrors, each paired with a different R1 mirror. Only one of the R22 mirrors can be active (read/write) on the link at a time.

While designed primarily for SRDF/Star, R22 devices can be used for both concurrent and cascaded modes of operations.

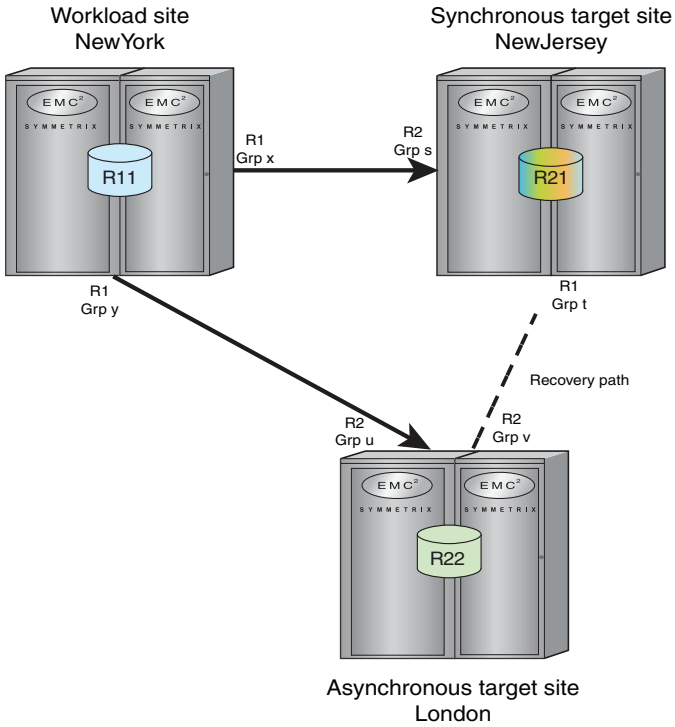

Figure 3 Typical concurrent SRDF/Star environment with R22 devices

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Note: Concurrent devices are available with Symmetrix arrays running Enginuity 5773.150 or higher.

As shown in Figure 4 on page 21, SRDF/Star can use R22 devices when operating in cascaded mode with a synchronous link between the workload site and the short-distance target site. From the synchronous target site, there is also an asynchronous link to the long-distance target site. The path between the workload site and the long-distance asynchronous site is passive, and is referred to as the recovery path if connectivity is lost between the workload site and the synchronous target site.

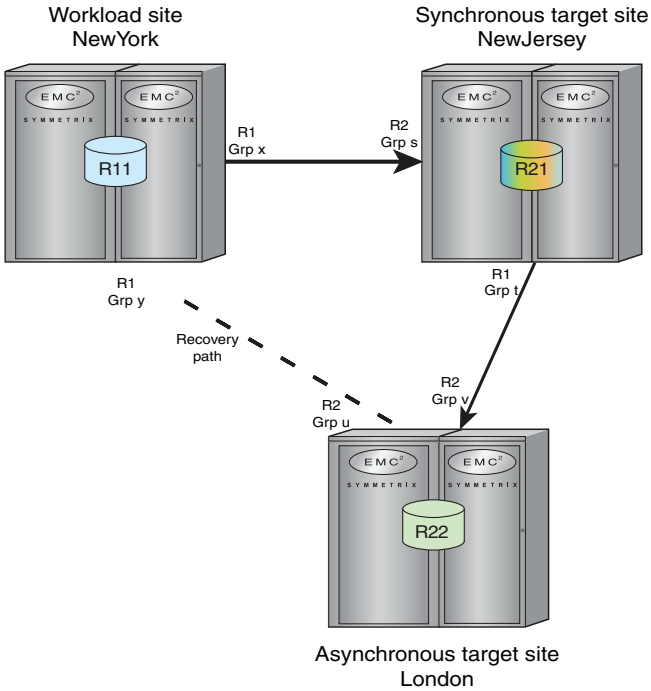

Figure 4 Typical cascaded SRDF/Star with an R22 devices

SRDF/Star environments with EDP

Solutions Enabler provides SRDF/Extended Distance Protection (EDP) configurations for cascaded and concurrent SRDF/Star environments. SRDF/EDP is primarily intended for cascaded SRDF/Star environments but can incorporate R2 devices or R22 devices at the asynchronous target site.

Figure 5 illustrates a cascaded SRDF/Star configuration with EDP. The diskless R21 device is at the synchronous target site (Site B) with an R2 at the asynchronous remote target (Site C). The diskless R21 device streamlines the connections to the R2. No data copies are available at the diskless site.

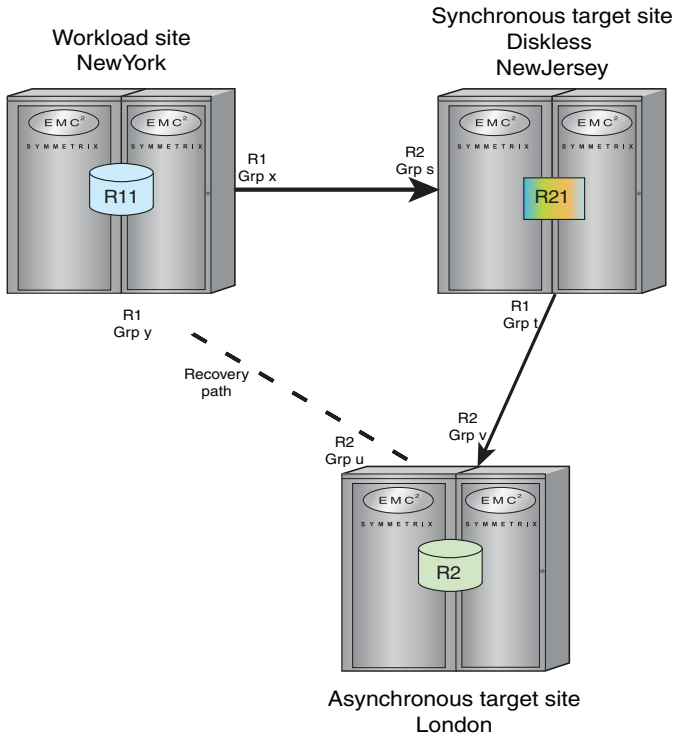

Figure 5 Cascaded SRDF/Star EDP (diskless) environment with an R2 device

Operational overview

The SRDF/Star operations that you can perform at any given time are determined by the current state of your environment. To understand the current state of your environment, you need to know the SRDF/Star state of your configuration, the states of your target sites, and the location of the workload site and target sites.

SRDF/Star states

SRDF/Star states refer to the workload site and both target sites as a complete entity. Your configuration must be in the Star Protected state to take advantage of the consistent data protection and incremental recovery capabilities of SRDF/Star. Table 1 describes the SRDF/Star states.

Table 1 SRDF/Star states

State	Description
Star Protected	Indicates that there is data flow and consistency protection at each target site. SDDF sessions are tracking the differences between the sites. If the workload site failed, a differential synchronization between the two target sites would be possible.
Star Tripped	Indicates that there is no data flow between the workload site and at least one of the target sites.
Star Unprotected	Indicates that a differential synchronization between the target sites would not be possible.

Target site states

The SRDF/Star target site states refer to the relationship between the target sites and the workload site. Table 2 describes the SRDF/Star target site states.

Table 2 SRDF/Star target site states

State	Description
Disconnected	Can indicate that there is no data flow between the workload site and the target sites. Will be reported if SRDF/Star cannot determine the site state. In this case, there may still be data flow between the sites.
Connected	Indicates there is data flow between the sites, but the target site is not necessarily synchronized with the workload site.
Protected	Indicates that there is data flow between the sites, and dependent write consistency of the data at the target site is assured.
Halted	Indicates that there is no data flow between the sites, there is no data protection at the target site relative to the workload site, and the data at each site is the same.
Isolated	Indicates that there is no data flow between the sites, and the devices at the target site are read/write enabled to their local host.
PathFail	Indicates that there is no data flow between the sites. Can only occur if the specified target was in a Protected state. The PathFail;CleanReq state indicates that the `cleanup` operation is required to perform MSC cleanup on the async target before it will be consistent.

SRDF/Star site configurations

Before performing an SRDF operation, you must identify the current workload site, synchronous target site, and asynchronous target site. Before any operations occur, Site A is always the workload site, B is the nearby synchronous target site, and C is the distant asynchronous target site. After a switch or reconfiguration, the workload site can shift to sites B or C, and the new location of the synchronous target and the asynchronous target varies based on the new configuration. The following diagrams show the site locations for the original configuration (with the workload at site A), and after the workload has been moved to B or C. In cascaded configurations, there are two possible configurations when the workload is at site C.

Note: When the workload is at site C, both of the target sites are long-distance links, so neither site can be synchronously mirrored. However, in the following diagrams, one of the targets is labeled as the sync target in order to allow you to differentiate between the two target sites when using the diagrams in "Operation flow examples" on page 26.

Note: In the examples used elsewhere in this document, NewYork corresponds to Site A, NewJersey to site B, and London to site C.

Figure 6 shows the site configurations (without concurrent devices) for Cascaded SRDF/Star and Concurrent SRDF/Star.

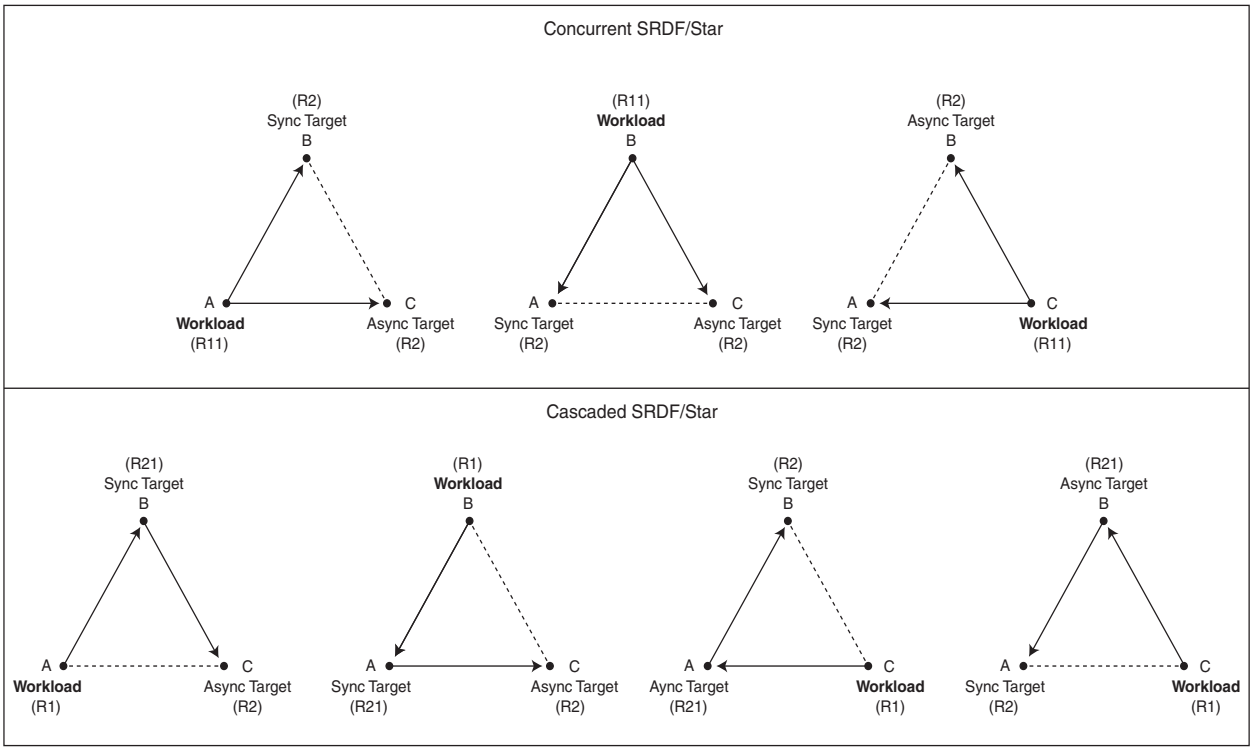

Figure 6 Site configurations without concurrent devices

Figure 7 shows the site configurations (with concurrent devices) for Cascaded SRDF/Star and Concurrent SRDF/Star.

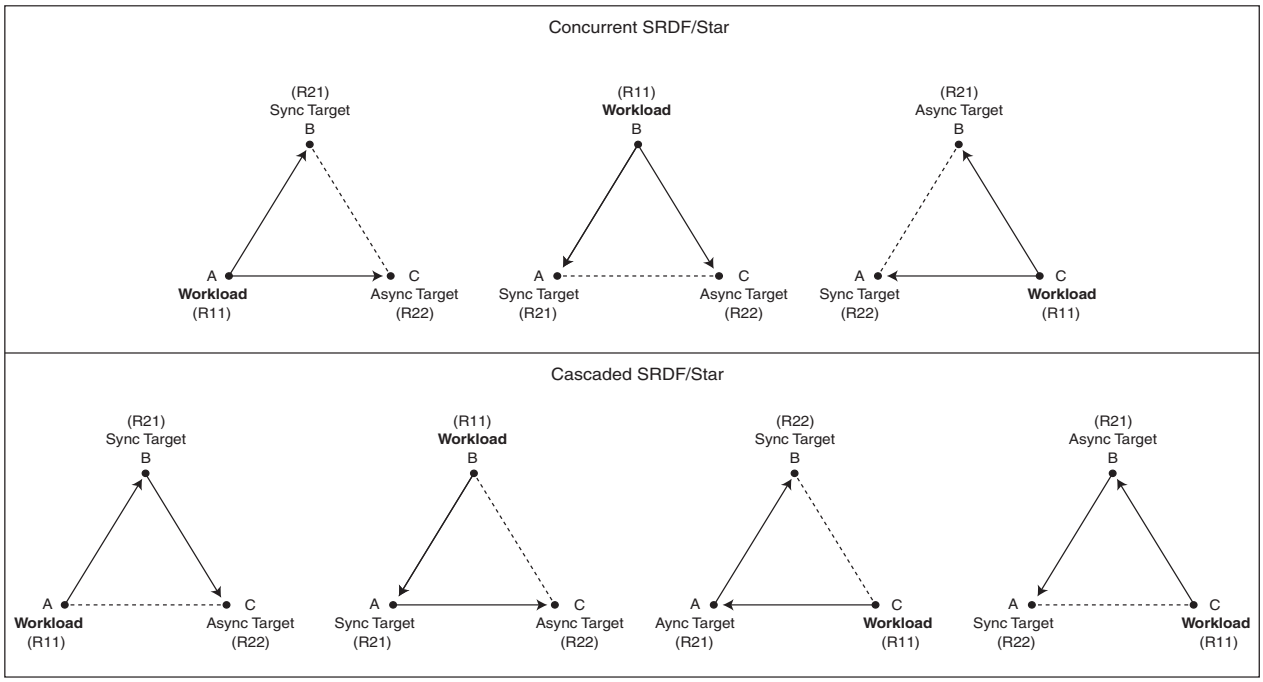

Figure 7 Site configurations with concurrent devices

Operation flow examples

Once you understand the current state of your environment, you can use the examples and diagrams in this section to determine which SRDF/Star operations are available to you.

SRDF/Star operations can be broken into four categories: normal, transient fault, switch, and reconfiguration. Table 3 describes the types of SRDF/Star operations.

Table 3 SRDF/Star operation categories

Operation Category	Description
Normal operations	Used to configure and setup SRDF/Star to achieve SRDF/Star protection. Also includes the actions required to isolate a site for testing or other required data processing.
Transient fault operations	Used to recover from a temporary failure caused by loss of network connectivity or either target site. Transient faults do not disrupt production at the workload site, so these operations can be executed at the workload site.
Switch operations	Planned: Used to move the production workload to a new site with a planned procedure. Planned switch operations are often used for maintenance purposes. They can also be used to return the workload to the original workload site after a disaster forced a move of production activity to one of the target sites. Unplanned: Used to recover from faults caused by the loss of a workload site. The loss of a workload site requires an unplanned switch of the workload to one of the target sites.
Reconfigure operations	Planned: Transitions the SRDF/Star setup from concurrent SRDF to cascaded SRDF or vice versa as part of a planned event. Unplanned: Transitions the SRDF/Star setup from concurrent SRDF to cascaded SRDF or vice versa after a failure. Reconfigure operations can be used to resolve a transient fault or as part of a switch operation.

Concurrent SRDF/Star

This section describes the operations that you can perform for Concurrent SRDF/Star configurations.

Normal operations

Normal operations are used to configure and setup SRDF/Star to achieve SRDF/Star protection. The `connect` operation transitions the state from Disconnected to Connected. The `protect` operation transitions the state from Connected to Protected, and the `enable` operation transitions all three sites into the Star Protected state.

The `disable`, `unprotect`, and `disconnect` operations reverse the `connect`, `protect`, and `enable` operations and revert the configuration back to the previous state.

You can use the `isolate` operation from the Protected target site state to isolate a site and bring it down for maintenance and testing.

Figure 8 shows the normal operations that are available from each state.

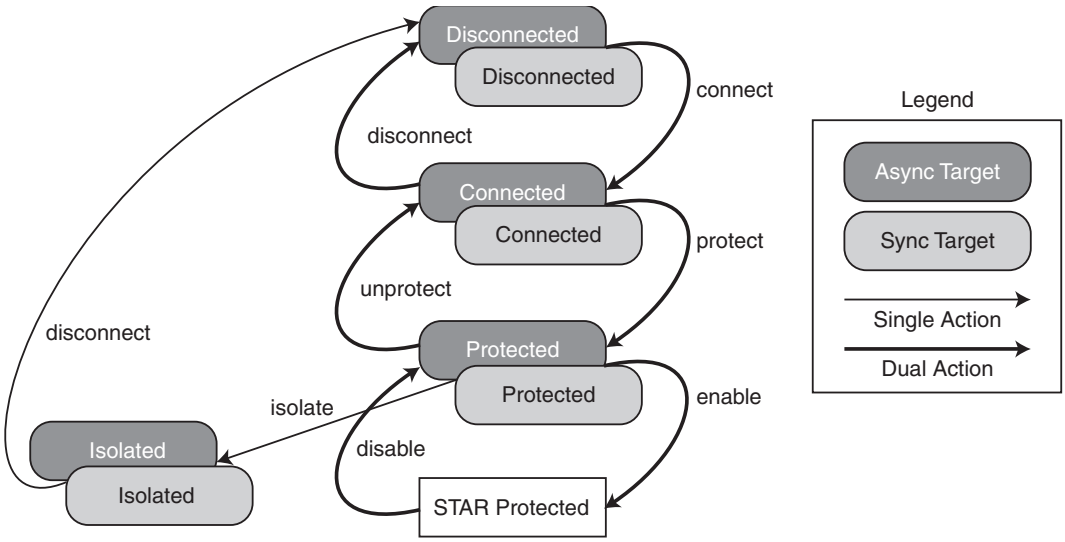

Figure 8 Concurrent SRDF/Star: Normal operations

Transient fault operations

After a transient fault, the `reset` operation transitions the state from PathFail to Disconnected. If the transient fault resulted from the failure of the link to the asynchronous target site, the `cleanup` operation performs MSC cleanup at the target site and transitions the state from PathFail;CleanReq to PathFail.

If the links between the synchronous target and the asynchronous target are working, you can use the `reconfigure -reset` operation to change the setup to a cascaded SRDF/Star. A reconfiguration would leave the asynchronous site in the disconnected state, and the `connect`, `protect`, and `enable` actions would bring the system to the Star Protected state.

After the PathFail state occurs, it is recommended to capture a gold copy at the failed target site after the reset action and before the `connect` operation.

Figure 9 shows the transient fault operations that are available from each state.

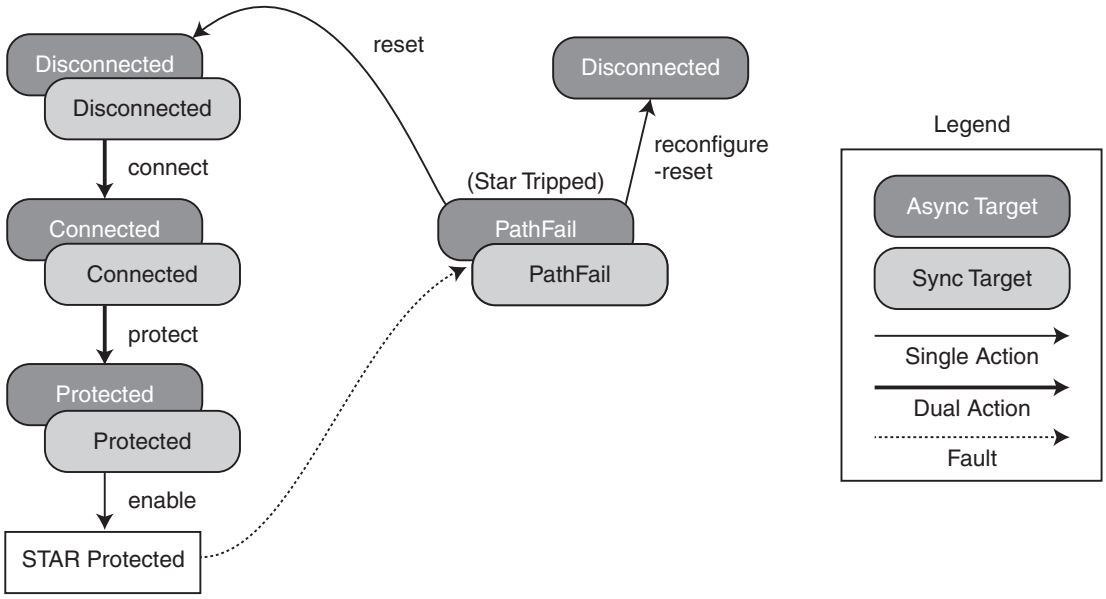

Figure 9 Concurrent SRDF/Star: Transient fault operations

Unplanned switch operations

After the loss of a workload site, an unplanned `switch` operation is required to move the production workload to one of the target sites. If you switch to a target site and keep the data at that site, the `switch` operation transitions the remaining sites to the Disconnected state, and you must issue a `connect` operation to bring the sites to the Connected state. If you switch to a target site and keep the data at the other target site, the `switch` operation transitions the other target site to the Connected state.

Figure 10 shows the unplanned switch operations that are available from each state.

Note: The rounded rectangles that represent the target sites after a switch are not color coded because the definition of the workload site and the target sites can change after the switch.

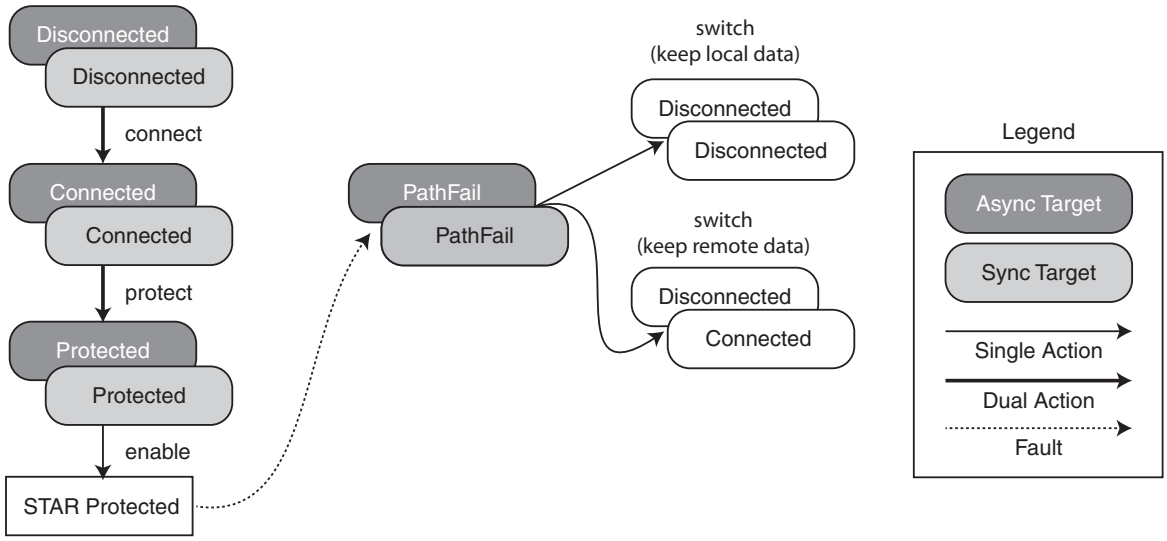

Figure 10 Concurrent SRDF/Star: Unplanned switch operations

Planned switch operations

The `halt` operation is a necessary first step for a planned switch whether you are returning the workload to the original site or moving the workload to another site. The `halt` operation write disables the R1 devices, drains the data to the two target sites, and makes the data at all three sites the same.

IMPORTANT

Before initiating the `halt` operation, you must stop the application workload at the current workload site and unmount the file systems. If you change your mind after halting the SRDF/Star system, issue the `halt -reset` command to restart the workload at the current workload site.

Figure 11 shows the planned switch operations that are available from each state.

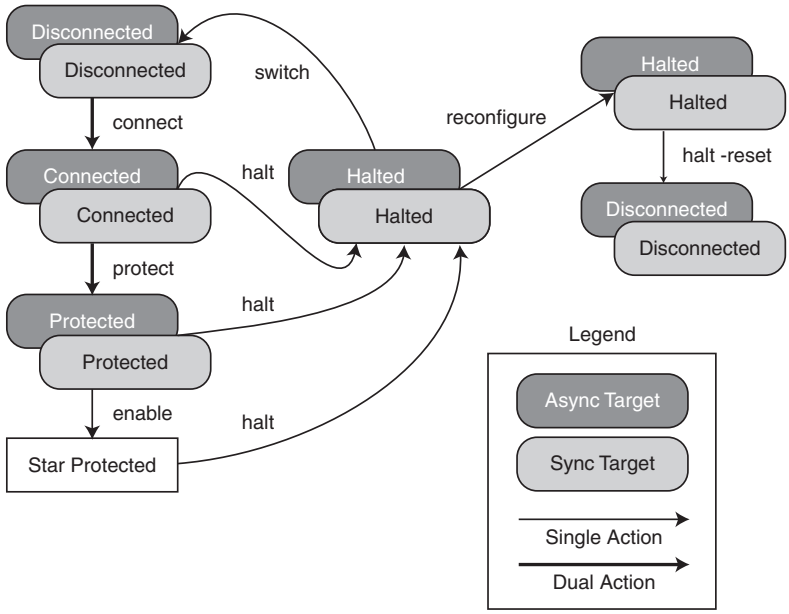

Figure 11 Concurrent SRDF/Star: Planned switch operations

Cascaded SRDF/Star

This section describes the operations that you can perform for Cascaded SRDF/Star configurations.

Normal operations

With Cascaded SRDF/Star, because the consistency of the asynchronous site data is dependent on the consistency of the synchronous site data, the asynchronous target can only be protected if the synchronous target is protected as well. Consequently, after the two sites have been connected, the synchronous target must be protected first.

Note: With Solutions Enabler version 7.5 and higher, you can isolate the synchronous target site if the asynchronous target site has a target site state of Disconnected, Isolated, or PathFail.

Figure 12 shows the normal operations that are available from each state.

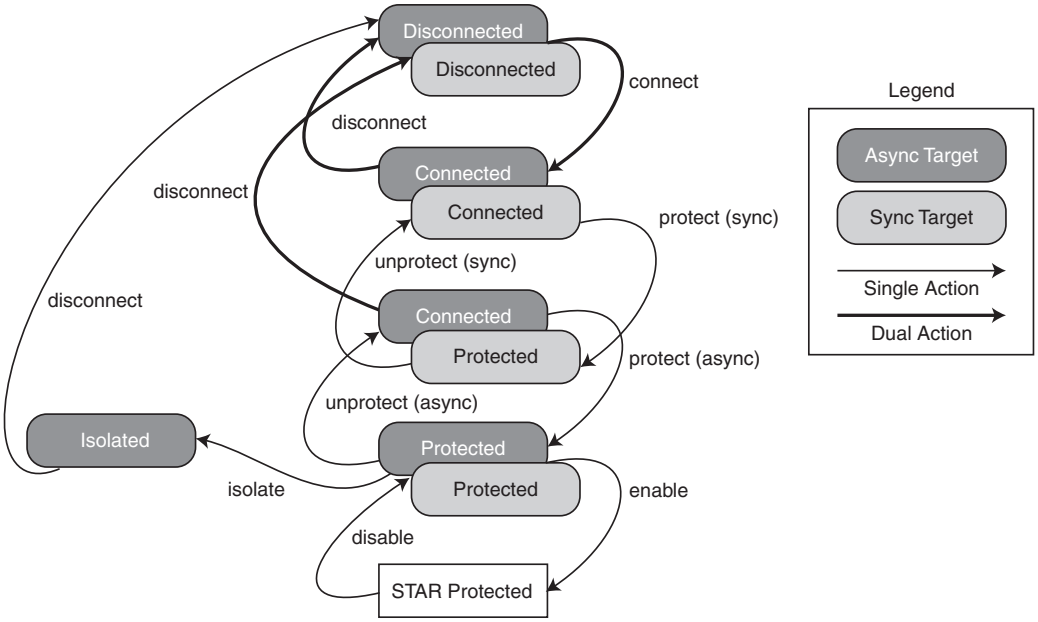

Figure 12 Cascaded SRDF/Star: Normal operations

Transient fault operations

In Cascaded SRDF/Star, the loss of either target site does not interrupt production, but the loss of the synchronous site can result in the loss of remote replication capability (unless SRDF/Star is reconfigured to run in Concurrent SRDF/Star).

After a transient fault from the loss of the asynchronous target site, the `reset` operation transitions the state from PathFail to Disconnected. If necessary, the `cleanup` operation performs MSC cleanup at the target site and transitions the state from PathFail;CleanReq to PathFail.

Figure 13 shows the transient fault operations that are available from each state after the loss of the asynchronous target site.

Note: This diagram assumes that the synchronous target stayed protected during the fault.

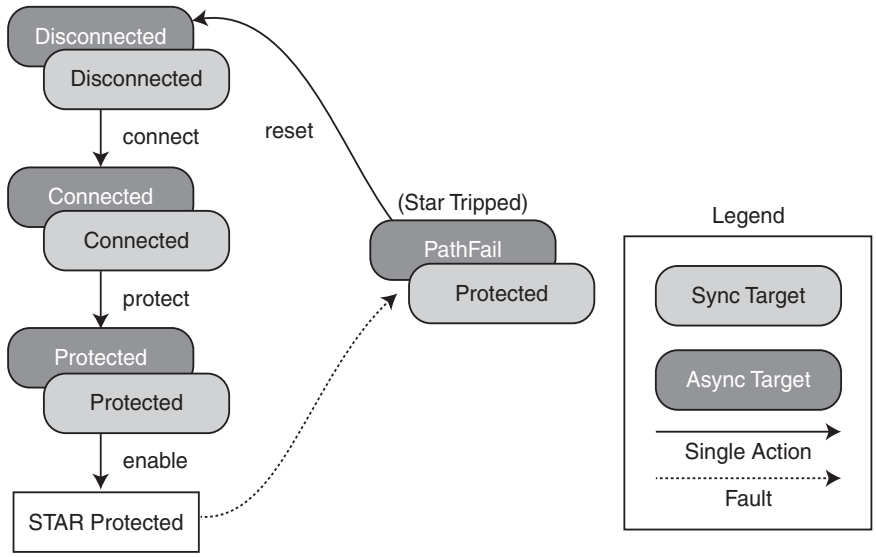

Figure 13 Cascaded SRDF/Star: Transient fault operations (asynchronous loss)

The loss of the synchronous target deprives Cascaded SRDF/Star of remote replication capabilities. If the outage is expected to be brief, you can continue production at the workload site without remote replication, and reset the synchronous target once the problem is resolved.

If you want remote replication as soon as the synchronous target is lost, you can reconfigure Cascaded SRDF/Star to Concurrent SRDF/Star. Figure 14 shows the use of the `reconfigure -reset` operation to convert to Concurrent SRDF/Star with the workload site communicating directly with the asynchronous target.

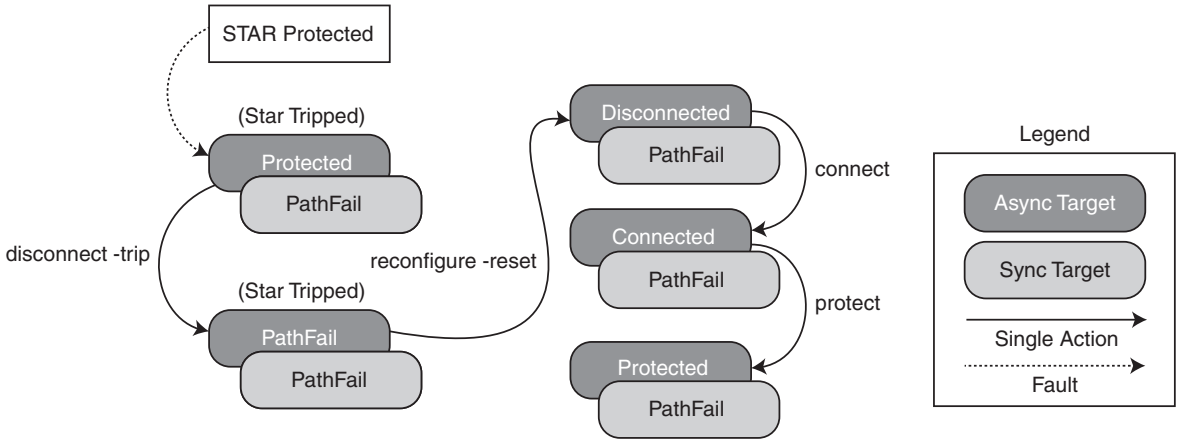

Figure 14 Cascaded SRDF/Star: Transient fault operations (synchronous loss)

Unplanned switch operations

After the loss of a workload site in a Cascaded SRDF/Star configuration, if you decide to switch production to the synchronous target, the SRDF/Star configuration must be converted to Concurrent SRDF/Star. In this instance, you can only keep the local data because the local data is ahead of the data at the asynchronous target site.

If you switch to the asynchronous target site, you can keep the local data or the data at the synchronous target site.

Figure 15 shows the unplanned switch operations that are available from each state.

Note: The rounded rectangles that represent the target sites after a switch are not color coded because the definition of the workload site and the target sites can change after the switch.

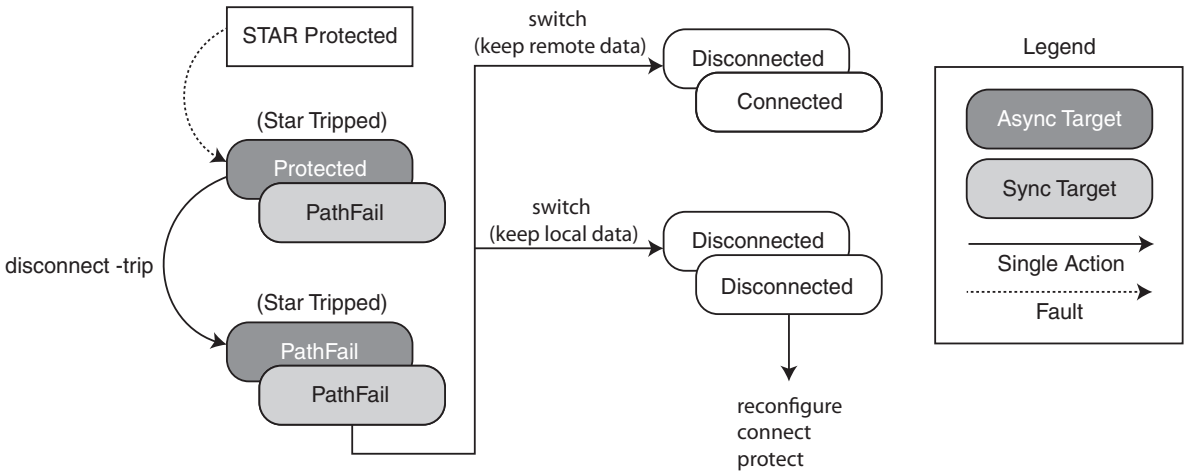

Figure 15 Cascaded SRDF/Star: Unplanned switch operations

CHAPTER 2
SRDF/Star Setup and Configuration

This chapter describes how to create and manage SRDF/Star configurations using the SYMCLI `symstar` command.

- Setting up SRDF/Star 36
- SRDF/Star control operations 45
- Dynamic modification of SRDF/Star consistency groups 53
- Critical control operations for concurrent SRDF/Star environments 63
- Switch workload back from target site to original workload site 74
- Critical control operations for cascaded SRDF/Star environments 75
- Planned reconfiguration of SRDF/Star mode of operation 86
- Defining an SRDF/Star configuration with R22 devices 92
- Setting up SRDF/Star with EDP 94

Setting up SRDF/Star

To make the SRDF/Star environment operational, perform the following tasks:

1. Verify the SRDF/Star host is locally connected to *only* one of the three sites. For instructions, refer to "Step 1: Verifying SRDF/Star host connectivity."
2. Verify the settings for each Symmetrix array to be included in the SRDF/Star configuration. For instructions, refer to "Step 2: Verifying Symmetrix settings."
3. Create a composite group at the workload site. For instructions, refer to "Step 3: Creating an SRDF/Star composite group" on page 37.
4. Create an SRDF/Star options file containing specific parameters for the setup procedure. For instructions, refer to "Step 4: Creating the SRDF/Star options file" on page 41.
5. Use the SRDF/Star `symstar setup` command to read and validate the information in the host composite group definition, and build the SRDF/Star definition file that defines the R1 composite group. For instructions, refer to "Step 5: Performing the symstar setup operation" on page 43.
6. Optionally, use the `symstar buildcg` command to build matching R2 or R21 composite groups at the target sites. For instructions, refer to "Step 6: Creating R2 or R21 composite groups" on page 44.
7. Optionally, add BCVs to the SRDF/Star configuration. For instructions, refer to "Step 7: Adding BCV devices to the SRDF/Star configuration" on page 44.

To perform SRDF/Star operations with access control enabled, you need the SRDF, BASECTRL, BASE, and BCV access types. For more information, refer to *EMC Solutions Enabler Symmetrix Array Management CLI Product Guide*.

Note: An SRDF/Star environment contains one or more triangles, where each triangle has a unique SRDF group for the synchronous link, the asynchronous link, and the recovery group link. No sharing of SRDF groups is allowed between any two SRDF/Star triangles.

The examples in this section use the name `StarGrp` for the composite group and the names `NewYork`, `NewJersey`, and `London` as the names for the workload site, the synchronous target site, and the asynchronous target site, respectively.

To see operational examples for SRDF/Star, refer to Chapter 3, "Implementing Concurrent SRDF/Star," and Chapter 4, "Implementing Cascaded SRDF/Star," in Part II of this manual.

Step 1: Verifying SRDF/Star host connectivity

The SRDF/Star host must be connected locally to *only* one of the three sites. To verify this configuration, issue the `symcfg list` command and the following output displays showing the required connectivity of `Local`, `Remote`, `Remote` under `Attachment`:

```
symcfg list

                              S Y M M E T R I X

                                      Mcode    Cache      Num Phys  Num Symm
SymmID        Attachment  Model       Version  Size (MB)  Devices   Devices

000194901217  Local       VMAX-1SE    5876       28672       369      6689
000194901235  Remote      VMAX-1SE    5876       28672         0      6890
000194901241  Remote      VMAX-1SE    5876       28672         0      7007
```

Step 2: Verifying Symmetrix settings

Verify the following requirements:

- ❑ Each Symmetrix array within SRDF/Star uses dynamic SRDF devices (capable of being dynamically converted to either an R1 or an R2 device).
- ❑ The SRDF directors are Fibre or GigE (RF or RE).
- ❑ The following states exist for each Symmetrix array within SRDF/Star (use the `symcfg list -v` command to display a Symmetrix configuration):
  - Concurrent SRDF Configuration State = Enabled
  - Dynamic SRDF Configuration State = Enabled
  - Concurrent Dynamic SRDF Configuration = Enabled
  - RDF Data Mobility Configuration State = Disabled
- ❑ Each SRDF group in the composite group has the following configuration (use the `symcfg list -rdfg -v` command to display):
  - Prevent RAs Online Upon Power On = Enabled
  - Prevent Auto Link Recovery = Enabled

  Note: Preventing automatic recovery preserves the remote copy that was consistent at the time of the link failure.

Step 3: Creating an SRDF/Star composite group

An RDF1 type composite group must be created on the control host for the Symmetrix array at the workload site (NewYork). When created, the composite group is enabled for consistency protection (thus, referred to as a consistency group). The consistency group is then populated with devices.

Concurrent SRDF/Star

Figure 16 illustrates a concurrent SRDF/Star setup using the `StarGrp` composite group. The workload site is `NewYork`, the synchronous target site is `NewJersey`, and the asynchronous target site is `London`.

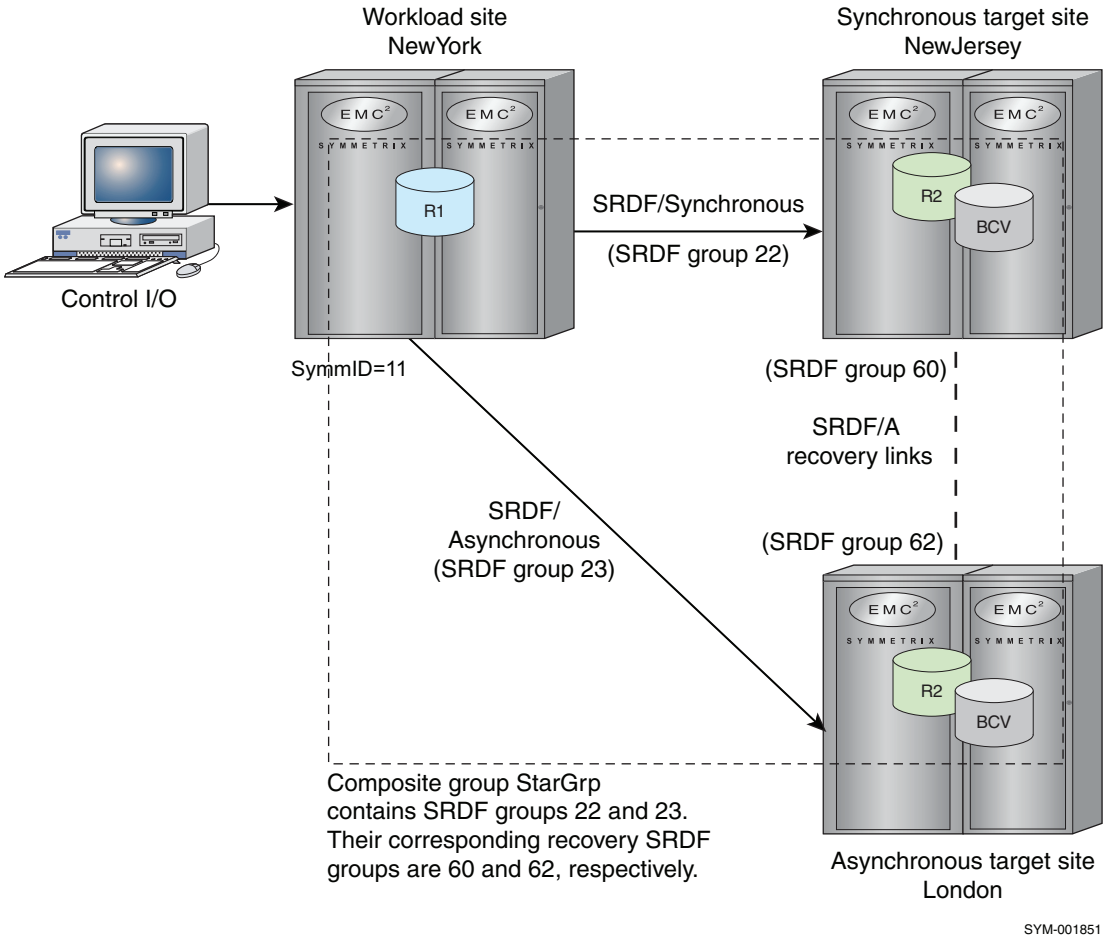

Figure 16 Concurrent SRDF/Star setup using the StarGrp composite group

Procedure

The following procedure for concurrent SRDF/Star explains how to build an RDF1 type composite group on the control host of the SRDF/Star workload site (that is, `NewYork`, `Symmetrix 11`). The R1 devices must be configured as concurrent dynamic devices (dynamic devices that are capable of being either an R1 or an R2 device).

Note: For additional information on composite groups and using the `symcg -cg` command, refer to the *EMC Solutions Enabler Symmetrix Array Management CLI Product Guide*.

---

1. Determine which devices on the local Symmetrix array (`-sid 11`) are configured as concurrent dynamic devices:

   `symrdf list -sid 11 -concurrent -dynamic -both`

Note: Use the `-dynamic` and `-both` options to display dynamic SRDF pairs in which the paired devices can be either R1 or R2 devices.

2. Create an RDF1-type composite group (for example, one named `StarGrp`) on the control host at the workload site (`NewYork`):

```
symcg create StarGrp -type rdf1 -rdf_consistency
```

Note: Use the `-rdf_consistency` option to specify consistency protection for the group.

3. Add devices to the composite group from those SRDF groups that represent the concurrent links for the SRDF/Star configuration:

```
symcg -cg StarGrp -sid 11 addall dev -rdfg 23
```

Note: With concurrent SRDF, the command that adds one of the two concurrent groups actually adds both concurrent groups (in this example, the synchronous SRDF group 22 is automatically added with the asynchronous SRDF group 23).

4. Create two SRDF group names (one for all synchronous links and one for all asynchronous links):

```
symcg -cg StarGrp set -name NewJersey -rdfg 11:22
symcg -cg StarGrp set -name London -rdfg 11:23
```

Note: The site named `NewJersey` includes synchronous SRDF group 22 on Symmetrix 11 (although you could include other synchronous SRDF groups by using the `sid:rdfg` syntax). The site named `London` includes concurrent asynchronous SRDF group 23.

You must also include the names `NewJersey` and `London` in the SRDF/Star options file as the values for the synchronous and asynchronous target site names, respectively. For more information, refer to "Step 4: Creating the SRDF/Star options file" on page 41.

5. For each source SRDF group that you added to the composite group, define a corresponding recovery SRDF group at the remote site. A recovery SRDF group can be static or dynamic, but it cannot be shared. A recovery SRDF group cannot contain any devices.

For example, SRDF group 60 is an empty static or dynamic group that was configured on the remote Symmetrix array to which source SRDF group 22 is linked. Recovery SRDF group 62 was configured on the other remote Symmetrix array as a match for the source SRDF group 23. To add these corresponding recovery SRDF groups at the remote sites, enter:

```
symcg -cg StarGrp set -rdfg 11:22 -recovery_rdfg 60
symcg -cg StarGrp set -rdfg 11:23 -recovery_rdfg 62
```

Note: These two recovery group definitions represent one recovery SRDF group as viewed from each of the two target sites.

Cascaded SRDF/Star

Figure 17 illustrates a cascaded SRDF/Star setup using the `StarGrp` composite group. The workload site is `NewYork`, the synchronous target site is `NewJersey`, and the asynchronous target site is `London`.

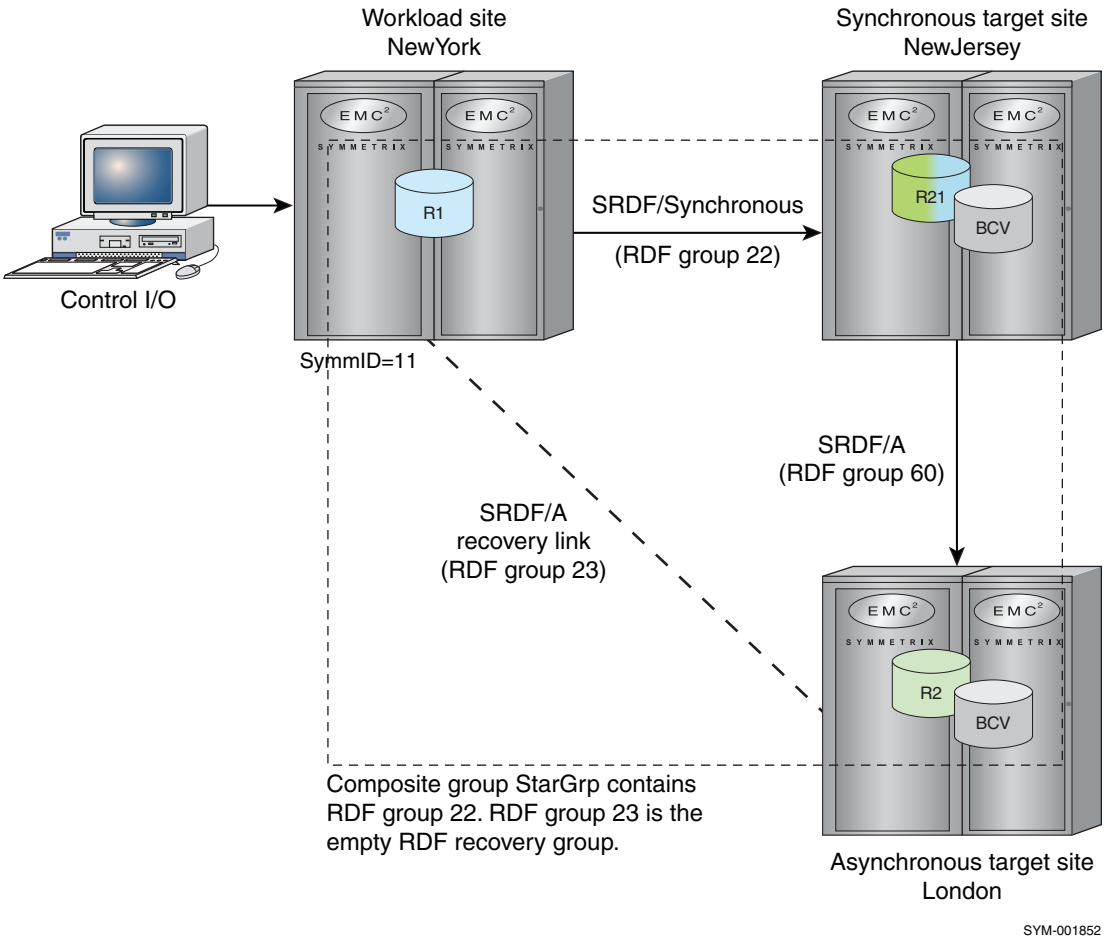

Figure 17 Cascaded SRDF/Star setup using the StarGrp composite group

Procedure

The following procedure for cascaded SRDF/Star explains how to build an RDF1-type composite group on the control host of the SRDF/Star workload site, which is NewYork, Symmetrix 11).

The R1 devices must be configured as cascaded dynamic devices. Dynamic devices are capable of being either R1 or R2. When a device is created, you specify whether it is R1 and/or R2. If the device is R1-capable and R2-capable, it can implicitly become an R21 device.

1. Determine which devices on the local Symmetrix array (`-sid 11`) are configured as cascaded dynamic devices:

   `symrdf list -sid 11 -R1 -cascaded -dynamic -both`

Note: Use the `-dynamic` and `-both` options to display dynamic SRDF pairs in which the paired devices can be either R1 or R2 devices.

2. Create an RDF1-type composite group (for example, one named `StarGrp` on the control host at the workload site (`NewYork`):

   `symcg create StarGrp -type rdf1 -rdf_consistency`

   Note: Use the `-rdf_consistency` option to specify consistency protection for the group.

3. Add devices to the composite group from those SRDF groups that represent the cascaded links for the SRDF/Star configuration:

   `symcg -cg StarGrp -sid 11 addall dev -rdfg 22`

4. Create one SRDF group name for all synchronous links:

   `symcg -cg StarGrp set -name NewJersey -rdfg 11:22`

   Note: The site named `NewJersey` includes synchronous SRDF group 22 on Symmetrix 11. You could include other synchronous SRDF groups by using the `sid:rdfg` syntax.

   You must also include the site names `NewJersey` and `London` in the SRDF/Star options file as the values for the synchronous and asynchronous target site names, respectively. For more information, refer to "Step 4: Creating the SRDF/Star options file" on page 41.

5. For each source SRDF group that you added to the composite group, define a corresponding recovery SRDF group at the local (workload) site. A recovery SRDF group can be static or dynamic, but it cannot be shared. A recovery SRDF group cannot contain any devices. It must be empty.

   For the cascaded setup in Figure 17 on page 40, the recovery SRDF group is the empty SRDF group 23 configured between the NewYork sync site and the London asynchronous site. To add this recovery SRDF group, enter:

   ```
   symcg -cg StarGrp set -rdfg 11:22 -recovery_rdfg 23
   ```

Step 4: Creating the SRDF/Star options file

The SRDF/Star options file (a text file) specifies the names of each SRDF/Star site and other required parameters. It can contain comment lines that begin with"`#`", as shown below. This file should conform to the following syntax, where you enter a value after the equal sign (`=`):

```
#Comment
SYMCLI_STAR_WORKLOAD_SITE_NAME=WorkloadSiteName
SYMCLI_STAR_SYNCTARGET_SITE_NAME=SyncSiteName
SYMCLI_STAR_ASYNCTARGET_SITE_NAME=AsyncSiteName
SYMCLI_STAR_ADAPTIVE_COPY_TRACKS=NumberTracks
SYMCLI_STAR_ACTION_TIMEOUT=NumberSeconds
SYMCLI_STAR_TERM_SDDF=Yes|No
SYMCLI_STAR_ALLOW_CASCADED_CONFIGURATION=Yes|No
SYMCLI_STAR_SYNCTARGET_RDF_MODE=ACP|SYNC
SYMCLI_STAR_ASYNCTARGET_RDF_MODE=ACP|ASYNC
```

Note: If the options file contains the `SYMCLI_STAR_COMPATIBILITY_MODE` parameter, it must be set to `v70`.

`WorkloadSiteName` value should be a name that is meaningful for the workload site. For example, if this site is located in New York, the site name might be `NewYork` or `New_York`. (In our examples we use `NewYork`.)

The `SyncSiteName` value should be a name that is meaningful for the synchronous target site. For example, if this site is located in New Jersey, the site name might be `NewJersey` or `New_Jersey`. This name must match the SRDF group name used for the synchronous SRDF groups when building the composite group, which is `NewJersey` in the examples.

The `AsyncSiteName` value should be a name that is meaningful for the asynchronous target site. For example, if this site is located in London, the site name might be `London` or `England`. This name must match the SRDF group name that you used for the asynchronous SRDF groups when building the composite group for a concurrent STAR configuration. (There are no SRDF group names for the asynchronous site in a cascaded configuration.)

`NumberTracks` specifies the maximum number of invalid tracks allowed for Star to transition from adaptive copy mode to synchronous or asynchronous mode. Star will wait until the number of invalid tracks is at or below `NumberTracks` before changing the SRDF mode. The default is 30,000.

The `NumberSeconds` value is the maximum time (in seconds) that the system waits for a particular condition before returning a time-out failure. The wait condition may be the time to achieve R2-recoverable SRDF/Star protection or SRDF consistency protection, or the time for SRDF devices to reach the specified number of invalid tracks while synchronizing. The default is 1800 seconds (30 minutes). The smallest value allowed is 300 seconds (5 minutes).

Setting `SYMCLI_STAR_TERM_SDDF` to Yes terminates the SDDF (Symmetrix Differential Data Facility) sessions on both the SYNC and ASYNC target sites during a `symstar disable`. The default setting is `No`, which deactivates (instead of terminates) the SDDF sessions during a `symstar disable`.

Setting `SYMCLI_STAR_ALLOW_CASCADED_CONFIGURATION` to `Yes`, enables you to select and operate in a STAR mode as a cascaded SRDF/Star environment. The default is `No`.

Leaving `SYMCLI_STAR_SYNCTARGET_RDF_MODE` set to `ACP` (default), the SRDF mode between the workload site and the synchronous target site transitions to adaptive copy mode at the end of the `symstar unprotect` operation. If set to SYNC, the SRDF mode between the workload site and synchronous target site remains synchronous at the end of the `symstar unprotect` action.

Similarly, leaving `SYMCLI_STAR_ASYNCTARGET_RDF_MODE` set to `ACP` (default), the SRDF mode between the workload site and the asynchronous target site transitions to adaptive copy mode at the end of the `symstar unprotect` operation. If set to ASYNC, the SRDF mode between the workload site and asynchronous target site remains asynchronous at the end of the `symstar unprotect` action.

Sample options file

The following is a sample options file that defines sites in `NewYork`, `NewJersey`, and `London` as operating points of a company's concurrent SRDF/Star storage environment:

```
#ABC Company's April 2012 financial Star storage environment
SYMCLI_STAR_WORKLOAD_SITE_NAME=NewYork
SYMCLI_STAR_SYNCTARGET_SITE_NAME=NewJersey
SYMCLI_STAR_ASYNCTARGET_SITE_NAME=London
SYMCLI_STAR_ADAPTIVE_COPY_TRACKS=30000
SYMCLI_STAR_ACTION_TIMEOUT=1800
SYMCLI_STAR_TERM_SDDF=No
SYMCLI_STAR_ALLOW_CASCADED_CONFIGURATION=No
SYMCLI_STAR_SYNCTARGET_RDF_MODE=ACP
```

Step 5: Performing the symstar setup operation

The SRDF/Star `symstar setup` command reads and validates the information in the host composite group definition and builds the SRDF/Star definition file that defines the R1 consistency group for the workload site. This information is combined with the settings in your SRDF/Star options file, and then is automatically written in an internal format to the SFS on a Symmetrix array at each site.

symstar setup command

The following is the syntax for the `symstar setup` command:

```
setup -options OptionsFile [-distribute]
      [-site SiteName]
      [-opmode <concurrent | cascaded>]

setup -options OptionsFile -reload_options

setup -remove [-force]
```

- Use `setup -options OptionsFile` to execute the setup operation for the SRDF/Star consistency group and include settings from the SRDF/Star options file. To build an SRDF/Star definition file for the `StarGrp` CG using the settings from `MyOpFile.txt`, enter:

  `symstar -cg StarGrp -options MyOpFile.txt setup`

- Use `-reload_options` to update the options values in the SRDF/Star definition file. Do not use this option to update any site name values.
- Use `-distribute` with SRDF/Star CGs that were configured with Solutions Enabler 6.5 or lower in which the SRDF/Star definition file was manually copied to each other site. This option automatically distributes the SRDF/Star definition file to a Symmetrix array at each site without altering the state of the SRDF/Star setup. Only run `-distribute` from the workload site and when both target sites are reachable.
- Use `setup -remove` to change the STAR mode setting of all participating SRDF groups to OFF and remove the SRDF/Star definition files from all reachable sites. Only run `setup -remove` from the workload site and when the target sites are either in the Connected or Disconnected state. In addition, SRDF/Star must be disabled with both target sites in the Unprotected state.

You can run `setup -remove -force` from a non-workload site, and when the remote sites are in the Pathfail state or in a STAR Tripped state. The `setup -remove -force` command removes all distributed SRDF/Star definition files associated with an SRDF/Star consistency group even when its definition no longer exists in the SYMAPI database. It also removes the host's local definition files for the SRDF/Star CG.

If a site is unreachable, you must run the `setup -remove -force` command at that site to remove the SRDF/Star definition file from the SFS, and remove the host's local definition files of the SRDF/Star CG.

Step 6: Creating R2 or R21 composite groups

Once the setup is complete and the SRDF/Star definition file is distributed to the SFS on a Symmetrix array at the other sites, use the `symstar buildcg` command to create the matching R2 or R21 composite groups needed for recovery operations at the synchronous and asynchronous target sites:

```
symstar -cg StarGrp buildcg -site NewJersey
symstar -cg StarGrp buildcg -site London
```

The `setup` and `buildcg` actions ignore BCV devices that you may have added to the composite group at the workload site (`NewYork`). If remote BCVs are protecting data during the resynchronization of the synchronous and asynchronous target sites, you must manually add the BCVs to the synchronous and asynchronous composite groups.

Step 7: Adding BCV devices to the SRDF/Star configuration

Although optional, BCVs are strongly recommended at both the synchronous and asynchronous target sites, which are `NewJersey` and `London` in this example. BCVs retain a consistent restartable image of the data volumes during periods of resynchronization.

To add BCV devices to the SRDF/Star configuration, do the following:

1. Add BCVs at the remote target sites by associating the BCVs with the composite group:

```
symbcv -cg StarGrp -sid 11 associateall dev -devs 182:19A -rdf -rdfg 22
symbcv -cg StarGrp -sid 11 associateall dev -devs 3B6:3C9 -rdf -rdfg 23 (concurrent
   SRDF/Star setup only)
```

Note: Include the SRDF group number of the local R1 source devices.

2. Synchronize the remote BCV pairs by issuing the following commands to copy data from the R2 or R21 devices on the remote Symmetrix arrays to the BCV devices there. The `-rdf` option signifies that the targets are the remote BCVs. The names `NewJersey` and `London` are those that were previously set for SRDF groups 22 and 23 (concurrent SRDF/Star setup only), respectively. The `-star` option is required for any TimeFinder operations that affect BCV devices in an SRDF/Star composite group. To synchronize the remote BCV pairs, enter:

```
symmir -cg StarGrp establish -star -full -rdf -rdfg name:NewJersey
symmir -cg StarGrp establish -star -full -rdf -rdfg name:London
```

Note: You can associate BCVs to a composite group either before or after performing the `setup` operation. The `setup` operation does not save BCV information for the composite group, so any BCVs that were associated are excluded from the internal definitions file copied to the remote hosts.

SRDF/Star control operations

Controlling SRDF/Star involves tasks such as bringing up the SRDF/Star sites for normal operation, isolating one or more sites for testing or other purposes, or switching the workload to one or more of the remote sites after workload site failure. You perform these and other SRDF/Star operations using the `symstar` commands listed in Table 4 and described in the following sections.

Table 4 symstar control operations

Control operation task	symstar action argument	Results	Workload (W) or target (T) task
Cleans up after a disaster (workload site) failure	`cleanup`	Cleans up internal meta information and Symmetrix cache at the remote site after a failure at the workload site.	T
Upgrades an existing SRDF/Star environment. (see page 93)	`configure`	Upgrades or transitions an existing SRDF/Star environment to employ R22 devices, provided the current SRDF/Star environment is operating in normal condition.	W
Begins SRDF synchronization	`connect`	Starts the SRDF data flow in adaptive copy disk mode.	W
Enables full SRDF/Star protection	`enable`	Enables complete SRDF/Star consistency protection across the three sites.	W
Halts the SRDF/Star system	`halt`	Used to prepare the system for a planned switch of the workload to a target site. This action write-disables the R1 devices, drains all invalid tracks and MSC cycles so that NewYork=NewJersey=London, suspends SRDF links, disables all consistency protection, and sets adaptive copy disk mode.	W/T
Isolates a target site from the SRDF/Star configuration (see page 51)	`isolate`	Isolates one target site from the SRDF/Star configuration and makes its R2 devices read/write enabled to their hosts.	W
Displays information about the SRDF/Star composite group configurations (see page 51)	`list`	Lists each SRDF/Star composite group configuration, including workload name, mode of operation, CG and Star states, and target names and states.	W/T
Dynamically modifies an SRDF/Star consistency group (see page 53)	`modifycg`	Maintains consistency protection when adding or removing device pairs from an SRDF/Star consistency group.	W
Enables SRDF consistency protection for a target site	`protect`	Synchronizes devices between the workload and target sites and enables SRDF/Star consistency protection to the specified target site.	W
Displays SRDF/Star status (see page 48)	`query`	Displays the status of a given SRDF/Star site configuration.	W/T
Changes the Star replication path	`reconfigure`	Transitions the SRDF/Star setup from concurrent SRDF to cascaded SRDF or vice versa after a site or link failure, or as part of a planned event.	W

Table 4 symstar control operations (continued)

Control operation task	symstar action argument	Results	Workload (W) or target (T) task
Resets after a transient failure	`reset`	Cleans up internal meta information and Symmetrix cache at the remote site after transient fault (such as a loss of connectivity to the synchronous or asynchronous target site).	W
Displays the SRDF/Star internal definition (see page 47)	`show`	Displays the contents of the internal definition for a given SRDF/Star site configuration.	W/T
Switches workload operations to a target site	`switch`	Transitions workload operations to a target site after a workload site failure or as part of a planned event.	T
Disables SRDF consistency protection for a target site (see page 52)	`unprotect`	Disables SRDF/Star consistency protection to the specified target site.	W
Verifies the given site or SRDF/Star setup is in the desired state.	`verify`	Returns success if the state specified by the user matches the state of the Star setup.	W/T

Command failure while in Connected state

While in the SRDF/Star Connected state, if an operation fails that indicates the SRDF mode is invalid, issue the `symstar configure -reset rdf_mode` command at the workload site. This command resets the device pairs in the SRDF/Star CG to adaptive copy, and if the composite group has R22 devices, the SRDF mode for the recovery pairs is also set to adaptive copy.

Bringing up the SRDF/Star sites for normal operation

Cascaded and concurrent SRDF/Star support the same set of operations.

Restrictions

When operating in cascaded mode, the following restrictions apply:

- Issuing a `symstar protect` command to the asynchronous target is allowed only if the synchronous target site is in a *Protected* state. An unprotected flow of data cannot be allowed from the workload site to the synchronous target site if the asynchronous target site is in a *Protected* state as this will result in an inconsistent data image at the asynchronous target site.
- If the asynchronous target site is in a *Protected* state, the `symstar connect` and `symstar unprotect` commands will not be allowed to be issued to the synchronous target site as this will also result in an inconsistent data image at the asynchronous target site.
- A `symstar isolate` command cannot be issued to the synchronous target site since it is not possible to isolate only the synchronous target site.

Once you have completed all of the setup tasks described in "Setting up SRDF/Star" on page 36, you can bring up your SRDF/Star site configuration using a control host at the workload site. However, you first need to use the `symstar query` command to determine if the setup action left the target sites in a *Connected* or *Disconnected* state. For example:

```
symstar -cg StarGrp query -detail
```

Note: For an example of the output returned with this command, refer to "Using the symstar show command" on page 47.

In both concurrent and cascaded environments, if the system state is *Connected*, the devices are already read/write (RW) on the SRDF link, in which case you can omit the `symstar connect` commands from the command sequence below.

In both environments, if the system state is *Disconnected*, the following command sequence brings up SRDF/Star by first bringing up `NewJersey` and then `London`. (For concurrent SRDF/Star, to first bring up `London` and then `NewJersey`, reverse the order in which you execute the `symstar protect` commands:

```
symstar -cg StarGrp connect -site NewJersey
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site NewJersey
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

Where:

- The `connect` action sets the mode to adaptive copy disk and brings the devices to RW on the SRDF links, but does not wait for synchronization.
- The `protect` action transitions to the correct SRDF mode (sync or async), enables SRDF consistency protection, waits for synchronization, and sets the STAR mode indicators.
- The `enable` action provides complete SRDF/Star protection. It creates and initializes the SDDF sessions, sets the STAR mode indicators on the recovery groups, and enables SRDF/Star to wait for R2-recoverable STAR protection across SRDF/S and SRDF/A before producing a STAR Protected state.

Using the symstar show command

Use the `symstar show` command to display the contents of the SRDF/Star definition file that was created by the `symstar setup` command. To display the SRDF/Star definition file for the `StarGrp` composite group, enter:

```
symstar -cg StarGrp show

Composite Group Name          : StarGrp

Recovery RDF Pairs configured : Yes
Diskless Device Site          : N/A

Site NewYork to site NewJersey Information:

-----------------------------------
 Workload   View  SyncTarget  View
----------------  ----------------
             RD               RD
Symmetrix     F  Symmetrix     F
ID            G  ID            G
------------ --  ------------ ---
000190102011 22 000190300016    8
--------------------------------------

Site NewYork to site London Information:
```

```
      {
      --------------------------------------
       Workload   View  ASyncTarget  View
      ----------------  ----------------
                   RD                RD
      Symmetrix     F  Symmetrix     F
      ID            G  ID            G
      ------------ --  ------------ ---
      000190102011 23 000190300109   14
      ---------------------------------------

      Site NewJersey to site London Information:

      --------------------------------------
       SyncTarget  View  ASyncTarget  View
      ----------------- ----------------
                   RD                RD
      Symmetrix     F   Symmetrix     F
      ID            G   ID            G
      ------------ --  ------------ ---
      000190300016 60 000190300109   62
      ---------------------------------------

Options file settings                 :

      WorkloadSite                        : NewYork
      SyncTargetSite                      : NewJersey
      AsyncTargetSite                     : London
      Adaptive_Copy_Tracks                : 30000
      Action_Timeout                      : 1800
      Term_Sddf                           : Yes
      Allow_Cascaded_Configuration        : No
      Star_Compatibility_Mode             : v70
      Auto_Distribute_Internal_File       : Yes
      SyncTarget_RDF_Mode                 : ACP
      AsyncTarget_RDF_Mode                : ASYNC
```

Note: To display all the devices with SRDF/Star, include the `-detail` option.

Using the symstar query command

Use the `symstar query` command to display the local and remote Symmetrix array information and the status of the SRDF pairs in the composite group.

To display the status of the SRDF/Star site configuration for a composite group called `StarGrp`, enter:

```
symstar query -cg StarGrp

Site Name                                   : NewYork

Workload Site                               : NewYork
1st Target Site                             : NewJersey
2nd Target Site                             : London

Composite Group Name                        : StarGrp
Composite Group Type                        : RDF1
Composite Group State                       : Valid

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : Protected
```

```
  2nd_Target_Site                                : Protected
  STAR                                           : Protected
  Mode of Operation                              : Concurrent
  }

Last Action Performed                            : Enable
Last Action Status                               : Successful
Last Action Timestamp                            : 10/15/2010_16:07:39

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : STAR
  Synchronous Target Site                        : NewJersey
  Asynchronous Target Site                       : London
  Differential Resync Available                  : Yes
  R2 Recoverable                                 : Yes
  Asynchronous Target Site Data most Current     : No
  }

1st Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : NewJersey
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : SYNC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  02011  22 RW        0        0 RW 00016 150 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : MSC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  02011  23 RW        0        0 RW 00109 145 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:
```

```
Modes:
   Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Note: Using the `-detail` option with `query` includes extended information, such as the full Symmetrix IDs, status flags, recovery SRDF groups, and SRDF mode in the output.

Using the symstar list command

The `symstar list` command displays configuration information about the SRDF/Star composite groups that have the SRDF/Star definition file defined locally or on locally-attached SFS devices.

To list the configurations for all the SRDF/Star composite groups, enter:

```
symstar list

S T A R   G R O U P S
-------------------------------------------------------------------------------
                                          First Target      Second Target
                   Flags Workload   Star   ---------------- ----------------
Name                MLC  Name       State  Name       State  Name       State
-------------------------------------------------------------------------------
abc_test_cg_1       CW.  MyStarSit* Unprot MyStarSit* Conn   MyStarSit* Disc
boston_grp          CFV  Hopkinton  Trip   Westborou* Pfl    Southboro* Pfl
citi_west           CFV  Site_A     Unprot Site_B     Disc   Site_C     Conn
ha_apps_cg          CS.  Boston     Unprot Cambridge  Haltst SouthShor* Haltfl
ny                  CW.  A          Unprot B          Halt   C          Halt
star_cg             AS.  Boston     Prot   NewYork    Prot   Philly     Prot
ubs_core            AFI  A_Site     Trip   B_Site     Pfl    C_Site     Pfl
zcg                 AW.  SITEA      -      SITEB      -      SITEC      -
zcg2                ..I  -          -      -          -      -          -
zcg3                ..I  -          -      -          -      -          -

Legend:

  Flags:
    M(ode of Operation) : C = Concurrent, A = Cascaded, . = Unknown
    L(ocal Site)        : W = Workload, F = First target,
                          S = Second target, . = Unknown
    C(G State)          : V = Valid, I = Invalid, R = RecoveryRequired,. = Not defined

  States:
    Star State          : Prot = Protected, Prprot = PartiallyProtected,
                          Trip = Tripped, Tripip = TripInprogress,
                          Unprot = Unprotected, - = Unknown

    Target State        : Conn = Connected, Disc = Disconnected, Halt = Halted,
                          Haltfl = HaltFail, Haltst = HaltStarted,
                          Isol = Isolated, Pfl = PathFail, Prot = Protected,
                          Pflip = PathFailInProg, Pflcl = Pathfail CleanReq,
                          - = Unknown
```

An entry containing a dash or a dot in the `symstar list` output indicates the command was unable to determine this value.

Isolating the SRDF/Star sites

There may be occasions when you want to isolate one of the SRDF/Star sites, perhaps for testing purposes, and then rejoin the isolated site with the SRDF/Star configuration. The `symstar isolate` command allows you to temporarily isolate one or all of the SRDF/Star sites.

Note: In rejoining an isolated site to the SRDF/Star configuration, any updates made to London's R2 devices while *isolated* are discarded. That is, the data on the R1 devices overwrites the data on the R2 devices.

The `symstar isolate` command has the following requirements:

- SRDF/Star protection must be disabled.
- The site to be isolated must be in the Protected state.
- If there are BCVs at the target site that are paired with the SRDF/Star R2 devices, split these BCV pairs before executing the command.

Note: In a cascaded SRDF/Star configuration you cannot isolate a sync site.

Isolating a protected target site

If SRDF/Star is running normally and in the STAR Protected state, the `symstar disable` command disables STAR but leaves both target sites in the Protected state, from which you can isolate either site. For example:

```
symstar -cg StarGrp disable
symstar -cg StarGrp isolate -site London
```

This action isolates site London by splitting its SRDF pairs and making the R2 devices read/write enabled to the London host.

Isolating a disconnected target site

If the site you want to isolate is in the *Disconnected* state, you must first get it to the Protected state with the `connect` and `protect` commands. For example:

```
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site London
symstar -cg StarGrp isolate -site London
```

Rejoining an isolated site

After performing testing or other tasks in London that require the isolation, you can rejoin the London site with the SRDF/Star configuration and enable SRDF/Star protection again. To do this, you must first transition London from the *Isolated* state to the *Disconnected* state. Then proceed to connect and protect. For example:

```
symstar -cg StarGrp disconnect -site London
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

After rejoining the London site, you need to reestablish any London BCV pairs that are part of the `StarGrp` composite group.

Unprotecting the target sites

To unprotect the target sites, you must first turn off SRDF/Star protection (assuming the system state is STAR Protected). The following command sequence must be executed from the workload site (`NewYork`):

```
symstar -cg StarGrp disable
symstar -cg StarGrp unprotect -site NewJersey
symstar -cg StarGrp unprotect -site London
```

Where:

- The `disable` action disables SRDF/Star protection and terminates the SDDF sessions.
- The `unprotect` action disables SRDF consistency protection and sets the STAR mode indicators.

Halting the target sites

The `halt` operation is used to prepare the system for a planned switch of the workload site to a target site. It suspends the SRDF links, disables all consistency protection, and sets the mode to adaptive copy disk. In addition, this operation write-disables the R1 devices and drains all invalid tracks to create a consistent copy of data at each site. To halt SRDF/Star, enter:

```
symstar -cg StarGrp halt
```

Dynamic modification of SRDF/Star consistency groups

You can dynamically add or remove devices from an SRDF/Star consistency group while maintaining consistency protection. To do this, the SRDF/Star consistency group must be in the Connected, Protected, or STAR enabled states for the following configurations:

- Concurrent SRDF/Star CG
- Concurrent SRDF/Star CG with R22 devices
- Cascaded SRDF/Star CG (diskless and non-diskless)
- Cascaded SRDF/Star CG with R22 devices (diskless and non-diskless)

Executed at the workload site, the `symstar modifycg` command with the `add` and `remove` options performs dynamic modification of SRDF/Star consistency groups.

For more information on SRDF consistency group technology, refer to the SRDF Consistency Group Operations chapter of the *EMC Solutions Enabler Symmetrix SRDF Family CLI Product Guide.*

SRDF daemon interaction

Review the following to understand how the SRDF daemon (`storrdfd`) maintains consistency protection of an SRDF/Star CG during dynamic modification:

- The SRDF daemon must be running locally on the host where the dynamic modification operation is issued.
- The SRDF daemon on the local host continuously monitors the SRDF/Star consistency group that is being changed.
- The SRDF daemons running on other hosts do the following:
  - On hosts running GNS, SRDF daemons monitor the consistency group while it is being modified. After the SRDF/Star CG definition is modified, the GNS daemon sends the new CG definition file to all hosts local to the workload Symmetrix array.

Issue the `symstar buildcg -update` command from only one host attached to each affected remote Symmetrix array, and the GNS daemon propagates the new CG definition file to all hosts locally connected to the array.

Depending on the timing of the GNS updates, there may be a brief period during which the SRDF daemon stops monitoring the SRDF/Star CG while waiting for the updated CG definition to propagate to the local GNS daemon.

IMPORTANT

Do not enable the `gns_remote_mirror` option in the GNS daemon's options file if you are using GNS with SRDF/Star. This option is not supported in SRDF/Star environments. An SRDF/Star CG contains concurrent SRDF devices and/or cascaded SRDF devices, and when the `gns_remote_mirror` option is enabled, GNS will not remotely mirror CGs that contain concurrent or cascaded devices. Refer to the "Mirroring exceptions" section of the *EMC Solutions Enabler Symmetrix Array Management CLI Product Guide* for additional details.

If you are switching to a remote site, each SRDF/Star site should have its own definition of the CG. SRDF/Star provides the `symstar buildcg` command to build the CG definition at remote sites. Enabling the `gns_remote_mirroring` option does not provide the same functionality as the `symstar buildcg` command, and it should not be enabled on hosts that will contain SRDF/Star CG definitions. Enabling this option may cause GNS to temporarily try to remotely mirror the SRDF/Star CG when an SRDF/Star CG is being reconfigured or a switch is being performed to a remote site. This can cause adverse effects for SRDF/Star.

- On hosts *not* running GNS, SRDF daemons running on Solutions Enabler versions lower than 7.3.1 stop monitoring the SRDF/Star CG during dynamic modification. These daemons see the old CG definition until the `symstar buildcg -update` command is issued. This command retrieves the new SRDF/Star CG definition file from the local Symmetrix array and replaces the old CG definition with the updated one on that host.

Command restrictions

The following guidelines apply to both the `add` and `remove` options of the `symstar modifycg` command:

- The `symstar modifycg` command requires Symmetrix arrays running Enginuity 5773 or higher.
- The `symstar modifycg` command must be executed at the workload site.
- The `symstar modifycg` command requires that all its Symmetrix arrays are reachable.
- The SRDF daemon must be running locally on the host where the `symstar modifycg` command is issued.
- The `symstar modifycg` command can only move devices within one SRDF/Star triangle in the CG.
- The following options in the SRDF/Star options file must have these settings:

  SYMCLI_STAR_AUTO_DISTRIBUTE_INTERNAL_FILE=YES

SYMCLI_STAR_COMPATIBILITY_MODE =v70

- If the `symstar modifycg` command is run when one of its target sites is in the Connected state, the SRDF mode must be adaptive copy.
- When devices are virtually provisioned, all Symmetrix arrays in the Star triangle of the SRDF/Star CG must be running Enginuity 5874.210.168 or higher.

Note: In the event the `symstar modifycg` command fails, you can rerun the command or issue `symstar recover`. No control operations are allowed on a CG until after a recover completes on that CG.

Preparing the staging area

Before dynamic modification of SRDF/Star consistency groups can take place, you must create a staging area that mirrors the configuration of the CG being used for the Star triangle that is being modified. The staging area consists of the following:

- SRDF groups containing the device pairs to be added to an SRDF/Star consistency group using the `symstar modifycg -add` command.
- SRDF groups for receiving the device pairs removed from an SRDF/Star consistency group using the `symstar modifycg -remove` command.

The SRDF groups in the staging area must be established between the same Symmetrix arrays as the SRDF groups in the SRDF/Star consistency group being used for the Star triangle that is being modified.

Restrictions for dynamic add operations

The SRDF/Star restrictions described in "SRDF/Star Restrictions" on page 17 apply to dynamic add operations.

The following additional restrictions apply to the SRDF groups and devices in the staging area for dynamic symstar modifycg add operations:

- All device pairs must be set in the same mode:
  - Adaptive copy disk
  - Adaptive copy write pending for diskless R21->R2 device pairs
- Devices in the staging area must be in one of the following SRDF pair states for each SRDF group:
  - Synchronized
  - SyncInProg with no invalid tracks
  - Suspended with no invalid tracks (If any device is Suspended on any of its SRDF groups, then all devices must be Suspended on all of their SRDF groups.)
- All devices to be added in the staging area must be of the same configuration (and over the same Symmetrix arrays) as the Star configuration that you are updating:
  - Concurrent R1 devices
  - Cascaded R1 devices with diskless R21 devices

- Cascaded R1 devices with non-diskless R21 devices.

- No devices in the staging area can be configured as R22 devices, but they must have an available dynamic mirror position. The R22 devices in the recovery link will be added as part of the dynamic add operation.
- Devices in the staging area cannot be enabled for consistency protection.
- Devices in the staging area cannot be defined with SRDF/Star SDDF sessions.

Dynamic remove operation

The dynamic symstar modifycg remove operation moves the device pairs from the SRDF/Star consistency group into the SRDF groups in the staging areas. To prepare the staging area for this operation, create the SRDF groups for receiving these devices from an SRDF/Star CG. If the SRDF/Star CG has R22 devices, Solutions Enabler automatically performs a deletepair operation on the recovery links of the CG. Therefore, you do not need to create an SRDF group for the recovery links of the CG.

Restrictions

The following restrictions apply to the SRDF groups and devices in the staging area for a dynamic symstar modifycg remove operation:

- The remove operation is not allowed if the SRDF groups in the staging area are in the STAR state.
- SRDF groups in the staging area cannot be operating in asynchronous mode.

Dynamically adding devices

This section explains how to use the `symstar modifycg -add` command, which does the following:

- The command moves the device pairs from the staging area into the SRDF/Star CG.
- The command adds the devices to the SRDF/Star CG definition.
- The command brings the devices into states that are consistent with the existing devices in the CG.

R22 devices

If the SRDF/Star CG contains R22 devices, the `symstar modifycg -add` command performs a createpair operation for the added devices between the recovery SRDF groups of the SRDF/Star CG. These devices are set in adaptive copy disk mode and are in the Suspended pair state for that recovery link.

Restrictions

The following restrictions apply to the symstar modifycg add operation:

- The add operation can only add new device pairs to an existing Star triangle within the SRDF/Star CG. It cannot add a new Star triangle to the SRDF/Star CG.
- If the target of the operation is a concurrent SRDF/Star CG (with or without R22 devices), the devices to be added must be concurrent R1 devices.

- If the target of the operation is a cascaded SRDF/Star CG (with or without R22 devices), the devices to be added must be cascaded R1 devices.
- If the target of the operation is a cascaded SRDF/Star CG (with or without R22 devices) and the devices to be added are cascaded R1 devices with a diskless R21, then the R21 devices in the affected triangle of the SRDF/CG CG must also be diskless.
- If the target of the operation is a cascaded SRDF/Star CG (with or without R22 devices) and the devices to be added are cascaded R1 devices with a non-diskless R21, then the R21 devices in the affected triangle of the SRDF/Star CG must also be non-diskless.

Adding devices to an SRDF/Star concurrent consistency group

Table 5 shows the valid SRDF/Star states for adding device pairs to a CG in a concurrent SRDF/Star configuration.

Table 5 Allowable SRDF/Star states for adding device pairs to a concurrent CG

State of 1st target site (Synchronous)	State of 2nd target site (Asynchronous)	STAR state
Connected	Connected	Unprotected
Protected	Connected	Unprotected
Connected	Protected	Unprotected
Protected	Protected	Unprotected
Protected	Protected	Protected

For examples on this functionality, see "Example 8: Dynamically modifying a concurrent SRDF/Star CG" on page 174.

Example

Figure 18 shows the `ConStarCG` spanning a concurrent SRDF/Star configuration among Symmetrix 306, 311, and 402. The staging area contains devices 20 and 21.

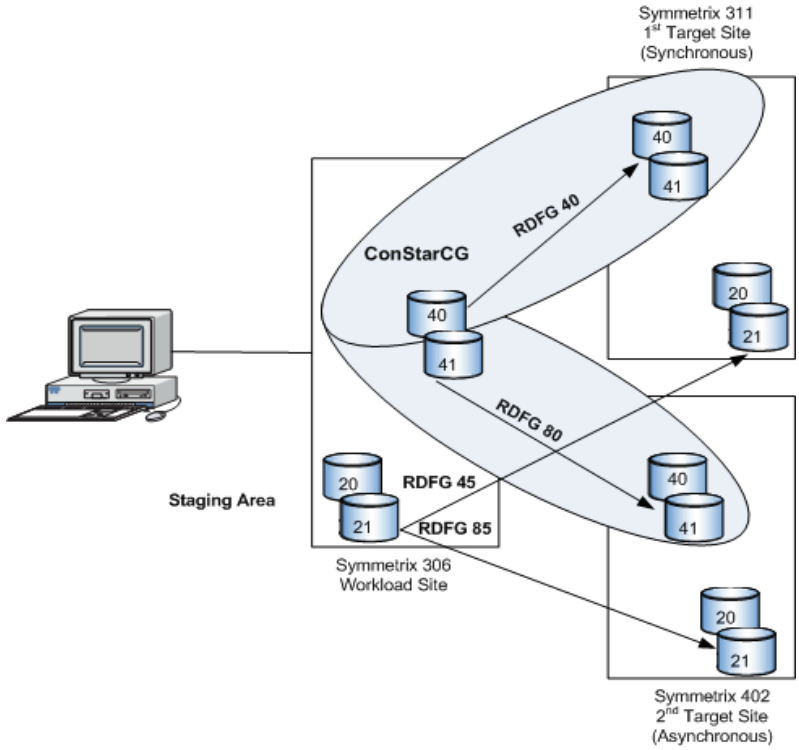

Figure 18 Adding a device to a concurrent SRDF/Star CG

To add only device 20 from the staging area into SRDF groups 40 and 80 of `ConStarCG`, enter:

```
symstar -cg ConStarCG modifycg -add -sid 306 -stg_rdfg 45,85 -devs 20 -cg_rdfg 40,80
```

To check if device 20 was added to `ConStarCG`, enter:

```
symstar show -cg ConStarCG -detail
```

Figure 19 shows `ConStarCg` after device 20 was added. Note that device 21 is still in the staging area.

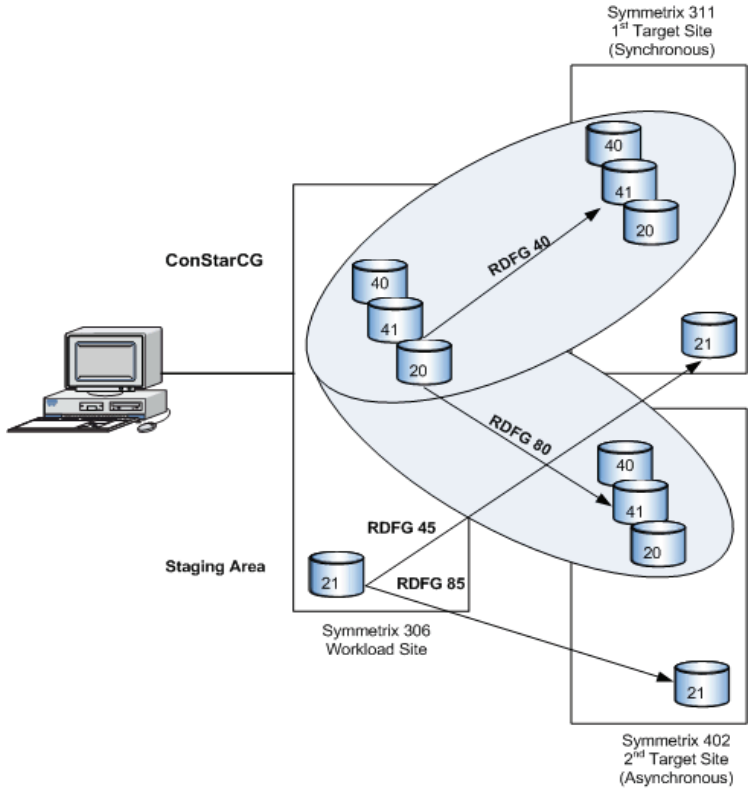

Figure 19 ConStarCG after a dynamic add operation

Adding devices to an SRDF/Star cascaded consistency group

Table 6 shows the valid states for adding device pairs to a CG in a cascaded SRDF configuration.

Table 6 Allowable states for adding device pairs to an SRDF/Star cascaded CG

State of 1st target site (Synchronous)	State of 2nd target site (Asynchronous)	STAR state
Connected	Connected	Unprotected
Protected	Connected	Unprotected
Protected	Protected	Unprotected
Protected	Protected	Protected

For examples on this functionality, see "Example 4: Dynamically adding devices to a consistency group" on page 221.

Example

Figure 20 shows the `CasStarCG` spanning a cascaded SRDF/Star configuration among Symmetrix 306, 311, and 402. The staging area contains devices 20 and 21.

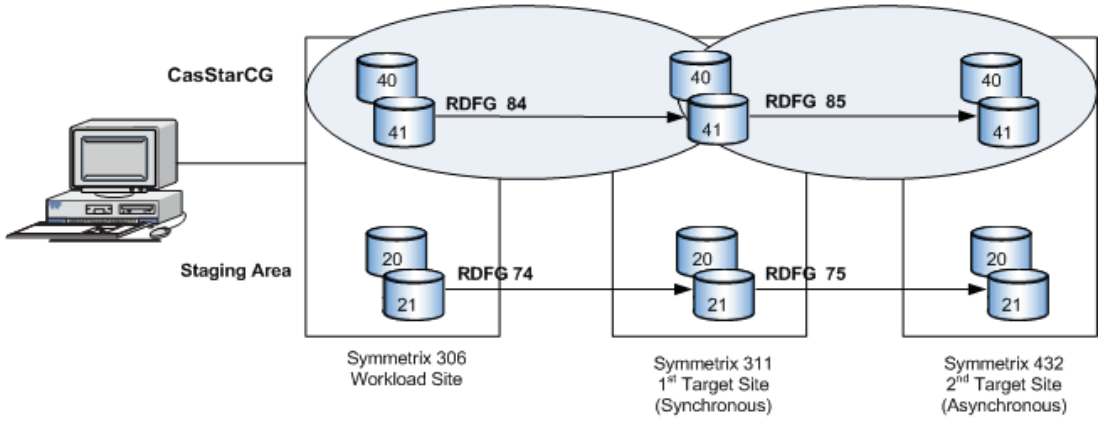

Figure 20 Adding devices to a cascaded SRDF/Star CG

To move devices 20 and 21 from the staging area into SRDF groups 84 and 85 of `CasStarCG`, enter:

```
symstar -cg CasStarCG modifycg -add -sid 306 -stg_rdfg 74 -devs 20:21 -stg_r21_rdfg 75 -cg_rdfg
84 -cg_r21_rdfg 85
```

To check if devices 20 and 21 were added to `CasStarCG`, enter:

```
symstar show -cg CasStarCG -detail
```

Figure 21 shows that devices 20 and 21 were added to `CasStarCG`. Since devices 20 and 21 were moved to `CasStarCg`, the staging area contains empty SRDF groups 74 and 75.

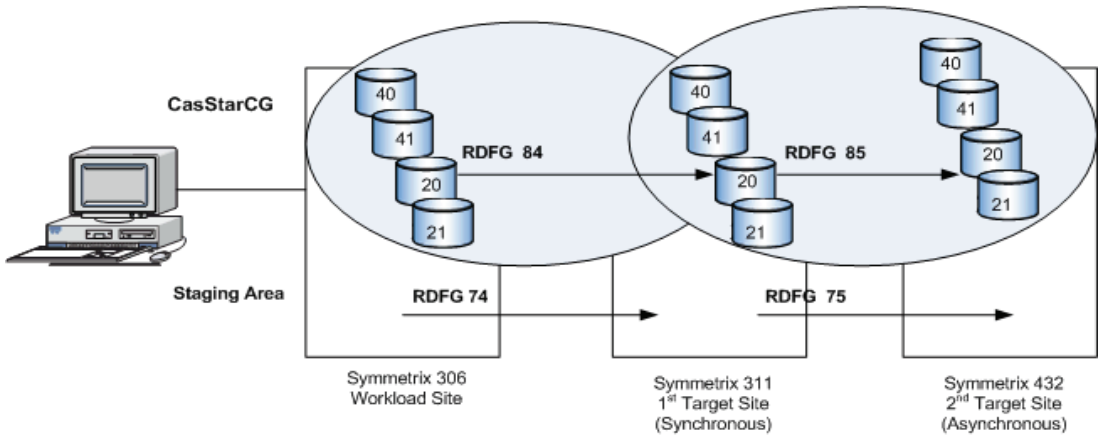

Figure 21 CasStarCG after a dynamic add operation

SRDF pair states of devices in an SRDF/Star CG after a symstar modifycg -add

Table 7 shows the pair states of the devices in the SRDF/Star CG after the `symstar modifycg -add` command completes. These pair states are based on the state of the SRDF/Star site and the SRDF mode of the device pairs in the CG.

Table 7 Pair states of the SRDF devices after symstar modifycg -add completion

State of SRDF/Star sites	Mode of device pairs in CG	Pair state of devices in CG after symstar modifycg -add	Possible delay for symstar modifycg -add command
Connected	Adaptive copy disk	Synchronized or SyncInProg	No delay because command completes when pair is SyncInProg.
	Adaptive copy write pending	Synchronized or SyncInProg	No delay because command completes when pair is SyncInProg.
Protected	SRDF/S	Synchronized	Completes when devices are synchronized.
	SRDF/A	Consistent without invalid tracks	Completes when the consistency exempt option (`-cons_exempt`) clears on the devices added to the CG.
Star Protected	SRDF/S	Synchronized	Completes when devices are synchronized.
	SRDF/A	Consistent without invalid tracks	Completes when devices are recoverable.

Dynamically removing devices

This section explains how to use the `symstar modifycg -remove` command.

The dynamic modifycg remove operation moves the device pairs from an SRDF/Star consistency group and places them into the staging area. If the SRDF/Star CG has R22 devices, Solutions Enabler automatically performs a deletepair operation on the recovery links of the CG.

Note: Never use the dynamic modifycg remove operation to remove an existing triangle from the SRDF/Star CG.

Removing devices from an SRDF/Star concurrent consistency group

Table 8 shows the valid states for removing device pairs from a CG in a concurrent SRDF/Star configuration.

Table 8 Allowable states for removing device pairs from an SRDF/Star concurrent CG

State of 1st target site (Synchronous)	State of 2nd target site (Asynchronous)	Star state
Connected	Connected	Unprotected
Protected	Connected	Unprotected

Table 8 Allowable states for removing device pairs from an SRDF/Star concurrent CG

State of 1st target site (Synchronous)	State of 2nd target site (Asynchronous)	Star state
Connected	Protected	Unprotected
Protected	Protected	Unprotected
Protected	Protected	Protected

Example

To move device 35 from the RDG groups 40 and 80 of `ConStarCG` into SRDF groups 45 and 85 of the staging area, enter:

```
symstar -cg ConStarCG modifycg -remove -sid 306 -stg_rdfg 45,85 -devs 35 -cg_rdfg 40,80
```

To check if the dynamic remove operation was successful for `ConStarCG`, enter:

```
symstar show -cg ConStarCG -detail
```

Removing devices from an SRDF/Star cascaded consistency group

Table 9 shows the valid states for removing device pairs from a CG in a cascaded SRDF configuration.

Table 9 Allowable SRDF/Star states for removing device pairs from a cascaded CG

State of 1st target site (Synchronous)	State of 2nd target site (Asynchronous)	Star state
Connected	Connected	Unprotected
Protected	Connected	Unprotected
Protected	Protected	Unprotected
Protected	Protected	Protected

Example

To move devices 21 and 22 from SRDF groups 84 and 85 of `ConStarCG` into SRDF groups 74 and 75 of the staging area, enter:

```
symstar -cg ConStarCG modifycg -remove -sid 306 -stg_rdfg 74 -devs 21:22 -stg_r21_rdfg 75
-cg_rdfg 84 -cg_r21_rdfg 85
```

To check if the dynamic remove operation was successful, enter:

```
symstar -cg ConStarCG show -detail
```

Recovering from a failed dynamic modifycg operation

After a dynamic modifycg operation is issued, Solutions Enabler stores details about the command, such as the target CG, SRDF groups, staging area, and operation type in the SFS. If a modifycg operation fails and all SRDF/Star sites are reachable, first reissue the command with the *exact* parameters. If the command fails again, execute the following command at the workload site:

```
symstar -cg CGName recover
```

If the workload site or any of the SRDF/Star CG sites are unreachable, use `-force`. For example:

```
symstar -cg CGName recover -force
```

The `symstar recover` command uses all existing information of a dynamic modifycg operation in SFS. The recover operation either completes the unfinished steps of the dynamic modifycg operation or rolls back any tasks performed on the CG by this operation, placing the CG into its original state before failure.

For an operational example of the recover option, see "Example 5: Recovering from a failed dynamic add operation" on page 227.

SRDF pair states of devices in an SRDF/Star CG after a recovery

Table 10 shows the possible pair state of the devices in the SRDF/Star CG after the symstar recover operation completes. As shown in Table 10, the synchronous target site and/or the asynchronous target site can be in the Disconnected or PathFail state when the recover operation is issued for a concurrent SRDF/Star CG or a cascaded SRDF/Star CG.

Table 10 Possible pair states of the SRDF devices after a recovery

State of SRDF/Star sites	Mode of device pairs in CG	Pair state of devices in CG after a recovery
Disconnected	Adaptive copy disk	Suspended[1]
	Adaptive copy write pending	Suspended[1]
PathFail	SRDF/S	Suspended[1]
	SRDF/A	Suspended[1]

1. The SRDF pair state can be Partitioned if the SRDF link is offline.

Command failure while in the Connected state

While in the SRDF/Star Connected state, if a dynamic modification operation fails and indicates the SRDF mode of one or more legs in the STAR CG is invalid, issue the `symstar configure -reset rdf_mode` command at the workload site. This command resets the device pairs in the SRDF/Star CG to adaptive copy mode. After the `symstar configure -reset rdf_mode` successfully completes, you can reissue the `symstar modifycg` operation.

Critical control operations for concurrent SRDF/Star environments

This section describes the critical control operations for concurrent SRDF/Star environments. The critical control operations for the cascaded SRDF/Star environments are described on page 75.

Concurrent recovery from transient fault without reconfiguration

An SRDF/Star fault caused by network or remote storage controller faults is considered a transient fault because it does not disrupt the production workload site. Only the transfer of data across the link is affected. Transient faults during normal SRDF/Star operations require a recovery action.[1] For example, a network fault in a concurrent SRDF/Star environment has temporarily interrupted communication on the SRDF/A link, as shown in Figure 22. When the physical cause of the transient fault is corrected, you can execute a series of commands to clean up the internal metadata and the Symmetrix cache at the asynchronous target site and return the site to SRDF/Star Protected.

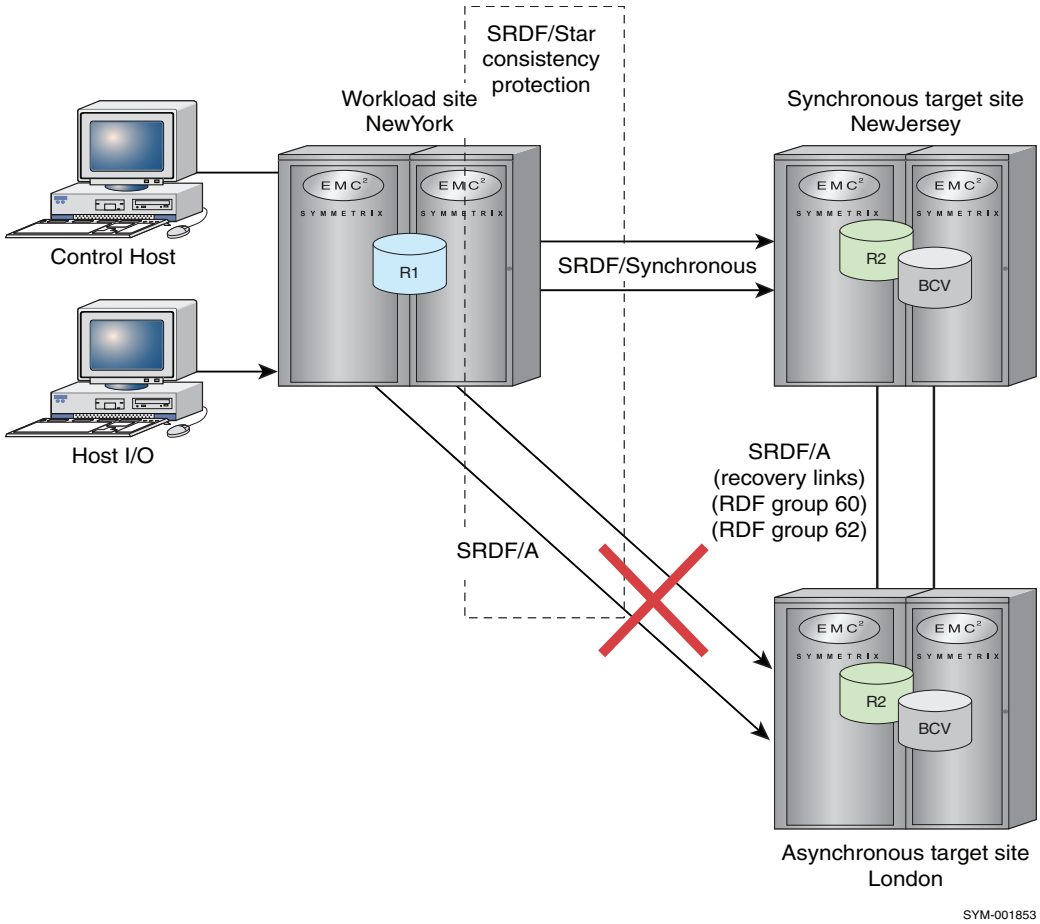

Figure 22 Transient failure recovery for concurrent SRDF/Star

Concurrent recovery method 1

The following concurrent SRDF/Star procedure assumes the transient fault affected the SRDF/A link between the NewYork site and the London site. The NewJersey state is still Protected, while the London state is PathFail.

1. The recovery action described in this section only applies if the transient fault occurs while the system is in the *Protected* or *Star_Protected* states. If a transient fault occurs on a link that is in the *Connected* state, the link is disconnected. Restarting synchronization again from a *Disconnected* state (after correcting the cause of the failure) would require only the `connect` action. A transient fault that occurs when the link is in a *Disconnected* state is not displayed.

1. Clean up any internal metadata or Symmetrix cache remaining at the London site after the transient fault occurred by entering:

   ```
   symstar -cg StarGrp reset -site London
   ```

2. If you are protecting SRDF/Star data with TimeFinder BCVs at the remote site, you should perform the appropriate TimeFinder action after executing the `reset` command.

   For example, to split off a consistent restartable image of the data volumes prior to the resynchronization process, enter:

   ```
   symmir -cg StarGrp split -star -rdf -rdfg name:London
   ```

   Note: Splitting the remote BCVs after a transient fault maintains a consistent image of the data at the remote site until that time when it is safe to reestablish the BCVs with the R2 devices. The act of starting the resynchronization activity will temporarily compromise the consistency of the R2 data until the resynchronization is fully completed. The split BCVs retain a consistent restartable image of the data volumes during periods of SRDF/Star resynchronization.

3. Perform the necessary composite actions required to return the London site to the SRDF/Star configuration by entering:

   ```
   symstar -cg StarGrp connect -site London
   symstar -cg StarGrp protect -site London
   symstar -cg StarGrp enable
   ```

4. If any London BCV pairs are part of the `StarGrp` composite group, reestablish them by entering:

   ```
   symmir -cg StarGrp establish -star -rdf -rdfg name:London
   ```

Concurrent recovery from transient fault with reconfiguration

This section describes a second approach to responding to an asynchronous site transient fault when operating in concurrent SRDF mode. It recovers by reconfiguring the target sync path to the asynchronous target site using the `reconfigure` operation. This alternate method might be desired when the asynchronous site needs to be recovered sooner as the transient fault time drags on.

Fault Description: Assume the links between the workload site and the asynchronous target sites are lost. However, the asynchronous target site is still accessible by the recovery SRDF groups at the synchronous site. In this case, you can connect to the asynchronous target site by reconfiguring the concurrent SRDF/Star into cascaded mode.

In Figure 23, the initial concurrent mode is protected with an asynchronous PathFail in the link between `NewYork` and `London`. A failure causes SRDF/Star to enter a tripped state. Using the `reconfigure` operation changes the mode to cascaded to successfully `recover` London.

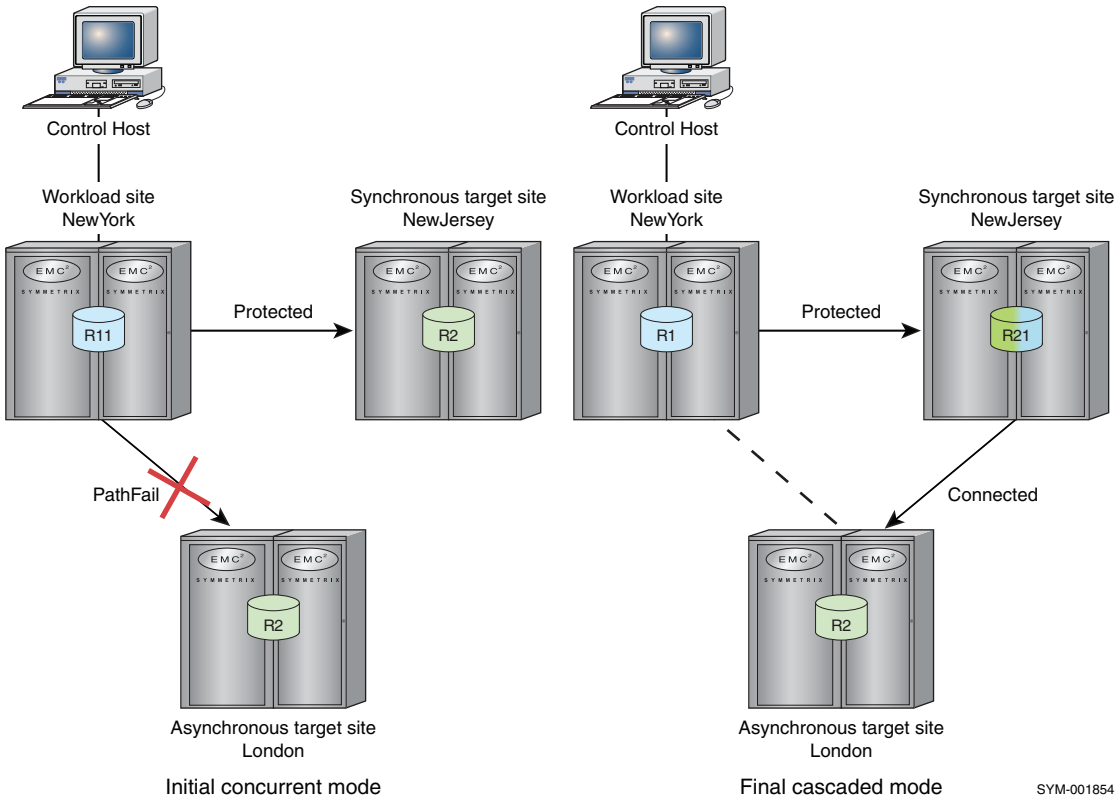

Figure 23 Transient fault management with reconfigure action

Concurrent recovery method 2

To recover from PathFail (asynchronous target site) and a tripped state (SRDF/Star), use the following command as the initial recovery step:

```
symstar -cg StarGrp reconfigure -reset -site London -path NewJersey:London
```

If the asynchronous target site is in the Disconnected state and STAR is unprotected, you must use the `-full` option. If the asynchronous target site is in the PathFail state and STAR is unprotected, use the `-reset` and `-full` options.

Note: Only use the `-full` option when SRDF incremental resync is not available.

Planned workload switch operations for concurrent SRDF/Star

A planned workload switch operation switches the workload function to one of the remote target sites, even though the original workload site is operating normally.

The system state is usually STAR Protected (or the target sites are at least Connected) before starting a switch to one of the remote target sites. Use the `symstar query` command to confirm the system state.

Regardless of which remote site you are switching to, you must first stop the application workload at the current workload site, unmount the file systems, export the volume groups, and so forth. Then execute the SRDF/Star `halt` action from the control host. For example:

```
symstar -cg StarGrp halt
```

Note: If you change your mind after halting the SRDF/Star system, issue the `halt -reset` command to restart the workload site on the same host.

The `halt` action at the current workload site (`NewYork`) disables the R1 devices, waits for all invalid tracks and cycles to drain, suspends the SRDF links, disables SRDF consistency protection, and sets the STAR mode indicators. This results in the target sites transitioning to the Halted state, and all three sites having the data.

Figure 24 shows the concurrent SRDF/Star setup. When the following command sequence is executed from the `NewJersey` control host, the workload switches to the synchronous target site and connects `NewJersey` to `NewYork` (synchronously), and `NewJersey` to `London` (asynchronously):

```
symstar -cg StarGrp switch -site NewJersey
symstar -cg StarGrp connect -site NewYork
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site NewYork
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

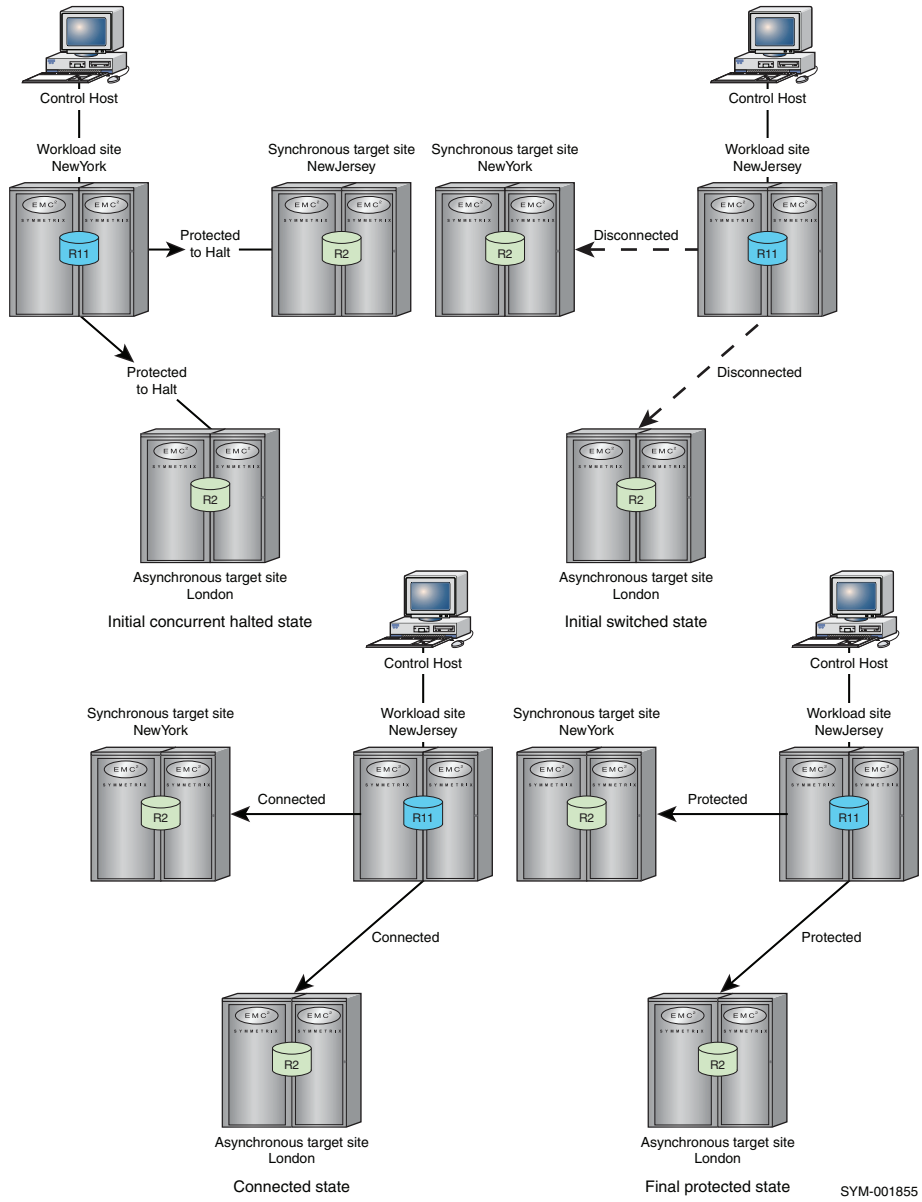

Figure 24 Planned switch of the workload site to a remote target site

Unplanned workload switch operations for concurrent SRDF/Star

An SRDF/Star fault caused by the loss of the workload site (`NewYork`) is a disaster because it disrupts the workload. By using the `switch` command, the workload switches to either one of the remote sites, and resumes data replication between each other.

Figure 25 shows a concurrent SRDF/Star environment where a disaster fault has caused the loss of the workload site (`NewYork`). You can execute a series of commands from the remote control host to establish the new remote workload site.

If the workload site is lost, you can switch the workload to either the synchronous or asynchronous target site. If the loss of the workload site was caused by a rolling disaster, the data at the synchronous target site can be ahead of the data at asynchronous site, or vice versa (as indicated by the `symstar query` command). You can specify which site data to keep in the `symstar switch` command.

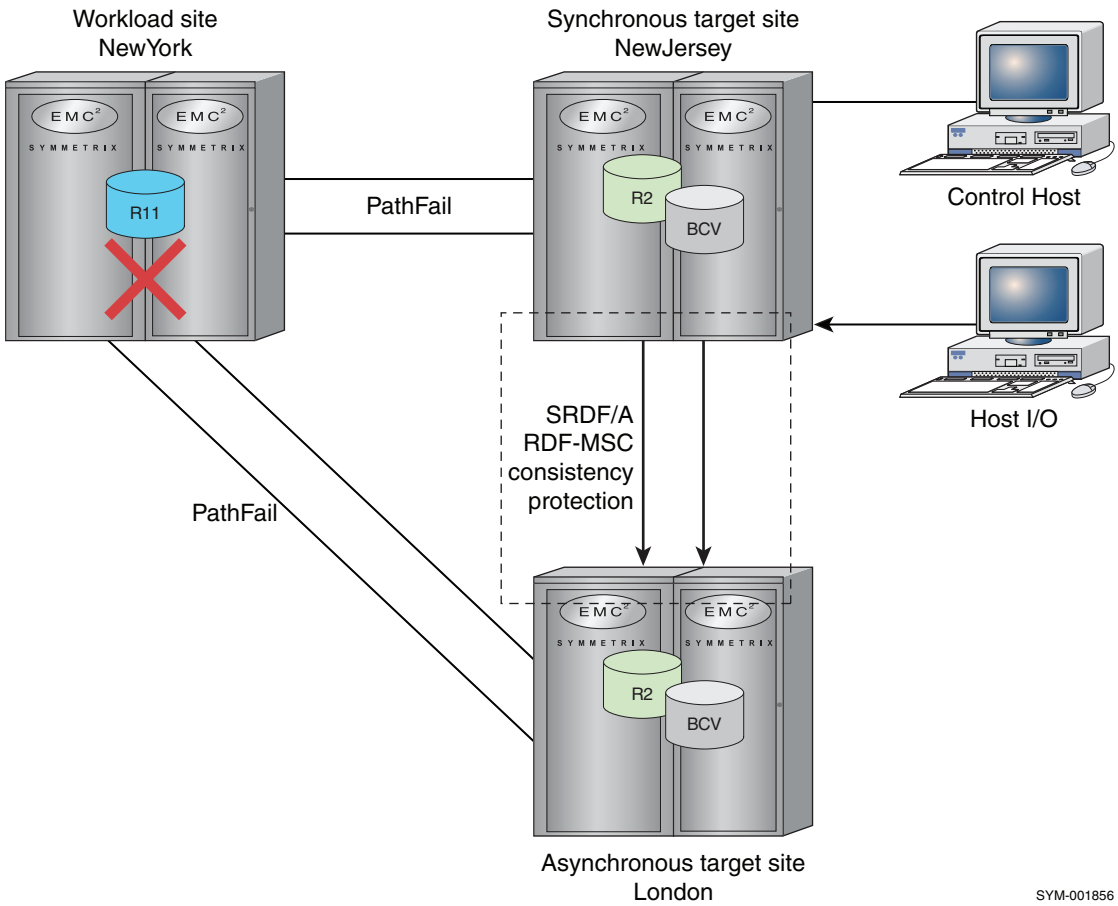

Figure 25 Loss of workload site and recovery for concurrent SRDF/Star

Unplanned workload switch to synchronous target site for concurrent SRDF/Star

The following procedure explains how to perform an unplanned switch operation for concurrent SRDF/Star, which means that the system state is *NewJersey:Pathfail*, *London:Pathfail*, and *STAR:Tripped*. This procedure uses the `symstar` commands from the `NewJersey` control host to bring up the synchronous `NewJersey` site as the new workload site. The `NewJersey` data is then replicated asynchronously to the asynchronous target site (`London`):

Note: When switching the workload to the synchronous target site but choosing to keep the data from the asynchronous target site, there is a wait for all the SRDF data to synchronize before the application workload can be started at the synchronous site. The `symstar switch` command does not return control until the data is synchronized.

Note: If the links from the workload to the asynchronous target are in the *TransmitIdle* state, the following command must be issued to get the asynchronous site to the *PathFail* state:

```
symstar -cg StarGrp disconnect -trip -site London
```

1. Clean up any internal metadata or Symmetrix cache remaining at the London site after the loss of the workload site occurred by entering:

   ```
   symstar -cg StarGrp cleanup -site London
   ```

   The `symstar cleanup` command cleans up internal metadata and Symmetrix cache after a failure. The cleanup action always applies to the asynchronous site. Since the target site in this case is `London`, this action performs the cleanup tasks there.

2. If you are protecting SRDF/Star data with TimeFinder BCVs at the `London` site, perform the appropriate TimeFinder action after executing the `cleanup` command. However, prior to performing a switch and resynchronization operation between NewJersey and London, there is no existing SRDF relationship between the synchronous and asynchronous target sites, therefore the BCV control operation must be performed with a separate device file instead of the composite group. In this case, the device file (`StarFileLondon`) defines the BCV pairs on Symmetrix 13 in London.

   For example, to split off a consistent restartable image of the data volumes during the resynchronization process using the device file, enter:

   ```
   symmir -f StarFileLondon split -star -sid 13
   ```

Note: Splitting the remote BCVs after a workload site failure maintains a consistent image of the data at the remote site until that time when it is safe to reestablish the BCVs with the R2 devices.

3. Use the `symstar switch` command to perform the tasks to start the workload at the specified site. For example, specifying `NewJersey` as the new workload site, and changing its R2 devices into R1 devices, as shown in Figure 26 on page 71.

   The following entries at the new workload site specify to retain the `NewJersey` data instead of the `London` data:

   ```
   symstar -cg StarGrp switch -site NewJersey -keep_data NewJersey
   symstar -cg StarGrp connect -site London
   symstar -cg StarGrp protect -site London
   ```

   As shown in Figure 26, the `connect` and `protect` actions perform the tasks necessary to reconfigure the SRDF devices between `NewJersey` and `London` into SRDF pairs (R1 devices at site NewJersey paired with the R2 devices at site `London`), and perform the differential resynchronization of the data between these sites. Once the recovery tasks are complete, the `NewJersey` workload is remotely protected through an asynchronous link to `London`.

You can begin the workload at `NewJersey` any time after the `switch` action completes. However, doing this before the `connect` and `protect` actions are completed results in no remote protection for a period of time.

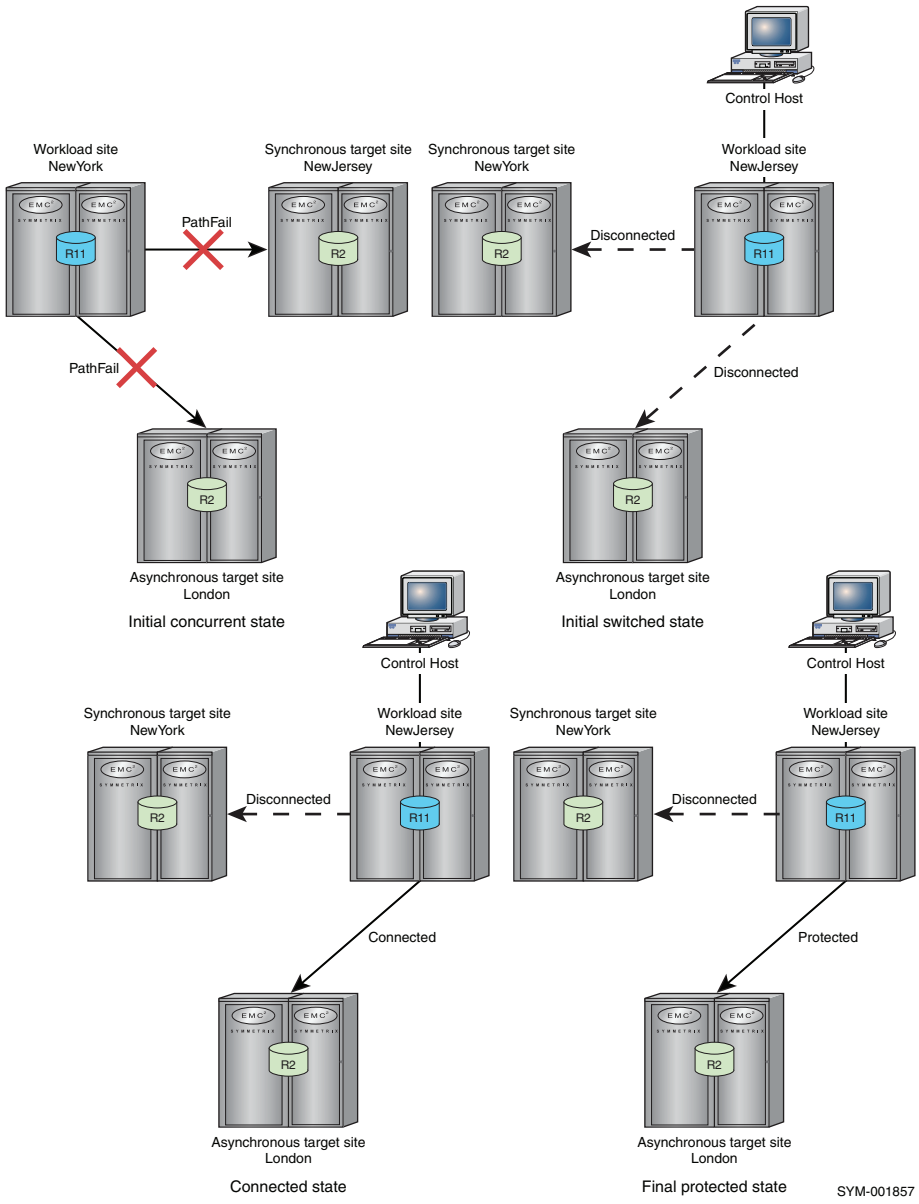

Figure 26 Switching workload site to synchronous target site for concurrent SRDF/Star

4. After recovering the London site, you must reestablish any BCV pairs at the `London` site. You can either use the device file syntax (`-f StarFileLondon`) or, if you have associated the `London` BCV pairs with the `StarGrp` composite group on the control host, you can use the `-cg` syntax. To reestablish any `London` BCV pairs that are part of the `StarGrp` composite group, enter:

```
symmir -cg StarGrp establish -star -rdf -rdfg name:London
```

5. Once the `NewYork` site is repaired, you may want to bring `NewYork` back into the SRDF/Star system while retaining the workload site at `NewJersey`. For example, to recover and enable the `NewYork` site, enter the following commands from the `NewJersey` control host:

```
symstar -cg StarGrp connect -site NewYork
symstar -cg StarGrp protect -site NewYork
symstar -cg StarGrp enable
```

Unplanned workload switch to asynchronous target site for concurrent SRDF/Star

The following concurrent SRDF/Star procedure explains how to perform an unplanned switch operation, which means that the system state is *NewJersey:Pathfail*, *London:Pathfail*, and *STAR:Tripped*. This procedure uses the `symstar` command at the `London` control host to bring up the asynchronous site `London` as the new workload site. The `London` data is replicated asynchronously to the synchronous target site (`NewJersey`):

Note: When switching the workload to the asynchronous target site but choosing to keep the data from the synchronous target site, there will be a wait for all the SRDF data to synchronize before the application workload can be started at the asynchronous site. The `symstar switch` command does not return control until the data is synchronized.

1. Clean up any internal metadata or Symmetrix cache remaining at the London site after the loss of the workload site occurred by entering:

   ```
   symstar -cg StarGrp cleanup -site London
   ```

   The `symstar cleanup` command cleans up internal metadata and Symmetrix cache after a failure. The cleanup action always applies to the asynchronous site. Since the target site is `London`, this action performs the cleanup tasks at this site.

2. If you are protecting SRDF/Star data with TimeFinder BCVs at the `NewJersey` site, you should perform the appropriate TimeFinder action after executing the `cleanup` command. However, prior to performing a switch and resynchronization operation between London and NewJersey, there is no existing SRDF relationship between the synchronous and asynchronous target sites, so the BCV control operation must be performed using a separate device file instead of the composite group. In this case, the device file (`StarFileNewJersey`) defines the BCV pairs on Symmetrix 13 in London.

   For example, to split off a consistent restartable image of the data volumes during the resynchronization process using the device file, enter:

   ```
   symmir -f StarFileNewJersey split -star -sid 16
   ```

   Note: Splitting the remote BCVs after a workload site failure maintains a consistent image of the data at the remote site until that time when it is safe to reestablish the BCVs with the R2 devices.

3. Use the `symstar switch` command at the new workload site to start the workload at the specified site. For example, Figure 27 shows the `switch` to the `London` as the new workload site, and changes its R2 devices there into R1 devices.

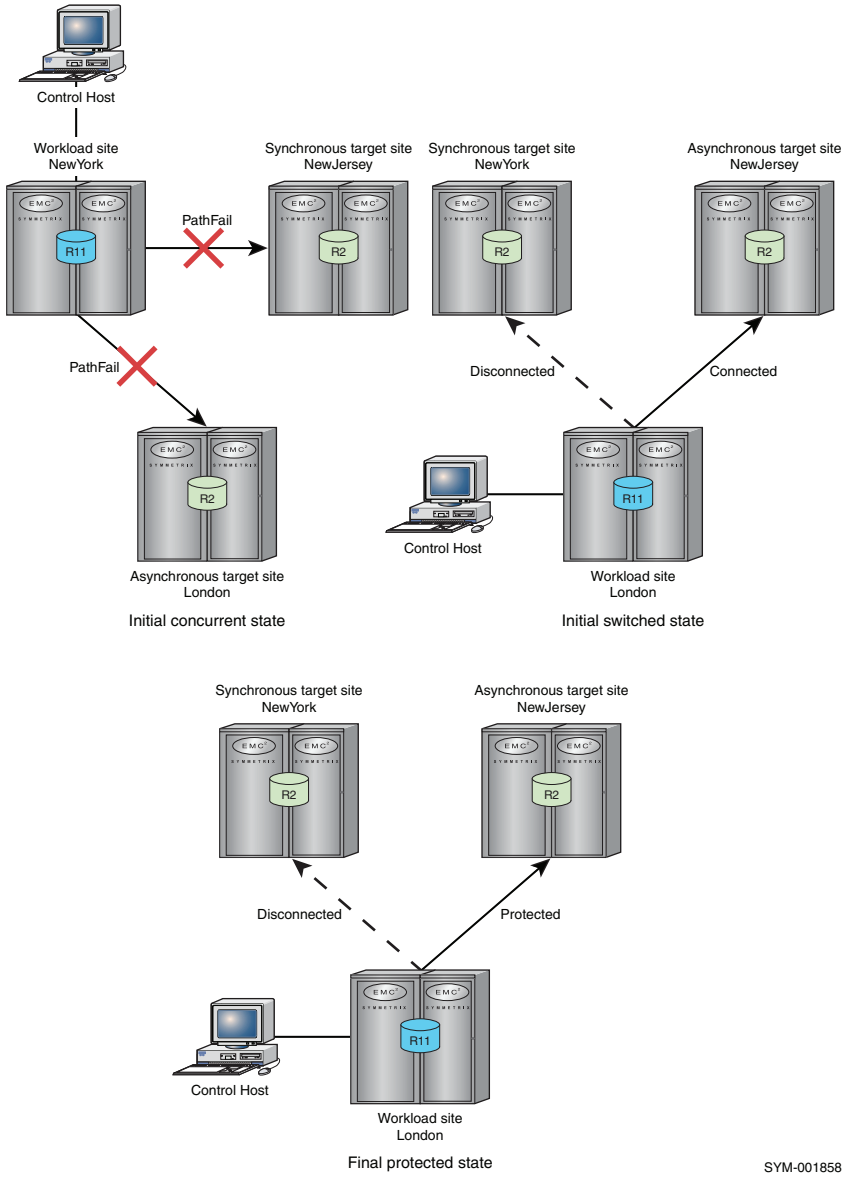

Figure 27 Switching workload site to asynchronous target site for concurrent SRDF/Star

The following command examples switch the workload site to London while keeping the NewJersey data instead of the London data:

```
symstar -cg StarGrp switch -site London -keep_data NewJersey
symstar -cg StarGrp protect -site NewJersey
```

The `connect` action is not required because the `switch` action performs that function to retrieve the remote data from the NewJersey site.

Because London is using the `NewJersey` data, you cannot start the application workload in `London` until the `switch` action completes (the `symstar switch` command blocks further action until it completes). This ensures that all of the SRDF pairs are synchronized prior to starting the workload.

4. After reconnecting the `NewJersey` site, reestablish any BCV pairs at the `NewJersey` site. You can either use the device file syntax (`-f StarFileNewJersey`) or, if you have associated the `NewJersey` BCV pairs with the `StarGrp` composite group on the control host, you can use the `-cg` syntax. To reestablish any `NewJersey` BCV pairs that are part of the `StarGrp` composite group, enter:

   ```
   symmir -cg StarGrp establish -star -rdf -rdfg name:NewJersey
   ```

5. Once the `NewYork` site is repaired, you cannot bring it back under STAR protection without switching the workload back to `NewYork` or `NewJersey`. If the workload remains at `London`, you can connect to NewYork by executing a `connect` action from the London control host. The `connect` action sets the mode to adaptive copy disk and brings the devices to RW on the SRDF links:

   ```
   symstar -cg StarGrp connect -site NewYork
   ```

6. With the workload at the asynchronous `London` site, you can perform a `protect` action on `NewYork` only if you first unprotect `NewJersey`. From the distant site, only one link at a time can operate in asynchronous mode. The `protect` action transitions the link from adaptive copy mode to asynchronous mode and enables SRDF consistency protection.

   The `symstar enable` action is blocked.

Note: To see expanded operational examples for SRDF/Star, you can refer to the technical Note, *Using SYMCLI to Implement SRDF/Star*.

Switch workload back from target site to original workload site

After a planned or unplanned switch of the workload to the synchronous or asynchronous target site (in a concurrent or cascaded SRDF/Star environment), you can (if the original workload site is operating normally) go back to the original workload site to reestablish the original SRDF/Star configuration.

To switch back to the original workload site, you must be able to completely synchronize the data at all three sites. Before initiating a switch back to the original workload site, the current workload site's SRDF links must be connected to the other two sites.

The following states allow you to switch from the synchronous target site to the original workload site:

- STAR Protected
- Both target sites are *Protected*
- One target site is *Protected* and the other is *Connected*
- Both target sites are *Connected*

The following states allow you to switch from the asynchronous target site to the original workload site:

- One target site is Protected and the other is Connected

- Both target sites are Connected

Regardless of which remote site you are working from, you must first stop the workload at that site and execute the halt action from the control host. Assuming the workload is currently running at NewJersey, issue the following command from the NewJersey control host:

```
symstar -cg StarGrp halt
```

The halt action disables the R1 devices, waits for all invalid tracks and cycles to drain, suspends the SRDF links, disables SRDF consistency protection, and sets the STAR indicators. This results in the target sites transitioning to the *Halted* state, and all the data on all three sites being the same.

This concurrent SRDF/Star example assumes the workload was running at the synchronous site NewJersey before stop it and performing the `halt` action. You must execute the following command sequence from the NewYork control host. The resulting actions switch the workload to NewYork and reconnect NewYork to NewJersey (synchronously), and NewYork to London (asynchronously):

```
symstar -cg StarGrp switch -site NewYork
symstar -cg StarGrp connect -site NewJersey
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site NewJersey
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

The resulting state is *STAR Protected*.

Critical control operations for cascaded SRDF/Star environments

This section defines the system states and actions that allow you to control the operation of a cascaded SRDF/Star environment in many probable configurations as well as internal or external behaviors derived from system faults that may or may not require switching of the production workload. For examples of cascaded SRDF/Star actions see "Implementing Cascaded SRDF/Star" on page 185.

This section describes a cascaded SRDF/Star setup with the workload site NewYork, the synchronous target site NewJersey and the asynchronous target site London.

Cascaded recovery from transient fault without reconfiguration

A recovery action is required after a transient fault, but does not require a move of the workload to another site. This section describes transient faults and procedures, when operating in cascaded mode, which can be recovered without performing any SRDF reconfiguration.

Loss of links to the asynchronous target site

As shown in Figure 28 the SRDF links to the asynchronous target site were temporarily dropped. The SRDF devices are now in the Suspended state.

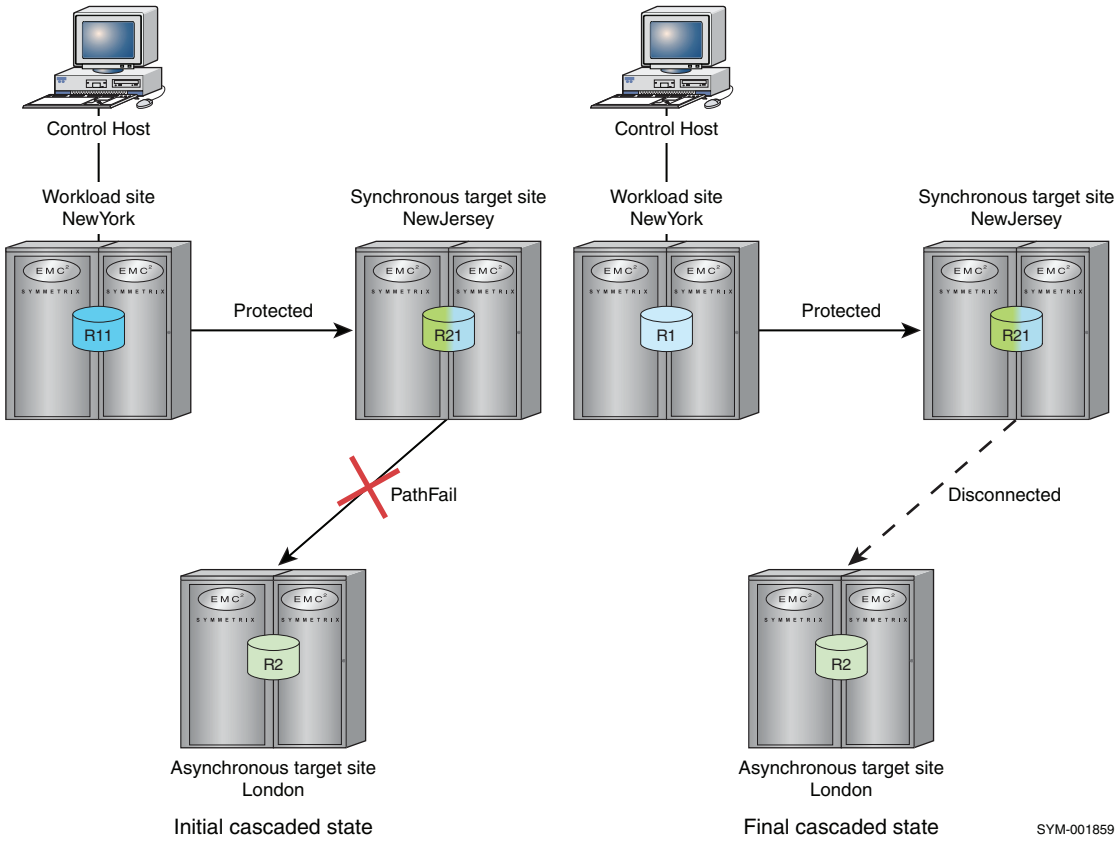

Figure 28 Resetting a cascaded asynchronous link fault transient

Initial recovery step

If the links from the workload to the asynchronous target are in the *TransmitIdle* state, issue the following command to get the asynchronous site to the *PathFail* state:

```
symstar -cg StarGrp disconnect -trip -site London
```

To recover from a *Protected* (NewJersey):*PathFail* (London):*Tripped* (STAR) state, use the following form of the `reset` command from the NewYork control host:

```
symstar -cg StarGrp reset -site London
```

Cascaded recovery from transient fault with reconfiguration

This section describes transient faults, when operating in cascaded SRDF/Star mode, which can be recovered by reconfiguring the path to the asynchronous target site.

Loss of links to asynchronous target site

When the asynchronous target site is no longer accessible, but the workload site is still operational and the asynchronous target site is accessible through the recovery SRDF group, you can reconfigure the SRDF/Star environment, and resynchronize data between

the workload site and the asynchronous target site to eventually achieve *direct* SRDF/A consistency protection between the workload site and the asynchronous target site. Figure 29 on page 77 shows an example with the workload site at `NewYork`.

Note: Performing this operation changes the STAR mode of operation from cascaded to concurrent.

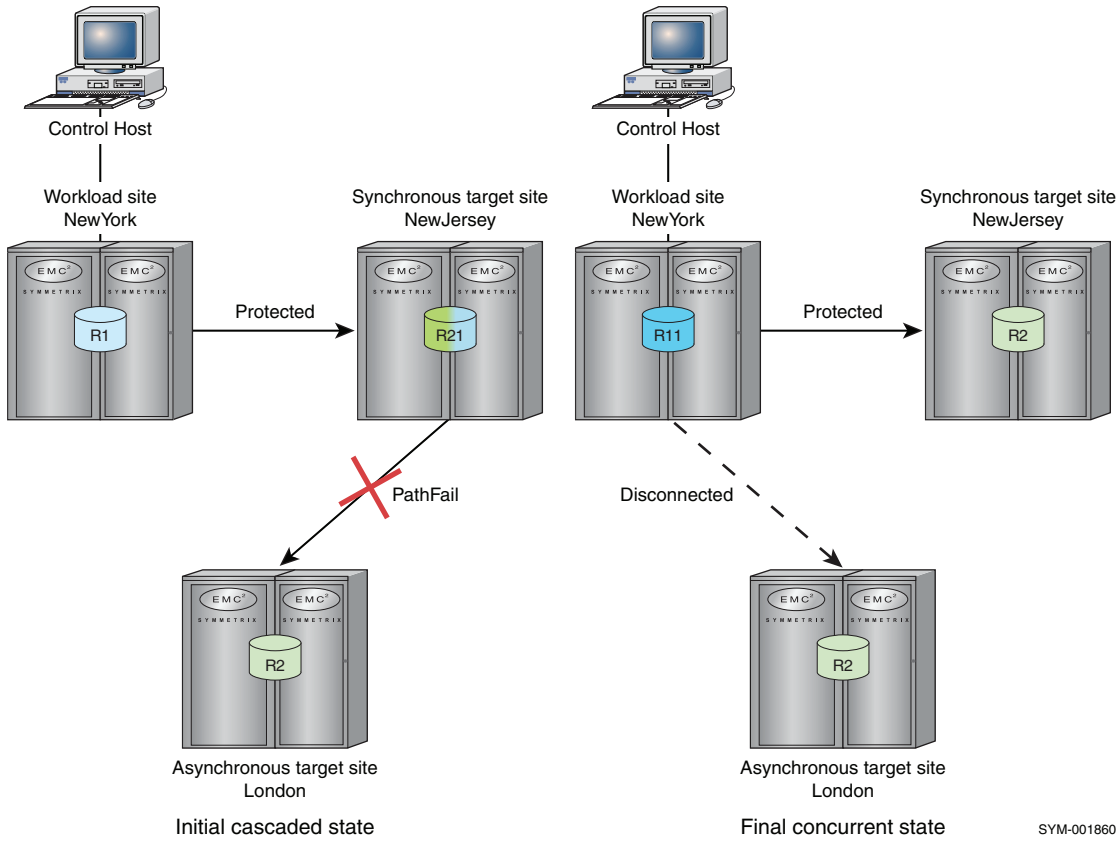

Figure 29 Reconfiguring to concurrent for a synchronous transient fault

Initial recovery step

To recover from a *Protected*(NewJersey):*PathFail*(London):*Tripped* (STAR) state, use the following `reconfigure` command from the NewYork control host:

```
symstar -cg StarGrp reconfigure -reset -site London -path NewYork:London
```

If the links from the workload site to the asynchronous target site are in the *TransmitIdle* state, issue the following command to get the asynchronous site to the *PathFail* state:

symstar -cg StarGrp disconnect -trip -site London

Note: If the system was not *STAR Protected*, differential resynchronization is not possible and you must use the `-full` option to perform full resynchronization.

Planned workload switch operations for cascaded SRDF/Star

This section describes the procedure for switching the production workload site to another site for maintenance or other reasons that permit the operation to be scheduled in advance.

This operation requires you to stop the workload at the current production site, halt the SRDF/Star environment (draining and synchronizing both remote sites in order for all three sites to have the same data), and then switching the production workload site to one of the remote sites.

If you switch the workload to the synchronous target site, you can transition the system to the STAR Protected state.

There is limited support for this configuration. When configured as cascaded SRDF with the workload at London, only the long-distance link can be protected. The short-distance link (NewJersey -> NewYork) can only be connected. SRDF/Star cannot be enabled at London.

At the end of the switch operation the system comes up in the same STAR mode of operation that was configured before the `switch` operation was initiated.

Example

In the following example, the SRDF/Star environment is operating in cascaded mode with the workload site at `NewYork`. The workload site needs to switch to the synchronous target site at `NewJersey`, as shown in Figure 30.

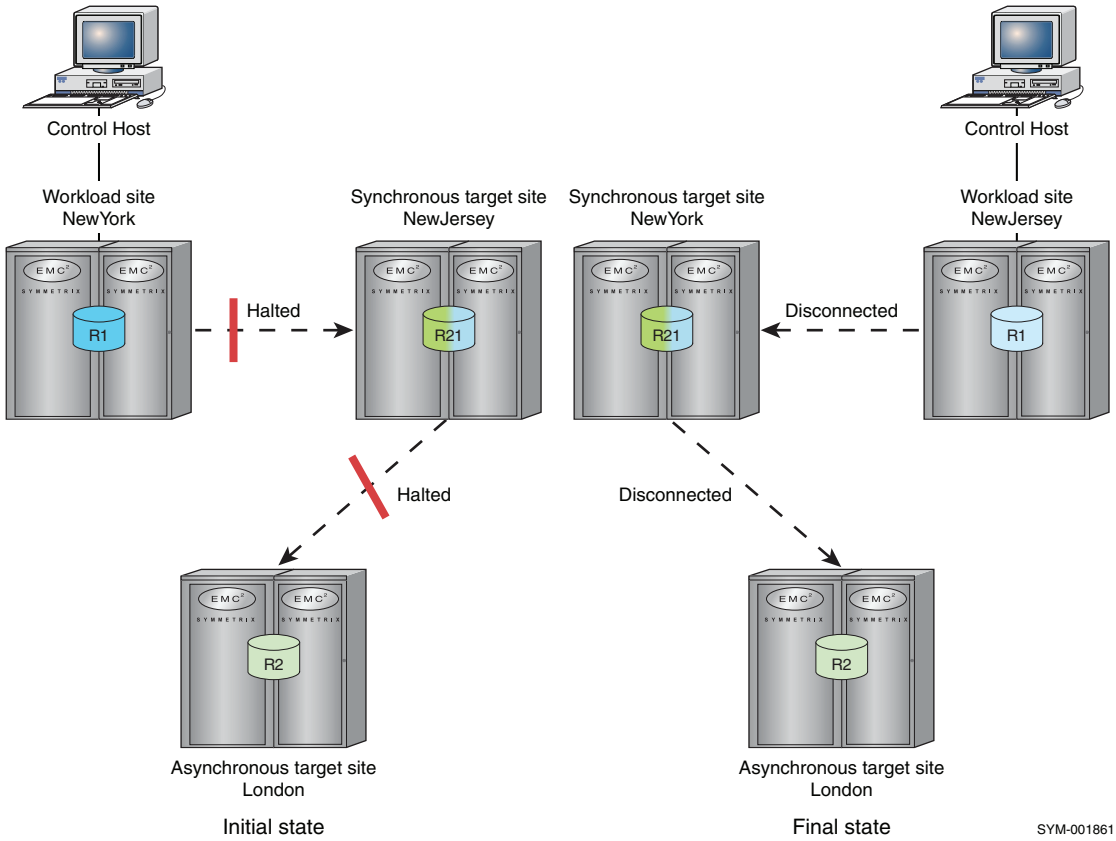

Figure 30 States before and after a planned switch operation

Perform the following steps to make the switch:

1. At the current workload site, halt the protected STAR operation:

   symstar -cg StarGrp halt

2. At the new workload site, execute the switch:

   symstar -cg StarGrp switch -site NewJersey

Note: The entire SRDF/Star environment can also be halted from a non-workload site.

Unplanned workload switch operations for cascaded SRDF/Star

This section describes the procedure for switching the workload site to the synchronous site because of an unplanned event, such as a hurricane, causing the current workload site to stop processing I/Os.

This type of operation assumes the system is STAR Protected.

Note: There is limited support when switching from `NewYork` to `London`. When configured as cascaded SRDF/Star with the workload at London, only the long-distance link can be protected. The short-distance link can only be connected. SRDF/Star cannot be enabled at London.

Unplanned switch to synchronous target site

This section describes the procedure to switch the workload site to the synchronous target site (`NewYork` to `NewJersey`) in the event of losing the current workload site. When operating in cascaded mode, data at the `NewJersey` site is always more current than the data at the London site. The `symstar` command does not allow the `London` site data to be retained when switching the workload to the `NewJersey` site.

Example

In the following example, the system is operating in cascaded mode at the `NewYork` workload site. A disaster takes place in `NewYork`, resulting in the loss of the workload site. A `switch` operation is performed to switch the workload site to `NewJersey`, as shown in Figure 31.

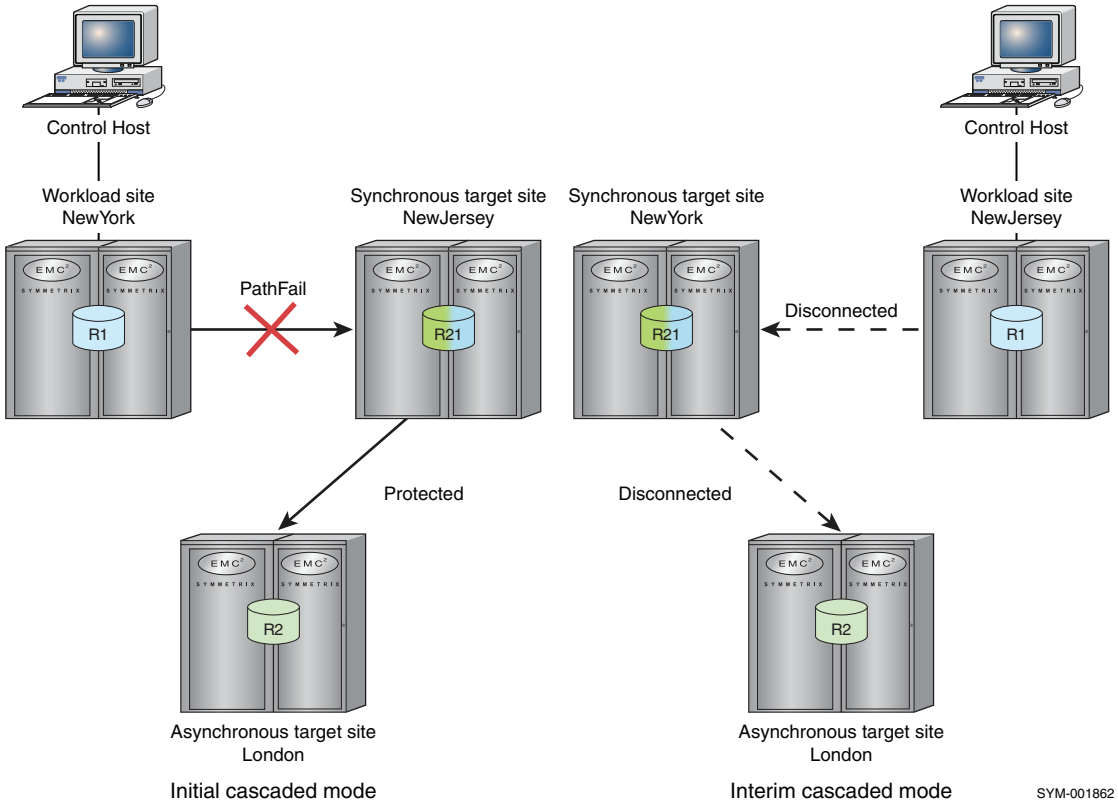

Figure 31 Switching the workload to NewJersey

At `NewJersey`, perform the following steps to make the switch:

1. If London is in a Protected state, issue a `disconnect` command:

```
symstar -cg StarGrp disconnect -trip -site London
```

2. If the disconnect leaves London in a CleanReq state, issue a `cleanup` command:

   `symstar -cg StarGrp cleanup -site London`

3. To complete the switch, issue a `switch` command:

   `symstar switch -cg StarGrp -site London -keep_data London`

   Note: At this time, obtain a TimeFinder/Clone or TimeFinder/Mirror copy, as explained in "Step 7: Adding BCV devices to the SRDF/Star configuration" on page 44.

Bring up SRDF/Star after switching to the synchronous target site

The `switch` operation (planned and unplanned) preserves the current STAR mode of operation. After the completion of the unplanned switch operation, all subsequent `symstar` commands assume you want to remain in cascaded mode. The data flows in a cascaded way from the `NewJersey` workload site to the `NewYork` synchronous target site onto the `London` asynchronous target site.

At this point, you can either bring up SRDF/Star in a cascaded mode or reconfigure the system to come up in concurrent mode. The following examples explain the steps required for each mode.

Example 1: Bring up SRDF/Star in cascaded mode (default)

In this example, the environment is configured to operate in cascaded mode with the workload at `NewYork`, the synchronous target site at `NewJersey`, and the asynchronous target site at `London`. The loss of `NewYork` site requires a manual unplanned `switch` operation to `NewJersey`.

In Figure 32 the NewJersey workload site is connected, and then protected with the other sites in the cascaded SRDF/Star configuration.

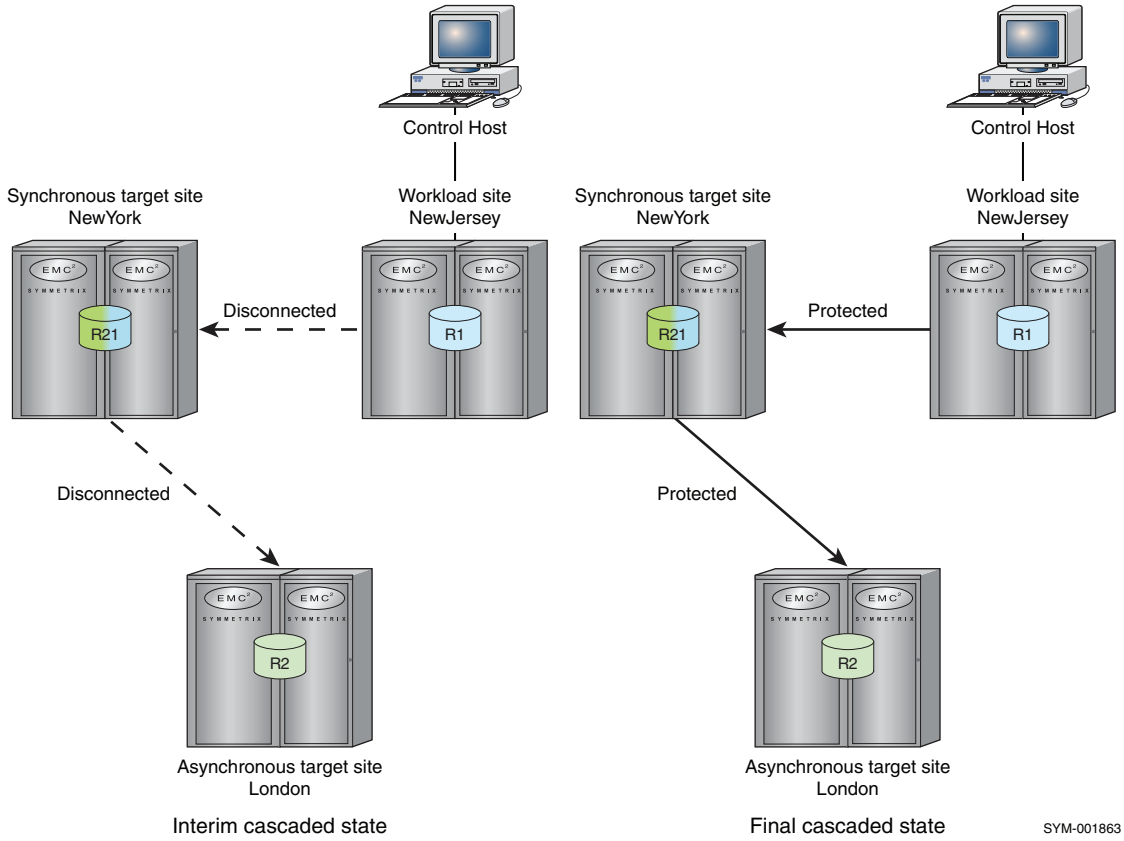

Figure 32 Switching the workload to NewJersey in a cascaded SRDF/Star setup

The following commands at the new workload site bring up the SRDF/Star environment in cascaded mode with the workload at `NewJersey`, the synchronous target site at `NewYork`, and the asynchronous target site at `London`:

```
symstar -cg StarGrp connect -site NewYork
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site NewYork
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

Example 2: Bring up SRDF/ Star in concurrent mode

The example in Figure 33 shows an environment operating in cascaded mode with the workload at `NewYork`, the synchronous target site at `NewJersey`, and the asynchronous target site at `London`. The loss of `NewYork` requires a manual unplanned switch to NewJersey.

In Figure 33 the `NewJersey` workload site is connected, and then protected to the other sites in the concurrent SRDF/Star configuration.

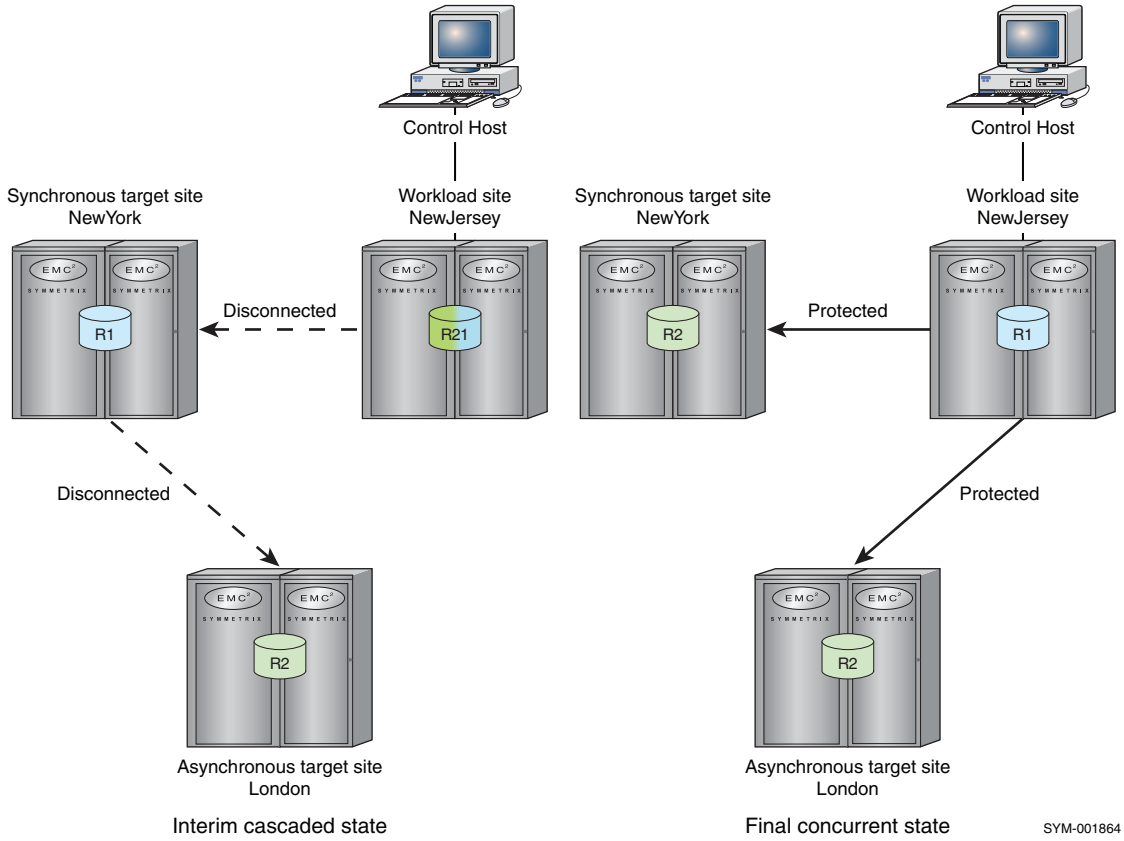

Figure 33 Switching the workload to NewJersey in a concurrent SRDF/Star setup

The following commands bring up the SRDF/Star environment in concurrent mode with the workload at `NewJersey`, the synchronous target site at `NewYork`, and the asynchronous target site at `London`:

```
symstar -cg StarGrp reconfigure -site London -path NewJersey:London
symstar -cg StarGrp connect -site NewYork
symstar -cg StarGrp connect -site London
symstar -cg StarGrp protect -site NewYork
symstar -cg StarGrp protect -site London
symstar -cg StarGrp enable
```

Unplanned switch to the asynchronous target site

This section describes the procedure that switches the workload site to the asynchronous target site (NewYork to London) in the event of a disaster at the workload site. As a result, you can retain data at London or NewJersey.

Unplanned switch to London

Figure 34 illustrates how the workload site switches to the current asynchronous target site, `London`. The data at `London` becomes the production workload, and `NewJersey` becomes the new asynchronous target site.

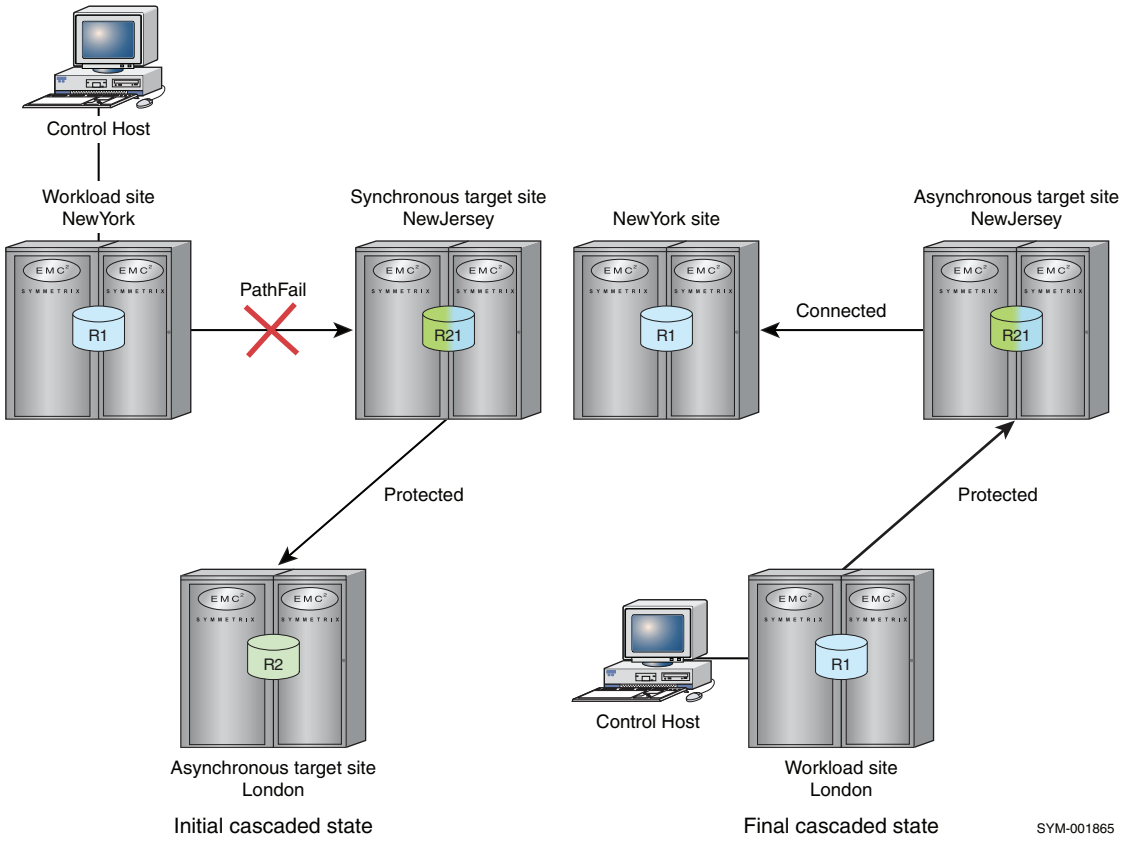

Figure 34 Switching workload to asynchronous London site

From the new workload site, perform the following steps to make the switch:

1. If `London` is in a Protected state, issue a `disconnect` command:

   ```
   symstar -cg StarGrp disconnect -trip -site London
   ```

2. If the `disconnect` leaves `London` in a CleanReq state, issue a `cleanup` command:

   ```
   symstar -cg StarGrp cleanup -site London
   ```

3. To complete the switch, issue a `switch` command:

   ```
   symstar switch -cg StarGrp -site London -keep_data London
   ```

4. To protect `NewJersey` after the switch, issue `connect` commands for `NewJersey` and `NewYork`, then the `protect` command for `NewJersey`:

   ```
   symstar -cg StarGrp connect -site NewJersey
   symstar -cg StarGrp connect -site NewYork
   symstar -cg StarGrp protect -site NewJersey
   ```

Note: At this time, obtain a TF/Clone or TF/Mirror copy, as explained in "Step 7: Adding BCV devices to the SRDF/Star configuration" on page 44.

To return to the original configuration with the workload site at `NewYork`, first enter a Halted state, then perform a planned switch to NewYork. See "Switch workload back from target site to original workload site" on page 74.

Unplanned switch to asynchronous target London

Figure 35 illustrates an unplanned switch to the asynchronous target site, `London`, while retaining data at `NewJersey`.

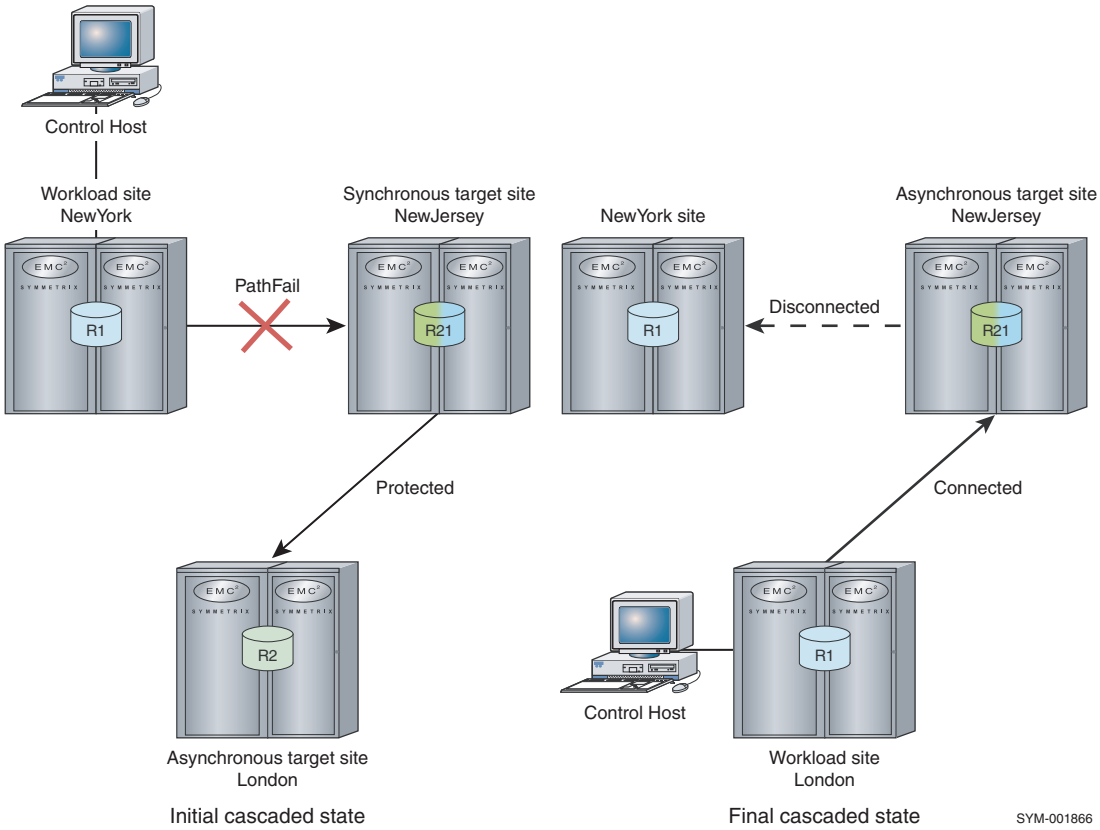

Figure 35 Switching to asynchronous London site while retaining the data at NewJersey

At the new workload site, perform the following steps to make the switch:

1. If `London` is in a Protected state, issue a `disconnect` command:

   ```
   symstar -cg StarGrp disconnect -trip -site London
   ```

2. If the disconnect leaves `London` in a CleanReq state, issue a `cleanup` command:

   ```
   symstar -cg StarGrp cleanup -site London
   ```

3. To complete the switch, issue the `switch` command:

   ```
   symstar switch -cg StarGrp -site London -keep_data NewJersey
   ```

Note: At this time, obtain a TF/Clone or TF/Mirror copy, as explained in "Step 7: Adding BCV devices to the SRDF/Star configuration" on page 44.

Planned reconfiguration of SRDF/Star mode of operation

This section describes the steps needed to reconfigure an existing SRDF/Star environment between concurrent SRDF and cascaded SRDF mode of operation. A planned reconfiguration of the STAR mode of operation is allowed from *Halted: Halted* state only and leaves the system in *Halted: Halted* state. When the workload site is at NewYork or NewJersey, you can only reconfigure the path to the asynchronous target site. When the workload site is at London, you can reconfigure the path to either the synchronous target site or the asynchronous target site.

Note: If you do not want to halt the workload site, another option is to inject an error, and then perform an Unplanned Reconfiguration. See "Reconfiguration without halting the workload site" on page 91 for details.

Reconfiguring cascaded mode to concurrent mode

As shown in Figure 36, you can reconfigure an existing SRDF/Star environment from cascaded to concurrent mode in a planned fashion.

To halt the SRDF/Star environment and reconfigure it, use the following entries:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site AsyncTargetSite
        -path WorkloadSite:AsyncTargetSite
```

Example 1: NewYork workload site

The example in Figure 36 shows the SRDF/Star environment is operating in cascaded mode with the workload at `NewYork`.

The following entries reconfigure this environment to operate in concurrent mode:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site London -path NewYork:London
```

Figure 36 illustrates the SRDF/Star configuration before and after the control operations.

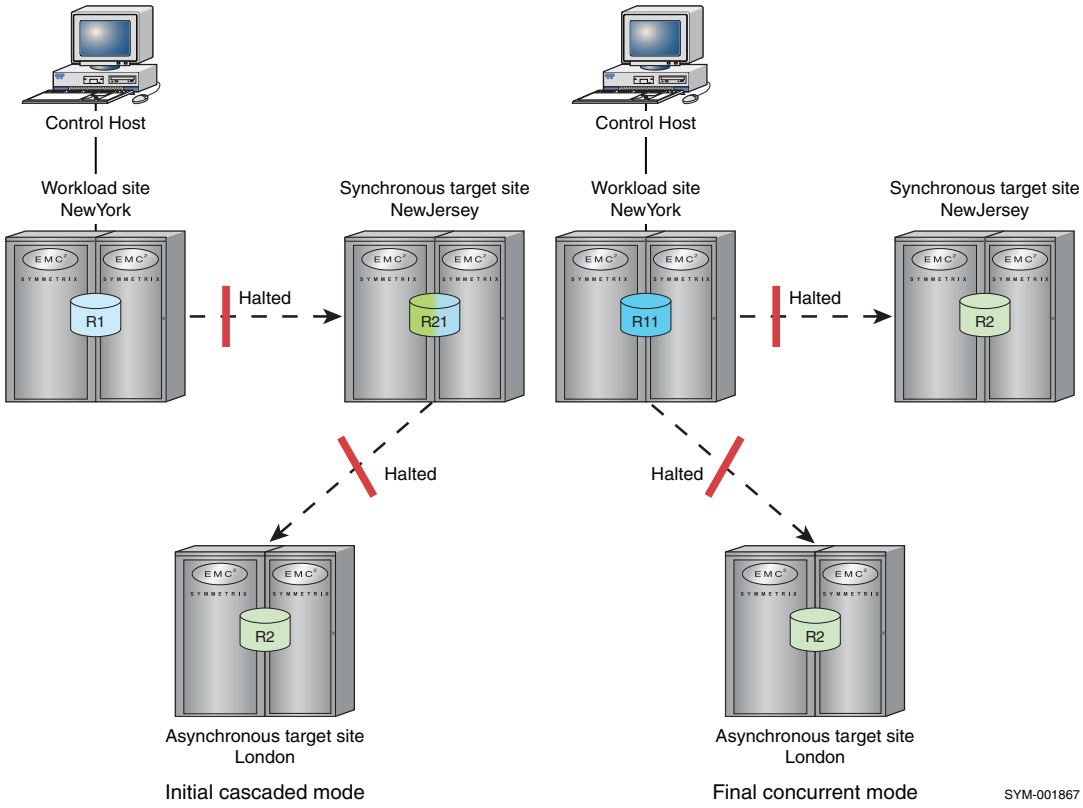

Figure 36 Reconfiguring SRDF/Star cascaded mode to concurrent mode

Example 2: London workload site

The example in Figure 37 shows the SRDF/Star environment is operating in cascaded mode with the workload at `London`. The following entries reconfigure this environment to operate in concurrent SRDF mode:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site NewYork -path London:NewYork
```

Figure 37 illustrates the SRDF/Star configuration before and after the control operations.

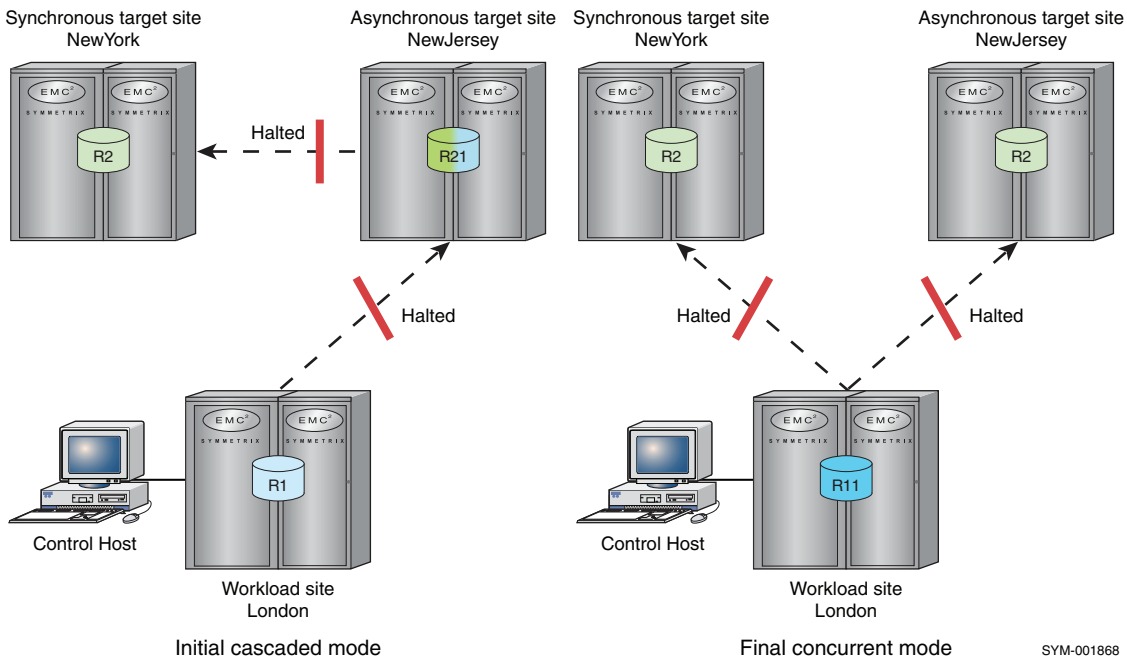

Figure 37 Reconfiguring SRDF/Star cascaded mode to concurrent mode

Reconfiguring the cascaded path (workload at London)

For this example, both remote target sites are long distance sites from `London`. The site directly connected to `London` is the asynchronous target site and the other site connected to the asynchronous target site is the synchronous target site. For example, if `London` is directly connected to `NewJersey`, then `NewJersey` is the asynchronous target site and `NewYork` is the synchronous target site. If `London` is directly connected to `NewYork`, then `NewYork` is the asynchronous target site and `NewJersey` is the synchronous target site.

You can reconfigure the path to the synchronous target site when the workload site is at `London`. Figure 38 shows two possible cascaded paths when the workload site is at `London`.

To halt the SRDF/Star environment and reconfigure it, use the following entries:

```
symstar -cg CG halt
symstar -cg CG reconfigure -site SyncTargetSite
      -path WorkloadSite:SyncTargetSite
      -remove WorkloadSite:AsyncTargetSite
```

Figure 38 illustrates the SRDF/Star configuration before and after the control operations.

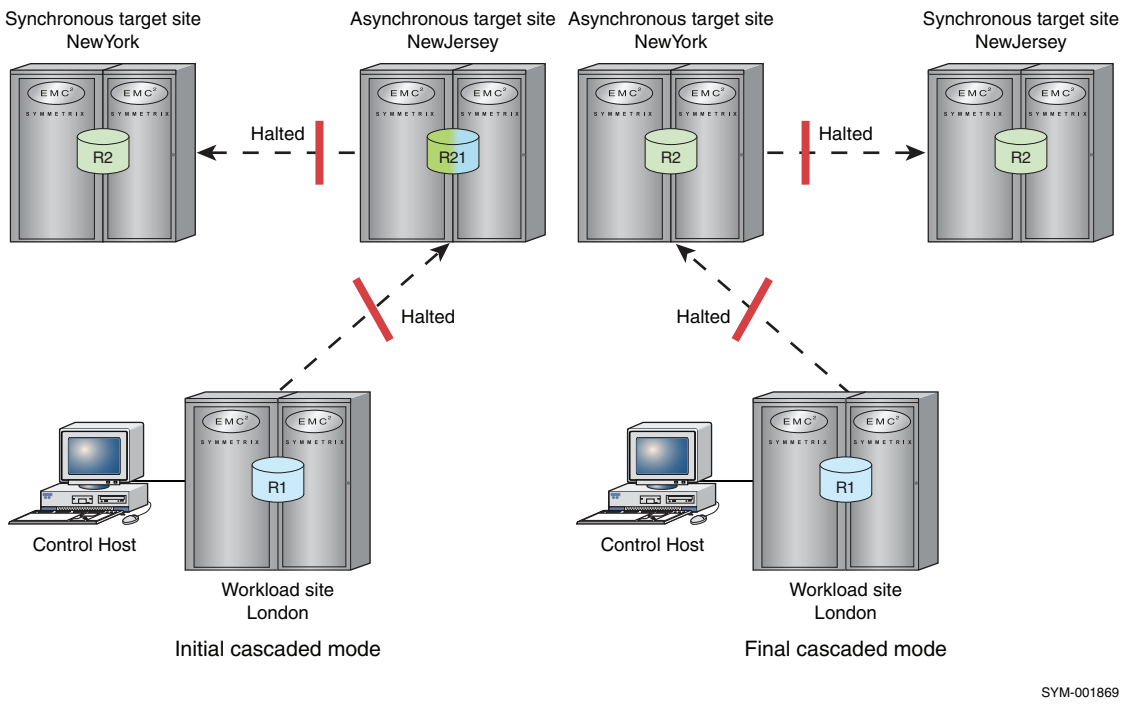

Figure 38 Reconfiguring the cascaded path to other target sites

Example

In the following example, the SRDF/Star environment is operating in cascaded mode with the workload at `London`, the asynchronous target site at `NewJersey`, and the synchronous target site at `NewYork`. To reconfigure the environment to operate in cascaded mode with the asynchronous target site at `NewYork` and the synchronous target site at `NewJersey`, use the following entries:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site NewYork
        -path London:NewYork
        -remove London:NewJersey
```

Reconfiguring concurrent mode to cascaded mode

This section describes the steps needed to reconfigure an existing SRDF/Star environment from concurrent to cascaded mode in a planned fashion.

To halt the SRDF/Star environment and reconfigure it, use the following entries:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site AsyncTargetSite
 -path SyncTargetSite:AsyncTargetSite
```

Example 1: NewYork workload site

The example in Figure 39 shows the SRDF/Star environment is operating in concurrent mode with workload at `NewYork`. To reconfigure this environment to operate in cascaded mode, use the following entries:

```
symstar -cg StarGrp halt
```

```
symstar -cg StarGrp reconfigure -site London -path NewJersey:London
```

Figure 39 illustrates the SRDF/Star configuration before and after the control operations.

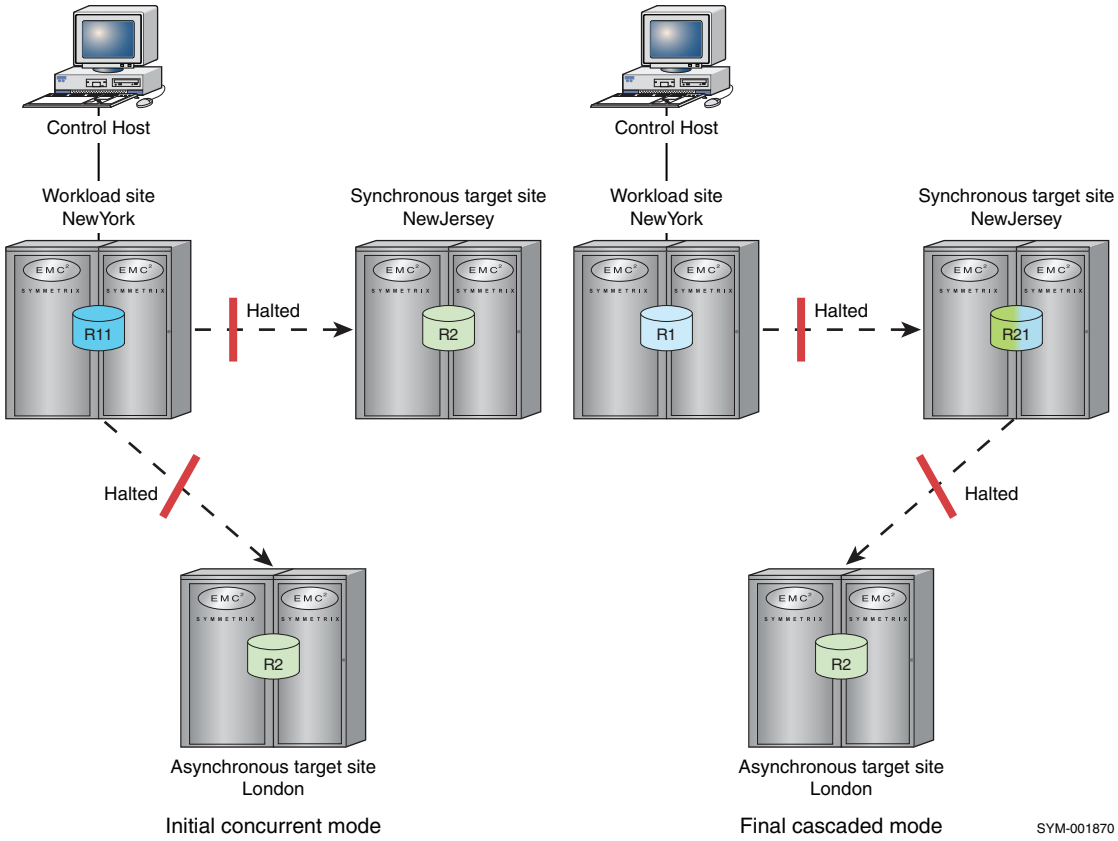

Figure 39 Reconfiguring concurrent mode to cascaded mode

Example 2: London workload site

The following example in Figure 40 shows the SRDF/Star environment is operating in concurrent SRDF mode with the workload at `London`. To reconfigure the environment to operate in cascaded mode, use the following entries:

```
symstar -cg StarGrp halt
symstar -cg StarGrp reconfigure -site NewYork -path
NewJersey:NewYork
```

Figure 40 illustrates the SRDF/Star configuration before and after the control operations.

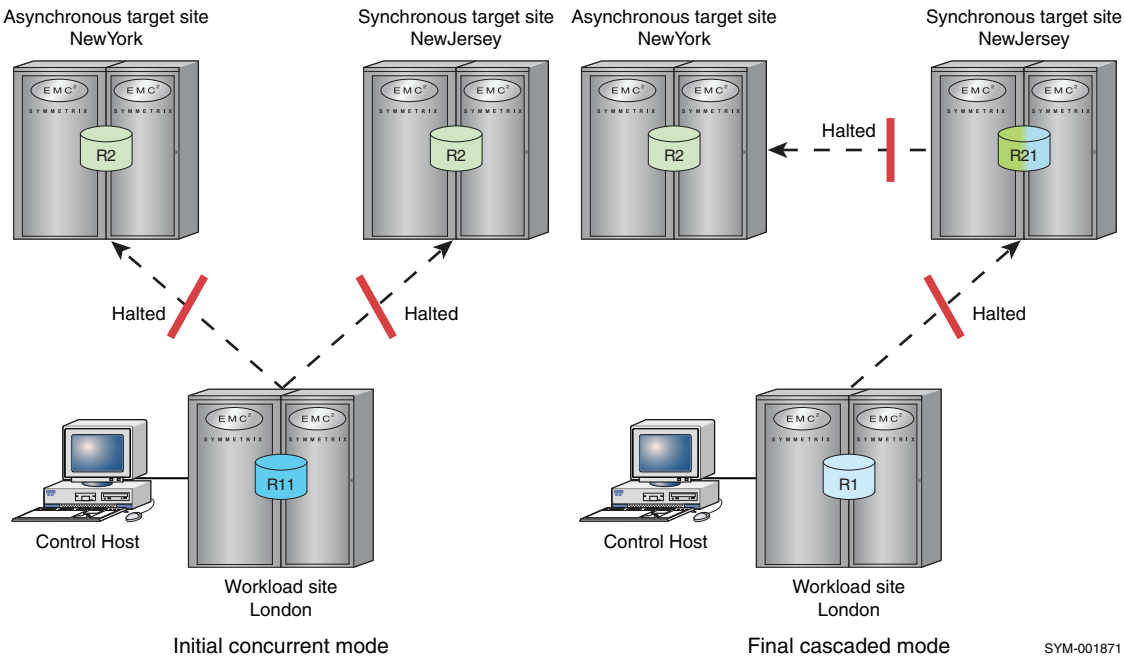

Figure 40 Reconfiguring SRDF/Star concurrent mode to cascaded mode

Reconfiguration without halting the workload site

This section describes the steps for performing an SRDF/Star reconfiguration without halting the workload site. Essentially, you inject an artificial error to suspend the SRDF links to the asynchronous target site, and then follow the steps outlined in "Cascaded recovery from transient fault with reconfiguration" on page 76.

Note: Performing this operation takes the system out of the "STAR Protected" state. Once reconfiguration is complete, bring the system back into STAR protection.

Reconfiguring cascaded mode to concurrent mode

In the following example, the SRDF/Star environment is operating in cascaded mode (Protected Sync, Protected Async, Protected STAR) with the workload at `NewYork`. The `symstar disconnect` drops the links between `NewJersey` and `London`, and `reconfigure` changes the mode to concurrent.

```
symstar -cg StarGrp disconnect -trip -site London
symstar -cg StarGrp reconfigure -reset -site London -path NewYork:London
```

Note: Always follow `-trip` with `reconfigure -reset`.

Reconfiguring concurrent mode to cascaded mode

In the following example, the SRDF/Star environment is operating in concurrent mode (Protected Sync, Protected Async, Protected Star) with the workload at `NewYork`. The `symstar disconnect` drops the links between `NewYork` and `London`, and `reconfigure` changes the mode to cascaded.

```
symstar -cg StarGrp disconnect -trip -site London
symstar -cg StarGrp reconfigure -reset -site London -path NewJersey:London
```

Defining an SRDF/Star configuration with R22 devices

You are responsible for creating the SRDF pair relationships and the setup of the SRDF/Star R22 environment as follows:

1. When creating an SRDF/Star configuration with R22 devices, review the following:
   - All devices at the workload site must be configured as concurrent (R11) devices with one mirror paired with the R2 mirror of the remote R21 device (sync target site) and the other mirror paired with an R2 mirror of the remote R22 device (asynchronous target site).
   - All devices at the sync target site must be configured as R21 devices paired with an R1 remote partner at the workload site and an R2 remote partner at the asynchronous target site.
   - All devices at the asynchronous target site must be configured as R22 devices paired with an R21 remote partner at the sync target site and an R11 remote partner at the workload site.
2. Create the appropriate RDF1 composite group (CG), adding the devices to the CG, setting RDFG names, etc. Note that in contrast to other SRDF/Star configurations, recovery SRDF groups do not need to be set in the CG for concurrent configurations.
3. Once the configuration is ready, execute the `symstar setup` command using the `-opmode` option to choose either `concurrent` or `cascaded` operation.

The `symstar setup` command is allowed if the following SRDF pair states are Suspended, Synchronized, and SyncInProg (workload to sync target, workload to asynchronous target, or workload to sync target, sync target to asynchronous target site). For example:

```
symstar -cg StarGrp setup -options MyOptnFile.txt -opmode concurrent

A STAR Setup operation is
in progress for composite group StarGrp. Please wait...

Setup ...............................................Started
Reading options file options.txt ....................Started
Reading options file options.txt ....................Done
Analyzing Host Composite Grp: r22cg .................Started
Syncing    Symmetrix information ....................Started
Syncing    Symmetrix information ....................Done
Gathering  Symmetrix SID: 000192600077 RDFG: 66......Started
Gathering  Symmetrix SID: 000192600077 RDFG: 66......Done
Gathering  Symmetrix SID: 000192600077 RDFG: 67......Started
Gathering  Symmetrix SID: 000192600077 RDFG: 67......Done
...
Distributing setup information to remote sites ......Started
Distributing setup information to remote sites ......Done
```

```
Update persistent state information .................Started
Update persistent state information .................Done
Setup ...............................................Done
```

Options file settings

To use R22 devices in an SRDF/Star environment, the STAR compatibility mode must be set to v70 (the default value) as described in "Step 4: Creating the SRDF/Star options file" on page 41. If set to v70, this option enables the Star State Tracking feature required to support R22 devices.

Upgrading an existing SRDF/Star environment to support R22 devices

You can upgrade or transition an existing SRDF/Star environment to employ R22 devices provided the current SRDF/Star environment is operating in normal condition. For example, all sites must be reachable and the relationships between the workload site and target sites must be properly configured. To do this, use the `symstar configure` command from the workload site:

```
symstar -cg CgName configure -add recovery_rdf_pairs
     [-opmode concurrent|cascaded]
```

This command is allowed from the workload site only while in the following states:

- Disconnected/Connected/Halted (to sync target site) and
- Disconnected/Connected/Halted (to asynchronous target site)

Both target sites are left in the same states as they were in when the `configure` command was issued.

For example, to immediately upgrade SRDF/Star to use R22 devices:

```
symstar -cg StarGrp configure -add recovery_rdf_pairs -opmode cascaded

A STAR Configure operation is
in progress for composite group StarGrp. Please wait...

Configure: Adding Recovery RDF Pairs................. Started
Update persistent state information ................. Started
Update persistent state information ................. Done
SA Write Disable Devs SID:000192600090............... Started
SA Write Disable Devs SID:000192600090............... Done
Createpair SID:000192600083 RDFG:114................. Started
Createpair SID:000192600083 RDFG:68.................. Started
Createpair SID:000192600083 RDFG:114................. Done
Createpair SID:000192600083 RDFG:68.................. Done
SA Write Enable Devs SID:000192600090................ Started
SA Write Enable Devs SID:000192600090................ Done
Distributing setup information to remote sites .......Started
Distributing setup information to remote sites .......Done
Update persistent state information ................. Started
Update persistent state information ................. Done
Configure: Adding Recovery RDF Pairs ................ Done
```

The show and query output

The following highlighted field in the `symstar show` output indicates R22 devices are configured as the recovery SRDF pairs.

```
Composite Group Name    : StarGrp

   Recovery RDF Pairs Configured   : Yes

    Site SiteA to site SiteB Information:
```

When performing a `query` action and `configure` was the last control action by `symstar`, the last Action Performed value is set to `ConfigureAddRcvryRDFPair` as the following shows:

```
symstar -cg CgName query

...
Last Action Performed           :ConfigureAddRcvryRDFPair
Last Action Status              :Successfull
Last Action timestamp           :03/15/2008_12:29:37
```

Setting up SRDF/Star with EDP

These are the requirements for an SRDF/Star environment using EDP:

- Symmetrix arrays running Enginuity 5773.150 or higher at the synchronous/diskless target site.
- All devices at the synchronous target site must be configured as diskless R21 devices with the R2 mirror paired with the R1 mirror of the device at the workload site, and the R1 mirror paired with the R2 mirror of the device at the asynchronous target site.

Requirements when not using R22 devices:

- Enginuity 5773 or higher at the workload site (Site A).
- Enginuity 5773 or higher at the asynchronous/non-diskless target site (Site C).
- All devices at the workload site must be configured as R1 devices paired with the R2 mirror of the diskless R21 device at the synchronous target site.
- All devices at the asynchronous target site must be configured as R2 devices paired with the R1 mirror of the diskless R21 device at the synchronous target site.

Requirements for using R22 devices:

- Symmetrix arrays running Enginuity 5773.150 or higher are required at all three sites.
- All devices at the workload site must be configured as concurrent (R11) devices with one mirror paired with the R2 mirror of the diskless R21 device at the synchronous target site and the other mirror paired with the R2 mirror of the R22 device at the asynchronous target site.
- All devices at the asynchronous target site must be configured as R22 devices with one mirror paired with the R1 mirror of the diskless R21 device at the synchronous target site and the other mirror paired with the R1 mirror of the R11 device at the workload site.

Follow these step to define an SRDF/Star with diskless R21 devices:

1. Create the SRDF pair relationships.
2. Create the appropriate RDF1 composite group (CG), adding the devices to the CG, setting the RDFG names and recovery SRDF groups.
3. Once the configuration is ready, execute the `symstar setup` command.

Note: The `symstar setup` command is only allowed from the following SRDF pair states only: Suspended/ Synchronized / SyncInProg (workload to sync target, sync target to asynchronous target site)

Options file settings

To use the EDP (diskless) R21 feature, the STAR compatibility mode must be set to v70 (the default value) as described in "Step 4: Creating the SRDF/Star options file" on page 41. If set to v70, this option enables the new Star State Tracking feature required to support R21devices, and is required in an environment using concurrent R2 devices.

The diskless show output

The `Diskless Device Site` field in the `symstar show` output shows the diskless target site name if one exists. If there is no diskless target site, the value is N/A.

```
symstar show StarGrp

Composite Group Name          : StarGrp

Recovery RDF Pairs configured : Yes
Diskless Device Site          : SiteB

    Site SiteA to site SiteB Information:
```

Limitations and restrictions

Table 11 on page 96 and Table 12 on page 97 list all possible pair states when operating with diskless R21 devices with the workload at Site A. Table 13 on page 98 lists all possible states when operating with diskless R21 devices with the workload at Site C.

The following are the highlights of limitations and restrictions that are documented in detail in the tables:

- When the workload site is at Site A, the `symstar connect` command on the synchronous target site is allowed only if the asynchronous target site is in the Connected state. In other words, the asynchronous target site must be brought to the Connected state before attempting to connect to the synchronous target site.
- The `symstar isolate` command is not allowed on the synchronous/diskless target site (Site B).
- The `symstar isolate` command is allowed on the asynchronous target site only if the synchronous/diskless target site is in PathFail or Disconnected state. It is recommended to always use the `symstar disconnect -trip` command to transition the synchronous/diskless target site from Protected to PathFail state. The `-trip flag` performs a consistent suspend guaranteeing a consistent image of data at the target site at the end of the command.

- The `symstar switch` command, both planned and unplanned, is not allowed on the synchronous/diskless target site.
- The unplanned `symstar switch` command on the asynchronous target site is allowed but you are only allowed to keep the local (in other words, asynchronous target) data.
- When the STAR mode of operation is concurrent SRDF, the `symstar connect` command to diskless R21 site will not be allowed.
- When the STAR mode of operations is concurrent SRDF, The `symstar halt` command is allowed from these states:
  - Connected (Non-Diskless Target Site):Disconnected (Diskless Target Site)
  - Protected (Non-Diskless Target Site):Disconnected (Diskless Target Site)
- If SRDF connectivity is lost between the synchronous/diskless target site and the asynchronous target site, Enginuity drops the SRDF links between the workload site and the synchronous/diskless target site. This means that a change in the SRDF link state of synchronous/diskless to the asynchronous target site may impact the site state for both target sites. For example, if the initial state was Connected:Connected, a loss of connectivity between sites B and C leaves the state in Disconnected:Disconnected state.

The Allowed actions SRDF/Star CG column in the following tables displays the state number in parenthesis that results when the action is executed, such as Setup(1). If the action results in transitioning to a state represented in another table, then (Table #(#)) is prefixed to this number, such as (Table 13 on page 98(1)).

Table 11 States and commands: cascaded operation with workload at site A (page 1 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed actions sync/diskless target site	Allowed actions async target site	Allowed actions SRDF/Star CG
1	Disconnected	Disconnected	Unprotected	-	Connect(2) Reconfigure -full (Table 12 on page 97(1))	Setup(1)
2	Disconnected	Connected	Unprotected	Connect(6)	Disconnect(1)	Setup(2)
3	Disconnected	Isolated	Unprotected	-	Disconnect(1)	-
4	Disconnected	Protected	Unprotected	-	Unprotect(2) Disconnect(1) Disconnect -trip(5) Isolate - force(3)	
5	Disconnected	Pathfail	Unprotected	-	Reset(1) Reconfigure -reset -full (Table 12 on page 97 (1))	
6	Connected	Connected	Unprotected	Disconnect(2) Protect(7)		Halt(14) Setup(6)
7	Protected	Connected	Unprotected	Unprotect(6) Disconnect(2)	Protect(8)	Halt(14)
8	Protected	Protected	Unprotected	Disconnect(4) Disconnect -trip(9)	Unprotect(7)	Halt(14) Enable(15)

Table 11 States and commands: cascaded operation with workload at site A (page 2 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed actions sync/diskless target site	Allowed actions async target site	Allowed actions SRDF/Star CG
9	Pathfail	Protected	Unprotected	Reset(4)	Unprotect(13) Disconnect(12) Disconnect -trip(11) Isolate(10)	-
10	Pathfail	Isolated	Unprotected	Reset(3)	Disconnect(12)	-
11	Pathfail	Pathfail	Unprotected	Reset(5)	Reset(12) Cleanup(11) Reconfigure -reset -full (Table 12 on page 97 (9))	-
12	Pathfail	Disconnected	Unprotected	Reset(1)	Connect(13) Reconfigure -full (Table 12 on page 97(9))	
13	Pathfail	Connected	Unprotected	Reset(2)	Protect(9) Disconnect(12)	-
14	Halted	Halted	Unprotected	-	Reconfigure (Table 12 on page 97(11))	Halt -reset(1) Switch to Site C (Table 13 on page 98(1))
15	Protected	Protected	Protected	Disconnect -trip(16)		Disable(8) Halt(14)
16	Pathfail	Protected	Tripped	Reset(4)	Disconnect -trip(17)	Disable(9)
17	Pathfail	Pathfail	Tripped	Reset(5)	Reset(12) Cleanup(17) Reconfigure -reset (Table 12 on page 97 (9))	Disable(11) Unplanned Switch to Site C (Table 13 on page 98(1))

Table 12 States and commands: concurrent operation with workload at site A (page 1 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed actions sync/diskless target site	Allowed actions async target site	Allowed actions SRDF/Star CG
1	Disconnected	Disconnected	Unprotected	-	Connect(2) Reconfigure -full (Table 28 (1))	-
2	Disconnected	Connected	Unprotected	-	Disconnect(1) Protect(4)	Halt(11)
3	Disconnected	Isolated	Unprotected	-	Disconnect(1)	-
4	Disconnected	Protected	Unprotected	-		Halt(11)
5	Disconnected	Pathfail	Unprotected	-	Reset(1) Reconfigure -reset -full (Table 11 on page 96 (1))	-
6	Pathfail	Protected	Unprotected	Reset(4)	Unprotect(10) Disconnect(9) Disconnect -trip(8) Isolate(7)	-
7	Pathfail	Isolated	Unprotected	Reset(3)	Disconnect(9)	-

Table 12 States and commands: concurrent operation with workload at site A (page 2 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed actions sync/diskless target site	Allowed actions async target site	Allowed actions SRDF/Star CG
8	Pathfail	Pathfail	Unprotected	Reset(5)	Reset(9) Cleanup(8) Reconfigure -reset -full (Table 11 on page 96 (12))	-
9	Pathfail	Disconnected	Unprotected	Reset(1)	Connect(10) Reconfigure -full (Table 11 on page 96(12))	-
10	Pathfail	Connected	Unprotected	Reset(2)	Protect(6) Disconnect(9)	Halt(11)
11	Halted	Halted	Unprotected	-	Reconfigure (Table 11 on page 96 (14))	Halt -reset(1) Switch to Site C (Table 14 on page 98)

Table 13 States and commands: cascaded SRDF operation with workload at site C

State #	Sync/diskless target state	Async target state	Star state	Allowed actions sync/diskless target site	Allowed actions async target site	Allowed actions Star CG
1	Disconnected	Disconnected	Unprotected		Connect(2) Reconfigure (Table 14(1))	
2	Disconnected	Connected	Unprotected	Connect(3)	Disconnect(1)	
3	Connected	Connected	Unprotected	Disconnect(2)		Halt(4)
4	Halted	Halted	Unprotected			Halt -reset (1) Switch (Table 11 (1))

Table 14 States and commands: concurrent operation with workload at site C (page 1 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed action(s) sync/diskless target site	Allowed action(s) async target site	Allowed action(s) SRDF/Star CG
1	Disconnected	Disconnected	Unprotected	-	Connect(2)	
2	Disconnected	Connected	Unprotected	-	Disconnect(1) Protect(4)	Halt(6)
3	Disconnected	Isolated	Unprotected	-	Disconnect(1)	-

Table 14 States and commands: concurrent operation with workload at site C (page 2 of 2)

State #	Sync/diskless target state	Async target state	SRDF/Star state	Allowed action(s) sync/diskless target site	Allowed action(s) async target site	Allowed action(s) SRDF/Star CG
4	Disconnected	Protect	Unprotected	-	Unprotected(2) Disconnect(1) Disconnect(-trip(5) Isolate -force(3)	Halt(6)
5	Disconnected	Pathfail	Unprotected	-	Reset(1)	
6	Halted	Halted	Unprotected	-		Halt -reset (1) Switch(1)

Disaster recovery procedures

The SRDF/Star environment supports the existing fault management procedures for both transient and disaster faults, within the confines of the limitations and restrictions listed previously.

The following is a sample use case for a disaster fault:

CgName:	StarGrp
Star mode of operation:	Cascaded SRDF
Workload site name:	NewYork
Sync/diskless target site name:	NewJersey
Async target site name:	London
Fault description:	Loss of the Workload Site (NewYork)
System state:	The table below shows the system state before fault and at the time of fault.

Table 15 System states

Pre-fault state			Fault state		
Sync/diskless target site state (SiteB)	Async target site state (SiteC)	Star state	Sync/diskless target site state (SiteB)	Async target site state	Star state
Protected	Protected	Protected	Pathfail	Protected	Tripped

Recovery procedure following the fault

The workload site (currently at `NewYork`) needs to be moved to the asynchronous target site (`London`) using the following steps:

1. The `symstar switch` command is not allowed if the asynchronous target site (`London`) is not in Pathfail state. The following command transitions the site to Pathfail state:

   ```
   symstar -cg StarGrp disconnect -trip -site London
   ```

   Note: This command "drains" all the data that was "in-flight" from the synchronous target site to the asynchronous target site at the time of the loss of the workload site. The drain operation consists of performing an RDF-MSC cycle switch if needed, and waiting for the data to synchronize between the two sites. This may result in a longer runtime for the `disconnect -trip` operation.

2. The next step is to perform an unplanned `symstar switch` command on the asynchronous target site (`London`) using the following command:

   ```
   symstar -cg StarGrp switch -site London -keep_data London
   ```

3. Once the workload site is moved to `London` and `NewYork` is recovered, "connect" to `NewYork` to achieve remote data replication. To do this, follow these steps:

   a. Reconfigure the STAR mode of operation to concurrent to "connect" to `NewYork` using the following command:

   ```
   symstar -cg StarGrp reconfigure -site NewYork
   -path London:NewYork
   ```

b. Once the STAR mode of operation is reconfigured to concurrent mode, “connect” to `NewYork` using the following command:

```
symstar -cg StarGrp connect -site NewYork
```

4. Protect the data at the workload site by transitioning NewYork to the Protected state using the following command:

```
symstar -cg StarGrp protect -site NewYork
```

Switching back to the original workload site

To switch back to the original workload site in cascaded mode, follow these steps:

1. Halt the workload site (`NewYork`) using the following command:

```
symstar -cg StarGrp halt
```

2. Perform a `reconfigure` to return to the original cascaded mode. The following switch command moves the workload back to `NewYork`, resulting in the cascaded mode:

```
symstar -cg StarGrp reconfigure -site NewYork -path
NewJersey:NewYork
```

3. Perform a planned switch back to the original workload site (`NewYork`) using the following command on `NewYork`:

```
symstar -cg StarGrp switch -site NewYork
```

Note: At the end of the `symstar switch` command, the STAR mode of operation is cascaded.

Achieving STAR protection

To achieve SRDF/Star protection, follow these steps:

1. Connect the asynchronous target site (`London`) using the following command:

```
symstar -cg StarGrp connect -site London
```

2. Connect the synchronous/diskless target site (`NewJersey`) using the following command:

```
symstar -cg StarGrp connect -site NewJersey
```

3. Protect the synchronous/diskless target site (`NewJersey`) using the following command:

```
symstar -cg StarGrp protect -site NewJersey
```

4. Protect the asynchronous target site (`London`) using the following command:

```
symstar -cg StarGrp protect -site London
```

5. Enable STAR protection using the following command:

```
symstar -cg StarGrp enable
```

CHAPTER 3
Implementing Concurrent SRDF/Star

This chapter provides examples of setting up and managing concurrent SRDF/Star configurations. This chapter provides the following examples:

- Example 1: Setting up an SRDF/Star configuration 104
- Example 2: Responding to a transient fault on the async link..... 116
- Example 3: Switching to the sync target site after a disaster fault 125
- Example 4: Isolating the sync target site temporarily 132
- Example 5: Performing a planned workload switch to the sync site 140
- Example 6: Switching the workload back to the original workload site 155
- Example 7: Disabling SRDF/Star for a device reconfiguration 169
- Example 8: Dynamically modifying a concurrent SRDF/Star CG 174

The commands in this chapter were executed using Solutions Enabler V7.2 and higher.

Example 1: Setting up an SRDF/Star configuration

The SRDF/Star hardware configuration consists of the following:

- NewYork workload site on Symmetrix 198 using R1 concurrent devices
- NewJersey site on Symmetrix 256 using R2 devices in synchronous mode
- London site on Symmetrix 321 using R2 devices in asynchronous mode

Commands are executed from a control host at the workload site.

Although optional (and not shown in this example), it is strongly recommended that you add BCVs at the sync and async target sites for mirroring R2 data. The BCVs retain a consistent restartable image of the R2 data volumes during periods of resynchronization between the sites (refer to "Step 7: Adding BCV devices to the SRDF/Star configuration" on page 44).

- The `symcg create` command creates a composite group named `StarProd` of RDF1 type. The `-rdf_consistency` parameter adds `StarProd` to the consistency database for SRDF/Star consistency protection.

  ```
  symcg create StarProd -type rdf1 -rdf_consistency
  ```

- The following commands add all devices from the four SRDF groups that represent the concurrent links for the SRDF/Star configuration to `StarProd`. With concurrent R1 devices, the command that adds one concurrent link (for example, SRDF group 90) actually adds both concurrent links (four concurrent R1 devices belonging to the synchronous SRDF group 90 and asynchronous SRDF group 110). The second command adds four concurrent R1 devices belonging to the synchronous SRDF group 91 and asynchronous SRDF group 111. The `symcg show` command that follows on the next page displays this configuration.

  ```
  symcg -cg StarProd -rdfg 90 -sid 198 addall dev
  symcg -cg StarProd -rdfg 91 -sid 198 addall dev
  ```

- The `symcg set -name` commands create the two SRDF group names required for the SRDF/Star configuration. This example uses the name `NewJersey` for synchronous SRDF groups 90 and 91 on the workload Symmetrix 198. It uses the name `London` for the asynchronous SRDF groups 110 and 111. The parameter `-recovery_rdfg` adds a corresponding unique *recovery* SRDF group at the remote site for each *source* SRDF group that you added to the composite group. For example, SRDF group 102 is an empty static or dynamic group configured on the remote Symmetrix 256 as the recovery group for SRDF group 90.

```
symcg -cg StarProd set -name NewJersey -rdfg 198:90 -recovery_rdfg 102
symcg -cg StarProd set -name NewJersey -rdfg 198:91 -recovery_rdfg 103
symcg -cg StarProd set -name London -rdfg 198:110 -recovery_rdfg 104
symcg -cg StarProd set -name London -rdfg 198:111 -recovery_rdfg 105
```

- The following `symcg show` command displays the contents of the `StarProd` composite group as it was created and configured using the preceding commands:

```
symcg show StarProd

Composite Group Name:  StarProd

  Composite Group Type                                  : RDF1
  Valid                                                 : Yes
  CG in PowerPath                                       : No
```

```
CG in GNS                                          : Yes
RDF Consistency Protection Allowed                 : Yes
RDF Consistency Mode                               : NONE
Concurrent RDF                                     : Yes
Cascaded RDF                                       : No

Number of RDF (RA) Groups                          :    4
Number of STD Devices                              :    8
Number of CRDF STD Devices                         :    8
Number of BCV's (Locally-associated)               :    0
Number of VDEV's (Locally-associated)              :    0
Number of TGT's Locally-associated                 :    0
Number of CRDF TGT Devices                         :    0
Number of RVDEV's (Remotely-associated VDEV)       :    0
Number of RBCV's (Remotely-associated STD-RDF)     :    0
Number of BRBCV's (Remotely-associated BCV-RDF)    :    0
Number of RRBCV's (Remotely-associated RBCV)       :    0
Number of RTGT's (Remotely-associated)             :    0
Number of Hop2 BCV's (Remotely-assoc'ed Hop2 BCV)  :    0
Number of Hop2 VDEV's (Remotely-assoc'ed Hop2 VDEV):    0
Number of Hop2 TGT's (Remotely-assoc'ed Hop2 TGT)  :    0
Number of Device Groups                            :    0
Device Group Names                                 : N/A

Number of RDFG Names (2):
  {

  1) RDFG Name                                     : NewJersey
     Consistency Mode                              : NONE

  2) RDFG Name                                     : London
     Consistency Mode                              : NONE
  }

Number of Symmetrix Units (1):
  {

  1) Symmetrix ID                                   : 000192600198
     Microcode Version                              : 5875
     Number of STD Devices                          :    8
     Number of CRDF STD Devices                     :    8
     Number of BCV's (Locally-associated)           :    0
     Number of VDEV's (Locally-associated)          :    0
     Number of TGT's Locally-associated             :    0
     Number of CRDF TGT Devices                     :    0
     Number of RVDEV's (Remotely-associated VDEV)   :    0
     Number of RBCV's (Remotely-associated STD_RDF) :    0
     Number of BRBCV's (Remotely-associated BCV-RDF):    0
     Number of RTGT's (Remotely-associated)         :    0
     Number of RRBCV's (Remotely-associated RBCV)   :    0
     Number of Hop2BCV's (Remotely-assoc'ed Hop2BCV):    0
     Number of Hop2VDEVs(Remotely-assoc'ed Hop2VDEV):    0
     Number of Hop2TGT's (Remotely-assoc'ed Hop2TGT):    0

     Number of RDF (RA) Groups (4):
       {

       1) RDF (RA) Group Number  :  90            (59)
          Remote Symmetrix ID    : 000192600256
          Microcode Version      : 5875
          Recovery RA Group      : 102            (65)
          RA Group Name          : NewJersey

          STD Devices (4):
            {
```

```
--------------------------------------------------------------------------------------------
                                                        Sym  Device           Flags    Cap
           LdevName    PdevName                         Dev  Config       Sts  CSRT    (MB)

--------------------------------------------------------------------------------------------
           DEV001     /dev/rdsk/c69t2d1                 0220 RDF1+R-5     RW   .--1    4314
           DEV002     /dev/rdsk/c69t2d2                 0221 RDF1+R-5     RW   .--1    4314
           DEV003     /dev/rdsk/c69t2d3                 0222 RDF1+R-5     RW   .--1    4314
           DEV004     /dev/rdsk/c69t2d4                 0223 RDF1+R-5     RW   .--1    4314
              }

        2) RDF (RA) Group Number  : 110            (6D)
           Remote Symmetrix ID    : 000192600321
           Microcode Version      : 5875
           Recovery RA Group      : 104            (67)
           RA Group Name          : London

           STD Devices (4):
           CRDF STD Devices (4):
              {

--------------------------------------------------------------------------------------------
                                                        Sym  Device           Flags    Cap
           LdevName    PdevName                         Dev  Config       Sts  CSRT    (MB)

--------------------------------------------------------------------------------------------
           DEV001     /dev/rdsk/c69t2d1                 0220 RDF1+R-5     RW   .--1    4314
           DEV002     /dev/rdsk/c69t2d2                 0221 RDF1+R-5     RW   .--1    4314
           DEV003     /dev/rdsk/c69t2d3                 0222 RDF1+R-5     RW   .--1    4314
           DEV004     /dev/rdsk/c69t2d4                 0223 RDF1+R-5     RW   .--1    4314
              }

        3) RDF (RA) Group Number  :  91            (5A)
           Remote Symmetrix ID    : 000192600256
           Microcode Version      : 5875
           Recovery RA Group      : 103            (66)
           RA Group Name          : NewJersey

           STD Devices (4):
              {

--------------------------------------------------------------------------------------------
                                                        Sym  Device           Flags    Cap
           LdevName    PdevName                         Dev  Config       Sts  CSRT    (MB)

--------------------------------------------------------------------------------------------
           DEV005     /dev/rdsk/c69t2d5                 0224 RDF1+R-5     RW   .--1    4314
           DEV006     /dev/rdsk/c69t2d6                 0225 RDF1+R-5     RW   .--1    4314
           DEV007     /dev/rdsk/c69t2d7                 0226 RDF1+R-5     RW   .--1    4314
           DEV008     /dev/rdsk/c69t3d0                 0227 RDF1+R-5     RW   .--1    4314
              }

        4) RDF (RA) Group Number  : 111            (6E)
           Remote Symmetrix ID    : 000192600321
           Microcode Version      : 5875
           Recovery RA Group      : 105            (68)
           RA Group Name          : London

           STD Devices (4):
           CRDF STD Devices (4):
              {

--------------------------------------------------------------------------------------------
                                                        Sym  Device           Flags    Cap
           LdevName    PdevName                         Dev  Config       Sts  CSRT    (MB)
```

```
-----------------------------------------------------------------------------------------
           DEV005     /dev/rdsk/c69t2d5                    0224 RDF1+R-5     RW   .--1    4314
           DEV006     /dev/rdsk/c69t2d6                    0225 RDF1+R-5     RW   .--1    4314
           DEV007     /dev/rdsk/c69t2d7                    0226 RDF1+R-5     RW   .--1    4314
           DEV008     /dev/rdsk/c69t3d0                    0227 RDF1+R-5     RW   .--1    4314
              }
         }
     }

Legend:
  RDFA Flags:
       C(onsistency)   : X = Enabled, . = Disabled, - = N/A
       (RDFA) S(tatus) : A = Active, I = Inactive, - = N/A
       R(DFA Mode)     : S = Single-session mode, M = MSC mode, - = N/A
       (Mirror) T(ype) : 1 = R1, 2 = R2, - = N/A
```

- The following command illustrates the use of the vi text editor to create an SRDF/Star options text file named `options.StarProd`. In this file, you enter the parameters and values that specify the site names. As required, the names chosen for the sync target site (`NewJersey`) and the async site (`London`) match the names previously specified in the `symcg set -name` commands. This options file is specified in the `setup` command shown next.

  vi options.StarProd

  ```
  SYMCLI_STAR_WORKLOAD_SITE_NAME    = NewYork
  SYMCLI_STAR_SYNCTARGET_SITE_NAME  = NewJersey
  SYMCLI_STAR_ASYNCTARGET_SITE_NAME = London
  SYMCLI_STAR_ADAPTIVE_COPY_TRACKS  = 30000
  SYMCLI_STAR_ACTION_TIMEOUT        = 1800
  SYMCLI_STAR_COMPATIBILITY_MODE=v70
  SYMCLI_STAR_AUTO_DISTRIBUTE_INTERNAL_FILE=Yes
  ```

- The following `symstar setup` command builds the SRDF/Star definition file that defines the R1 composite group at the workload site. This file is saved in a directory on the host (UNIX:`/var/symapi/config/STAR/def`, Windows: `/Program Files/EMC/SYMAPI/config/STAR/def`) as well as in the Symmetrix File System (SFS) directory at each site. The SRDF/Star definition file in the Symmetrix array allows you to build CGs at the remote target sites. In previous releases of Solutions Enabler, this file had to be copied from the workload site to the remote target sites. This is no longer necessary. Note the highlighted distribution step in the following output.

symstar -cg StarProd setup -options options.StarProd -noprompt

```
Setup.............................................................Started.
Analyzing  Host Composite Grp: StarProd...........................Started.
Syncing    Symmetrix information..................................Started.
Syncing    Symmetrix information..................................Done.
Gathering  Symmetrix SID: 000192600198 RDFG: 90...................Started.
Gathering  Symmetrix SID: 000192600198 RDFG: 90...................Done.
Gathering  Symmetrix SID: 000192600198 RDFG: 110..................Started.
Gathering  Symmetrix SID: 000192600198 RDFG: 110..................Done.
Gathering  Symmetrix SID: 000192600198 RDFG: 91...................Started.
Gathering  Symmetrix SID: 000192600198 RDFG: 91...................Done.
Gathering  Symmetrix SID: 000192600198 RDFG: 111..................Started.
Gathering  Symmetrix SID: 000192600198 RDFG: 111..................Done.
Validating Host Composite Grp: StarProd...........................Started.
Validating Symmetrix SID: 000192600198............................Started.
Validating Symmetrix SID: 000192600198............................Done.
Validating RDF Group SID: 000192600198 RDFG: 91...................Started.
Validating RDF Group SID: 000192600198 RDFG: 91...................Done.
Validating RDF Group SID: 000192600198 RDFG: 91 Devices...........Started.
```

```
Validating RDF Group SID: 000192600198 RDFG: 91 Devices............Done.
Validating Symmetrix SID: 000192600256..............................Started.
Validating Symmetrix SID: 000192600256..............................Done.
Validating RDF Group SID: 000192600256 RDFG: 101....................Started.
Validating RDF Group SID: 000192600256 RDFG: 101....................Done.
Validating RDF Group SID: 000192600256 RDFG: 101 Devices............Started.
Validating RDF Group SID: 000192600256 RDFG: 101 Devices............Done.
Validating RDF Group SID: 000192600256 RDFG: 103....................Started.
Validating RDF Group SID: 000192600256 RDFG: 103....................Done.
Validating RDF Group SID: 000192600198 RDFG: 90.....................Started.
Validating RDF Group SID: 000192600198 RDFG: 90.....................Done.
Validating RDF Group SID: 000192600198 RDFG: 90 Devices.............Started.
Validating RDF Group SID: 000192600198 RDFG: 90 Devices.............Done.
Validating RDF Group SID: 000192600256 RDFG: 100....................Started.
Validating RDF Group SID: 000192600256 RDFG: 100....................Done.
Validating RDF Group SID: 000192600256 RDFG: 100 Devices............Started.
Validating RDF Group SID: 000192600256 RDFG: 100 Devices............Done.
Validating RDF Group SID: 000192600256 RDFG: 102....................Started.
Validating RDF Group SID: 000192600256 RDFG: 102....................Done.
Validating RDF Group SID: 000192600198 RDFG: 111....................Started.
Validating RDF Group SID: 000192600198 RDFG: 111....................Done.
Validating RDF Group SID: 000192600198 RDFG: 111 Devices............Started.
Validating RDF Group SID: 000192600198 RDFG: 111 Devices............Done.
Validating Symmetrix SID: 000192600321..............................Started.
Validating Symmetrix SID: 000192600321..............................Done.
Validating RDF Group SID: 000192600321 RDFG: 111....................Started.
Validating RDF Group SID: 000192600321 RDFG: 111....................Done.
Validating RDF Group SID: 000192600321 RDFG: 111 Devices............Started.
Validating RDF Group SID: 000192600321 RDFG: 111 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 105....................Started.
Validating RDF Group SID: 000192600321 RDFG: 105....................Done.
Validating RDF Group SID: 000192600198 RDFG: 110....................Started.
Validating RDF Group SID: 000192600198 RDFG: 110....................Done.
Validating RDF Group SID: 000192600198 RDFG: 110 Devices............Started.
Validating RDF Group SID: 000192600198 RDFG: 110 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 110....................Started.
Validating RDF Group SID: 000192600321 RDFG: 110....................Done.
Validating RDF Group SID: 000192600321 RDFG: 110 Devices............Started.
Validating RDF Group SID: 000192600321 RDFG: 110 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 104....................Started.
Validating RDF Group SID: 000192600321 RDFG: 104....................Done.
Validating Host Composite Grp: StarProd.............................Done.
Gathering  Recovery Path Connection Information.....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 103....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 103....................Done.
Validating Symmetrix SID: 000192600256 RDFG: 103....................Started.
Validating Symmetrix SID: 000192600256 RDFG: 103....................Done.
Gathering  Symmetrix SID: 000192600256 RDFG: 102....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 102....................Done.
Validating Symmetrix SID: 000192600256 RDFG: 102....................Started.
Validating Symmetrix SID: 000192600256 RDFG: 102....................Done.
Gathering  Recovery Path Connection Information.....................Done.
Analyzing  Host Composite Grp: StarProd.............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Done.
Distributing setup information to remote sites......................Started.
Distributing setup information to remote sites......................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Setup...............................................................Done.
```

- The following `symstar query` command shows that the current System State for both remote target sites is Disconnected:

```
symstar -cg StarProd query

Site Name                                   : NewYork

Workload Site                               : NewYork
1st Target Site                             : NewJersey
2nd Target Site                             : London

Composite Group Name                        : StarProd
Composite Group Type                        : RDF1

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : Disconnected
  2nd_Target_Site                           : Disconnected
  STAR                                      : Unprotected
  Mode of Operation                         : Concurrent
  }

Last Action Performed                       : SetupInit
Last Action Status                          : Successful
Last Action Timestamp                       : 07/19/2010_10:12:11

STAR Information:
  {
  STAR Consistency Capable                  : Yes
  STAR Consistency Mode                     : NONE
  Synchronous Target Site                   : NewJersey
  Asynchronous Target Site                  : London
  Differential Resync Available             : N/A
  R2 Recoverable                            : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : NewJersey
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : NONE
  Site Data Image Consistent                : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI          ST                     M
        RD   A                    N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 RW        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --          -- -------- -------- - ------------
            RW        0        0 NR          WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : London
```

```
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0   276120 NR 00321 111 WD        0        0 S Suspended
  00198 110 RW        0   276120 NR 00321 110 WD        0        0 S Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0   552240 NR           WD        0        0 S Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- You now have the option of using the `symstar buildcg` command to build a matching R2 composite group at each site. If the SRDF/Star options file, used at setup time, contains `SYMCLI_STAR_AUTO_DISTRIBUTE_INTERNAL_FILE=YES`, you can execute `symstar buildcg` from any control host that has access to the SRDF/Star definition file located in the SFS of a Symmetrix array. If this SRDF/Star option is set to `NO`, you can execute this command from any control host with access to the SRDF/Star definition file located on the host. The following shows the output that is generated when building the two R2 composite groups:

```
symstar -cg StarProd buildcg -site NewJersey
BuildCG.............................................................Started.
BuildCG.............................................................Done.

symstar -cg StarProd buildcg -site London
BuildCG.............................................................Started.
BuildCG.............................................................Done.
```

- The following `symstar connect` commands bring the NewJersey and London devices to read/write (RW) on the SRDF links:

```
symstar -cg StarProd connect -site NewJersey -noprompt

 Connect_NewJersey...................................................Started.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Setting Star data consistency indicators............................Not Needed.
 Setting Star data consistency indicators............................Not Needed.
 Disable RDF Consistency protection..................................Started.
 Disable RDF Consistency protection..................................Done.
 Set Mode Adaptive Copy..............................................Not Needed.
 Establish SID:000192600198 RDFG:91..................................Started.
 Establish SID:000192600198 RDFG:90..................................Started.
 Establish SID:000192600198 RDFG:91..................................Done.
 Establish SID:000192600198 RDFG:90..................................Done.
 SA RW Enable Devs...................................................Not Needed.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Connect_NewJersey...................................................Done.
```

```
symstar -cg StarProd connect -site London -noprompt

Connect_London.....................................................Started.
Setting Star data consistency indicators...........................Not Needed.
Setting Star data consistency indicators...........................Not Needed.
Disable RDF Consistency protection.................................Started.
Disable RDF Consistency protection.................................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:111...................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:110...................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:111...................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:110...................Done.
Establish SID:000192600198 RDFG:111................................Started.
Establish SID:000192600198 RDFG:110................................Started.
Establish SID:000192600198 RDFG:111................................Done.
Establish SID:000192600198 RDFG:110................................Done.
SA RW Enable Devs..................................................Not Needed.
SA RW Enable Devs..................................................Not Needed.
Ready Devs.........................................................Not Needed.
Update persistent state information................................Started.
Update persistent state information................................Done.
Connect_London.....................................................Done.
```

- The following `symstar protect` command brings up the NewJersey site, turning on SRDF consistency protection for the sync target site:

```
symstar -cg StarProd protect -site NewJersey -noprompt

Protect_NewJersey..................................................Started.
Wait for invalid tracks to reach 30000.............................Started.
Wait for invalid tracks to reach 30000.............................Done.
Set Mode Sync SID:000192600198 RDFG:91.............................Started.
Set Mode Sync SID:000192600198 RDFG:90.............................Started.
Set Mode Sync SID:000192600198 RDFG:91.............................Done.
Set Mode Sync SID:000192600198 RDFG:90.............................Done.
Enable RDF Consistency protection..................................Started.
Enable RDF Consistency protection..................................Done.
Wait for invalid tracks to reach 0.................................Started.
Wait for invalid tracks to reach 0.................................Done.
Wait until RDF consistency is achieved.............................Started.
Wait until RDF consistency is achieved.............................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Update persistent state information................................Started.
Update persistent state information................................Done.
Protect_NewJersey..................................................Done.
```

- The following `symstar query` command shows the 1st_Target_Site is now Protected, the Last Action Performed was to protect NewJersey, and the Mode of Operation is Concurrent:

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
```

```
  1st_Target_Site                                  : Protected
  2nd_Target_Site                                  : Connected
  STAR                                             : Unprotected
  Mode of Operation                                : Concurrent
  }

Last Action Performed                              : Protect_NewJersey
Last Action Status                                 : Successful
Last Action Timestamp                              : 07/19/2010_10:24:27

STAR Information:
  {
  STAR Consistency Capable                         : Yes
  STAR Consistency Mode                            : NONE
  Synchronous Target Site                          : NewJersey
  Asynchronous Target Site                         : London
  Differential Resync Available                    : N/A
  R2 Recoverable                                   : N/A
  Asynchronous Target Site Data most Current       : N/A
  }

1st Target Site Information:
  {
  Source Site Name                                 : NewYork
  Target Site Name                                 : NewJersey
  RDF Consistency Capability                       : SYNC
  RDF Consistency Mode                             : SYNC
  Site Data Image Consistent                       : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                                 : NewYork
  Target Site Name                                 : London
  RDF Consistency Capability                       : MSC
  RDF Consistency Mode                             : NONE
  Site Data Image Consistent                       : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 WD        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }
```

```
Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command brings up the London site, setting async mode and turning on SRDF consistency protection to the async target site:

```
symstar -cg StarProd protect -site London -noprompt

 Protect_London.....................................................Started.
 Wait for invalid tracks to reach 30000.............................Started.
 Wait for invalid tracks to reach 30000.............................Done.
 Set Mode Async SID:000192600198 RDFG:111...........................Started.
 Set Mode Async SID:000192600198 RDFG:110...........................Started.
 Set Mode Async SID:000192600198 RDFG:111...........................Done.
 Set Mode Async SID:000192600198 RDFG:110...........................Done.
 Enable RDF Consistency protection..................................Started.
 Enable RDF Consistency protection..................................Done.
 Wait for invalid tracks to reach 0.................................Started.
 Wait for invalid tracks to reach 0.................................Done.
 Wait until RDF consistency is achieved.............................Started.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................Done.
 Setting Star data consistency indicators...........................Started.
 Setting Star data consistency indicators...........................Done.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Protect_London.....................................................Done.
```

- The following `symstar query` shows that both target sites are Protected. The SRDF pairs at the NewJersey site are still in the Synchronized state. The SRDF pairs at the London site are now in async mode, and their pair state is Consistent.

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Protected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Protect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/19/2010_10:31:35

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
```

```
  Asynchronous Target Site                     : London
  Differential Resync Available                : N/A
  R2 Recoverable                               : N/A
  Asynchronous Target Site Data most Current   : N/A
  }

1st Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : NewJersey
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : SYNC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : MSC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 WD        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar enable` command initiates SRDF/Star protection. It creates and initializes SDDF sessions, and enables SRDF/Star such that it waits for R2-recoverable Star protection before producing the STAR Protected system state:

```
symstar -cg StarProd enable -noprompt

 Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target SID:000192600256................................Started.
```

```
Create STAR target SID:000192600256.............................Done.
Create STAR target SID:000192600321.............................Started.
Create STAR target SID:000192600321.............................Done.
Deactivate STAR target..........................................Not Needed.
Deactivate STAR target..........................................Not Needed.
Clear STAR target SID:000192600256..............................Started.
Clear STAR target SID:000192600256..............................Done.
Clear STAR target SID:000192600321..............................Started.
Clear STAR target SID:000192600321..............................Done.
Setting Star data consistency indicators........................Not Needed.
Activate STAR target SID:000192600256...........................Started.
Activate STAR target SID:000192600256...........................Done.
Enable STAR protection..........................................Started.
Enable STAR protection..........................................Done.
Wait until R2 Recoverable is achieved...........................Started.
Wait until R2 Recoverable is achieved...........................In Progress.
Wait until R2 Recoverable is achieved...........................In Progress.
Wait until R2 Recoverable is achieved...........................In Progress.
Wait until R2 Recoverable is achieved...........................Done.
Enable..........................................................Done.
```

- The following `symstar query` command shows the state of the SRDF/Star configuration after SRDF/Star protection is enabled (STAR Protected). Note that Differential Resync Available and R2 Recoverable now indicate Yes, which indicates that SRDF/Star R2 recoverable protection is now operational.

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Protected
  STAR                                          : Protected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Enable
Last Action Status                              : Successful
Last Action Timestamp                           : 07/19/2010_10:39:46

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : STAR
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : Yes
  R2 Recoverable                                : Yes
  Asynchronous Target Site Data most Current    : No
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
```

```
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 WD        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 2: Responding to a transient fault on the async link

The SRDF groups that represent the links to the async target site (London) have experienced a transient fault (unplanned interruption). Commands are executed from the control host at the workload site.

- The following `symstar query` command shows that all R1 devices linked to the London site are in the Suspended state. The System State shows that the sync target site is still protected but that the path to the async site has failed and that SRDF/Star protection was tripped.

```
symstar query -cg StarProd

Site Name                                     : NewYork

Workload Site                                 : NewYork
```

```
1st Target Site                                  : NewJersey
2nd Target Site                                  : London

Composite Group Name                             : StarProd
Composite Group Type                             : RDF1

Workload Data Image Consistent                   : Yes
System State:
  {
  1st_Target_Site                                : Protected
  2nd_Target_Site                                : PathFail
  STAR                                           : Tripped
  Mode of Operation                              : Concurrent
  }

Last Action Performed                            : Enable
Last Action Status                               : Successful
Last Action Timestamp                            : 07/19/2010_10:39:46

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : STAR
  Synchronous Target Site                        : NewJersey
  Asynchronous Target Site                       : London
  Differential Resync Available                  : Yes
  R2 Recoverable                                 : Yes
  Asynchronous Target Site Data most Current     : No
  }

1st Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : NewJersey
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : SYNC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : MSC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
```

```
ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

00198 111 RW        0     5524 NR 00321 111 WD        0        0 A Suspended
00198 110 RW        0     5524 NR 00321 110 WD        0        0 A Suspended

 Totals:  -- -------- -------- --           -- -------- -------- - ------------
          RW        0    11048 NR           WD        0        0 A Suspended
}
```

- Assuming that the physical cause of the transient fault is corrected, you can begin steps to recover the London site. The `symstar reset` command cleans up the internal metadata and the Symmetrix cache at the London site. Note that the `reset` action is rejected if the SRDF path to the site is in a Partitioned state.

```
symstar -cg StarProd reset -site London -noprompt

 Reset_London.......................................................Started.
 MSC Cleanup........................................................Not Needed.
 Setting Star data consistency indicators...........................Started.
 Setting Star data consistency indicators...........................Done.
 Disable STAR protection............................................Started.
 Disable STAR protection............................................Done.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target SID:000192600256............................Started.
 Deactivate STAR target SID:000192600256............................Done.
 Disable RDF Consistency protection.................................Started.
 Disable RDF Consistency protection.................................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:111...................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:110...................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:111...................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:110...................Done.
 Reset_London.......................................................Done.
```

- If you are protecting SRDF/Star data with TimeFinder BCVs at the London site, issue the following command after executing the `reset` command:

  symmir -cg StarProd split -star -rdf -rdfg name:London

- The following `symstar query` command shows an updated status of this SRDF/Star configuration. The Last Action status line shows that resetting the async target site was successful. The System State shows that the 1st_Target sync site is still Protected but that the 2nd_Target async site is Disconnected and thus unprotected.

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Disconnected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }
```

```
Last Action Performed                          : Reset_London
Last Action Status                             : Successful
Last Action Timestamp                          : 07/19/2010_13:27:38

STAR Information:
  {
  STAR Consistency Capable                     : Yes
  STAR Consistency Mode                        : NONE
  Synchronous Target Site                      : NewJersey
  Asynchronous Target Site                     : London
  Differential Resync Available                : N/A
  R2 Recoverable                               : N/A
  Asynchronous Target Site Data most Current   : N/A
  }

1st Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : NewJersey
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : SYNC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : NONE
  Site Data Image Consistent                   : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0     5524 NR 00321 111 WD        0        0 C Suspended
  00198 110 RW        0     5524 NR 00321 110 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0    11048 NR           WD        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar connect` command sets the mode to adaptive copy (if not in that mode already), and brings the devices to read/write (RW) on the SRDF link. If no change is needed, it is marked Not Needed, as shown below.

```
symstar -cg StarProd connect -site London -noprompt

Connect_London.....................................................Started.
Setting Star data consistency indicators...........................Not Needed.
Setting Star data consistency indicators...........................Not Needed.
Disable RDF Consistency protection.................................Started.
Disable RDF Consistency protection.................................Done.
Set Mode Adaptive Copy.............................................Not Needed.
Establish SID:000192600198 RDFG:111................................Started.
Establish SID:000192600198 RDFG:110................................Started.
Establish SID:000192600198 RDFG:111................................Done.
Establish SID:000192600198 RDFG:110................................Done.
SA RW Enable Devs..................................................Not Needed.
SA RW Enable Devs..................................................Not Needed.
Ready Devs.........................................................Not Needed.
Update persistent state information................................Started.
Update persistent state information................................Done.
Connect_London.....................................................Done.
```

- The following `symstar query` command shows that London was successfully connected. The SRDF pairs for London are now Synchronized and running in adaptive copy mode (C).

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Connected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Connect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/19/2010_13:38:38

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
```

```
  Target Site Name                            : NewJersey
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 WD        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
```

- The following `symstar protect` command transitions the asynchronous target site London from adaptive copy mode to asynchronous mode and enables SRDF consistency protection:

```
symstar -cg StarProd protect -site London -noprompt

Protect_London.....................................................Started.
Wait for invalid tracks to reach 30000.............................Started.
Wait for invalid tracks to reach 30000.............................Done.
Set Mode Async SID:000192600198 RDFG:111...........................Started.
Set Mode Async SID:000192600198 RDFG:110...........................Started.
Set Mode Async SID:000192600198 RDFG:111...........................Done.
Set Mode Async SID:000192600198 RDFG:110...........................Done.
Enable RDF Consistency protection..................................Started.
Enable RDF Consistency protection..................................Done.
Wait for invalid tracks to reach 0.................................Started.
Wait for invalid tracks to reach 0.................................Done.
Wait until RDF consistency is achieved.............................Started.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Update persistent state information................................Started.
```

```
Update persistent state information.............................Done.
Protect_London..................................................Done.
```

- The following `symstar query` command shows that London was successfully protected. The SRDF pairs for London are now consistent and running in asynchronous mode (A).

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Protect_London
Last Action Status                           : Successful
Last Action Timestamp                        : 07/19/2010_13:44:07

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewYork
  Target Site Name                           : NewJersey
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : SYNC
  Site Data Image Consistent                 : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                  LI           ST                   M
        RD   A                   N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
```

```
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 WD        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar enable` command initiates SRDF/Star protection. It initializes the SDDF sessions, and enables SRDF/Star such that it waits for R2-recoverable Star protection before producing the STAR Protected system state, shown in the next query display:

symstar -cg StarProd enable -noprompt

```
Enable.............................................................Started.
Deactivate STAR target.............................................Not Needed.
Create STAR target.................................................Not Needed.
Create STAR target.................................................Not Needed.
Deactivate STAR target.............................................Not Needed.
Deactivate STAR target.............................................Not Needed.
Clear STAR target SID:000192600256.................................Started.
Clear STAR target SID:000192600256.................................Done.
Clear STAR target..................................................Not Needed.
Setting Star data consistency indicators...........................Not Needed.
Activate STAR target SID:000192600256..............................Started.
Activate STAR target SID:000192600256..............................Done.
Enable STAR protection.............................................Started.
Enable STAR protection.............................................Done.
Wait until R2 Recoverable is achieved..............................Started.
Wait until R2 Recoverable is achieved..............................In Progress.
Wait until R2 Recoverable is achieved..............................In Progress.
Wait until R2 Recoverable is achieved..............................In Progress.
Wait until R2 Recoverable is achieved..............................Done.
Enable.............................................................Done.
```

- The following `symstar query` command shows that the enable action was successful and the System State is now STAR Protected:

symstar -cg StarProd query

```
Site Name                                     : NewYork

Workload Site                                 : NewYork
1st Target Site                               : NewJersey
2nd Target Site                               : London
```

```
Composite Group Name                          : StarProd
Composite Group Type                          : RDF1

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : Protected
  STAR                                        : Protected
  Mode of Operation                           : Concurrent
  }

Last Action Performed                         : Enable
Last Action Status                            : Successful
Last Action Timestamp                         : 07/19/2010_13:50:34

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : STAR
  Synchronous Target Site                     : NewJersey
  Asynchronous Target Site                    : London
  Differential Resync Available               : Yes
  R2 Recoverable                              : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : NewJersey
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------
```

```
  00198 111 RW        0        0 RW 00321 111 WD        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- If you are protecting SRDF/Star data with TimeFinder BCVs at the London site and you split them after the reset action, you can now reestablish them using the following command:

  `symmir -cg StarProd establish -star -rdf -rdfg name:London`

Example 3: Switching to the sync target site after a disaster fault

This example illustrates a switch to the sync target site (NewJersey) when a disaster fault occurs at the workload site (NewYork). As a result of the failure at NewYork, all commands are run from the NewJersey control host.

- The following `symstar query` command displays the state of the SRDF/Star system. STAR has been Tripped, and the state of the links to both remote target sites is PathFail. Note that Differential Resync is available and Asynchronous Target Site Data most Current is No, indicating the synchronous data site New Jersey has the most current data.

```
symstar query -cg StarProd

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : PathFail
  2nd_Target_Site                            : PathFail
  STAR                                       : Tripped
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Enable
Last Action Status                           : Successful
Last Action Timestamp                        : 07/19/2010_13:50:34

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : STAR
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : Yes
```

```
  R2 Recoverable                                : Yes
  Asynchronous Target Site Data most Current    : No
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0     5524 NR 00256 101 NA       NA       NA S Partitioned
  00198  90 RW        0     5524 NR 00256 100 NA       NA       NA S Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0    11048 NR           NA       NA       NA S Partitioned
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0     5524 NR 00321 111 NA       NA       NA A Partitioned
  00198 110 RW        0     5524 NR 00321 110 NA       NA       NA A Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0    11048 NR           NA       NA       NA A Partitioned
```

- The following `symstar switch` command performs the tasks necessary to start the production workload at the NewJersey site. Because the NewJersey data is the most current, use this data in the recovery.

```
symstar -cg StarProd switch -site NewJersey -keep_data NewJersey -nop

Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 SA Write Disable Devs.............................................Not Needed.
 Not Ready Devs SID:000192600256...................................Started.
 Not Ready Devs SID:000192600256...................................Done.
 Suspend...........................................................Not Needed.
 Suspend...........................................................Not Needed.
 Half Swap SID:000192600256 RDFG:101...............................Started.
 Half Swap SID:000192600256 RDFG:100...............................Started.
 Half Swap SID:000192600256 RDFG:101...............................Done.
 Half Swap SID:000192600256 RDFG:100...............................Done.
```

```
Set Mode Adaptive Copy SID:000192600256 RDFG:101....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:101....................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Done.
SA RW Enable Devs...................................................Not Needed.
Ready Devs SID:000192600256.........................................Started.
Ready Devs SID:000192600256.........................................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
SA RW Enable Devs...................................................Not Needed.
Ready Devs..........................................................Not Needed.
Switch_NewJersey....................................................Done.
```

- The following `symstar query` command shows that the switch action was successful and that NewJersey is the new workload site. Since the links between NewJersey and NewYork are broken, their SRDF pairs remain in the Partitioned state. Because NewJersey does not have a replication relationship with London until recovery is executed, their SRDF pair states are nonexistent (N/A).

```
symstar -cg StarProd query

Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Disconnected
  2nd_Target_Site                            : Disconnected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Switch_NewJersey
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_10:05:27

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewYork
  Asynchronous Target Site                   : London
  Differential Resync Available              : Yes
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewJersey
  Target Site Name                           : NewYork
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : NONE
  Site Data Image Consistent                 : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                    M
```

```
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 NR 00198  91 NA       NA       NA C Partitioned
  00256 100 RW        0        0 NR 00198  90 NA       NA       NA C Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NA       NA       NA C Partitioned
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 NA       NA       NA NA 00321 104 NA       NA       NA O N/A
  00256 103 NA       NA       NA NA 00321 105 NA       NA       NA O N/A

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NA       NA       NA NA           NA       NA       NA O N/A
  }
```

- The following `symstar connect` command connects NewJersey to London, making its devices read/write (RW) on the links and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site London -noprompt

Connect_London.......................................................Started.
Suspend..............................................................Not Needed.
Cleanup Control Data SID:000192600321 RDFG:111......................Started.
Cleanup Control Data SID:000192600321 RDFG:110......................Started.
Cleanup Control Data SID:000192600321 RDFG:111......................Done.
Cleanup Control Data SID:000192600321 RDFG:110......................Done.
SA Write Disable Devs................................................Not Needed.
Not Ready Devs SID:000192600321.....................................Started.
Not Ready Devs SID:000192600321.....................................Done.
Half Delete SID:000192600321 RDFG:111...............................Started.
Half Delete SID:000192600321 RDFG:110...............................Started.
Half Delete SID:000192600321 RDFG:111...............................Done.
Half Delete SID:000192600321 RDFG:110...............................Done.
Createpair SID:000192600256 RDFG:102................................Started.
Createpair SID:000192600256 RDFG:103................................Started.
Createpair SID:000192600256 RDFG:102................................Done.
Createpair SID:000192600256 RDFG:103................................Done.
Deactivate STAR target SID:000192600256.............................Started.
Deactivate STAR target SID:000192600256.............................Done.
Deactivate STAR target...............................................Not Needed.
Assign Name:London, Recovery RDFG:110 to SID:000192600256 RDFG:102..Started.
Assign Name:London, Recovery RDFG:110 to SID:000192600256 RDFG:102..Done.
Assign Name:London, Recovery RDFG:111 to SID:000192600256 RDFG:103..Started.
Assign Name:London, Recovery RDFG:111 to SID:000192600256 RDFG:103..Done.
Setting Star data consistency indicators............................Not Needed.
```

```
Setting Star data consistency indicators..........................Not Needed.
Disable RDF Consistency protection................................Started.
Disable RDF Consistency protection................................Done.
SA RW Enable Devs.................................................Not Needed.
SA RW Enable Devs.................................................Not Needed.
Ready Devs SID:000192600256.......................................Started.
Ready Devs SID:000192600256.......................................Done.
Update persistent state information...............................Started.
Update persistent state information...............................Done.
Connect_London....................................................Done.
```

- The following `symstar query` command shows the connection from NewJersey to London was completed successfully. The R1 devices at NewJersey are now Synchronized with the R2 devices at London.

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Disconnected
  2nd_Target_Site                               : Connected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Connect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_10:14:05

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : NewYork
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------
```

```
  00256 101 RW        0        0 NR 00198  91 NA       NA       NA C Partitioned
  00256 100 RW        0        0 NR 00198  90 NA       NA       NA C Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NA       NA       NA C Partitioned
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 C Synchronized
  00256 103 RW        0        0 RW 00321 105 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command transitions the London link from adaptive copy to asynchronous mode and enables SRDF consistency protection:

```
symstar -cg StarProd protect -site London -noprompt

 Protect_London.....................................................Started.
 Wait for invalid tracks to reach 30000.............................Started.
 Wait for invalid tracks to reach 30000.............................Done.
 Set Mode Async SID:000192600256 RDFG:102...........................Started.
 Set Mode Async SID:000192600256 RDFG:103...........................Started.
 Set Mode Async SID:000192600256 RDFG:102...........................Done.
 Set Mode Async SID:000192600256 RDFG:103...........................Done.
 Enable RDF Consistency protection..................................Started.
 Enable RDF Consistency protection..................................Done.
 Wait for invalid tracks to reach 0.................................Started.
 Wait for invalid tracks to reach 0.................................Done.
 Wait until RDF consistency is achieved.............................Started.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................Done.
 Setting Star data consistency indicators...........................Started.
 Setting Star data consistency indicators...........................Done.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Protect_London.....................................................Done.
```

- The following `symstar query` command shows that London was successfully protected. The SRDF pairs for London are now Consistent and running in async mode (A). London is replicating the NewJersey data asynchronously through MSC.

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Disconnected
  2nd_Target_Site                               : Protected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Protect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_10:19:41

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : NewYork
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 NR 00198  91 NA       NA       NA C Partitioned
  00256 100 RW        0        0 NR 00198  90 NA       NA       NA C Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NA       NA       NA C Partitioned
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes
```

```
            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                     M
        RD   A                    N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 A Consistent
  00256 103 RW        0        0 RW 00321 105 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 4: Isolating the sync target site temporarily

This example illustrates how to isolate the NewJersey site, perhaps for testing purposes, and then joining it again with an SRDF/Star configuration. The site to be isolated needs to be in the Protected state. If SRDF/Star is enabled when the need to isolate arises, you must first disable SRDF/Star protection (`symstar -cg StarProd disable`).

Disabling SRDF/Star leaves both target sites in the **Protected** state, which is a legal state for isolating either site. All commands are executed from a control host at the NewYork workload site.

The following `symstar query` command shows that the 1st_Target_Site is Protected, indicating the NewJersey site is protected and ready to be isolated:

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Protect_NewJersey
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_13:09:40

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : STAR
  Synchronous Target Site                    : NewJersey
```

```
  Asynchronous Target Site                     : London
  Differential Resync Available                : Yes
  R2 Recoverable                               : Yes
  Asynchronous Target Site Data most Current   : No
  }

1st Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : NewJersey
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : SYNC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : MSC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar isolate` command isolates the NewJersey site by splitting the SRDF pairs between NewYork and NewJersey, and making the R2 devices at NewJersey read/write (RW) at the NewJersey control host:

```
symstar -cg StarProd isolate -site NewJersey -noprompt

 Isolate_NewJersey.....................................................Started.
 Setting Star data consistency indicators..........................Started.
 Setting Star data consistency indicators..........................Done.
```

```
Split SID:000192600198 RDFG:91.....................................Started.
Split SID:000192600198 RDFG:90.....................................Started.
Split SID:000192600198 RDFG:91.....................................Done.
Split SID:000192600198 RDFG:90.....................................Done.
Disable RDF Consistency protection..................................Started.
Disable RDF Consistency protection..................................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Done.
Isolate_NewJersey...................................................Done.
```

- The following `symstar query` command shows that the isolate action was successful. The SRDF pairs operating in synchronous mode are now in the Split state.

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Isolated
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Isolate_NewJersey
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_13:17:35

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewYork
  Target Site Name                           : NewJersey
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : NONE
  Site Data Image Consistent                 : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------
```

```
  00198  91 RW        0        0 NR 00256 101 RW        0        0 C Split
  00198  90 RW        0        0 NR 00256 100 RW        0        0 C Split

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           RW        0        0 C Split
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                  LI           ST                   M
        RD   A                   N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other
```

- After performing testing or other tasks at the NewJersey site that require isolation, you can rejoin the NewJersey site with the SRDF/Star configuration and enable SRDF/Star protection again. To do this, you must first transition NewJersey from the Isolated state to the Disconnected state, as shown below.

```
symstar -cg StarProd disconnect -site NewJersey -noprompt

 Disconnect_NewJersey.................................................Started.
 Setting Star data consistency indicators............................Not Needed.
 Suspend.............................................................Not Needed.
 Disable RDF Consistency protection..................................Started.
 Disable RDF Consistency protection..................................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Done.
 RA Write Disable R2 Devs SID:000192600198 RDFG:91...................Started.
 RA Write Disable R2 Devs SID:000192600198 RDFG:90...................Started.
 RA Write Disable R2 Devs SID:000192600198 RDFG:91...................Done.
 RA Write Disable R2 Devs SID:000192600198 RDFG:90...................Done.
 Disconnect_NewJersey.................................................Done.
```

- The following `symstar query` command shows that the `disconnect` action was successful. The NewJersey site is now in the Disconnected state:

```
symstar -cg StarProd query

Site Name                                     : NewYork

Workload Site                                 : NewYork
```

```
1st Target Site                                  : NewJersey
2nd Target Site                                  : London

Composite Group Name                             : StarProd
Composite Group Type                             : RDF1

Workload Data Image Consistent                   : Yes
System State:
  {
  1st_Target_Site                                : Disconnected
  2nd_Target_Site                                : Protected
  STAR                                           : Unprotected
  Mode of Operation                              : Concurrent
  }

Last Action Performed                            : Disconnect_NewJersy
Last Action Status                               : Successful
Last Action Timestamp                            : 07/20/2010_13:20:22

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : NONE
  Synchronous Target Site                        : NewJersey
  Asynchronous Target Site                       : London
  Differential Resync Available                  : N/A
  R2 Recoverable                                 : N/A
  Asynchronous Target Site Data most Current     : N/A
  }

1st Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : NewJersey
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : NONE
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 RW        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : MSC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
```

```
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar connect` command reconnects the NewJersey site with the SRDF/Star configuration. In returning an isolated site to the SRDF/Star replication, any updates made to the NewJersey R2 devices while isolated are discarded. That is, the data on the R1 devices overwrites the data on the R2 devices.

```
symstar -cg StarProd connect -site NewJersey -noprompt

 Connect_NewJersey.....................................................Started.
 Update persistent state information...................................Started.
 Update persistent state information...................................Done.
 Setting Star data consistency indicators..............................Not Needed.
 Setting Star data consistency indicators..............................Not Needed.
 Disable RDF Consistency protection....................................Started.
 Disable RDF Consistency protection....................................Done.
 Set Mode Adaptive Copy................................................Not Needed.
 Establish SID:000192600198 RDFG:91....................................Started.
 Establish SID:000192600198 RDFG:90....................................Started.
 Establish SID:000192600198 RDFG:91....................................Done.
 Establish SID:000192600198 RDFG:90....................................Done.
 SA RW Enable Devs.....................................................Not Needed.
 SA RW Enable Devs.....................................................Not Needed.
 Ready Devs............................................................Not Needed.
 Update persistent state information...................................Started.
 Update persistent state information...................................Done.
 Connect_NewJersey.....................................................Done.
```

- The following `symstar query` command shows that NewJersey was connected successfully:

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Connected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Connect_NewJersey
```

```
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:23:51

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 C Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
```

- The following `symstar protect` command transitions the NewJersey link from adaptive copy mode to synchronous mode, enables SRDF consistency protection, and waits for synchronization:

```
symstar -cg StarProd protect -site NewJersey -noprompt

 Protect_NewJersey.................................................Started.
```

```
Wait for invalid tracks to reach 30000..............................Started.
Wait for invalid tracks to reach 30000..............................Done.
Set Mode Sync SID:000192600198 RDFG:91..............................Started.
Set Mode Sync SID:000192600198 RDFG:90..............................Started.
Set Mode Sync SID:000192600198 RDFG:91..............................Done.
Set Mode Sync SID:000192600198 RDFG:90..............................Done.
Enable RDF Consistency protection...................................Started.
Enable RDF Consistency protection...................................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Wait until RDF consistency is achieved..............................Started.
Wait until RDF consistency is achieved..............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Protect_NewJersey...................................................Done.
```

- The following `symstar query` command shows that NewJersey was successfully protected. Both target sites are now in the Protected state, allowing SRDF/Star to be enabled again.

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Protected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Protect_NewJersey
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:26:08

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                       Target Site
```

```
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 5: Performing a planned workload switch to the sync site

A planned switch operation moves the workload function to one of the remote target sites, even though there was no failure of the original workload site. This example switches the workload from NewYork to the NewJersey sync site.

- Regardless of which remote site you are switching to, you must first *stop* the I/O at the current workload site *before* performing the following `symstar halt` action. The following command is executed from the NewYork control host:

```
symstar -cg StarProd halt -noprompt

 Halt.............................................................Started.
 SA Write Disable Devs SID:000192600198...........................Started.
 SA Write Disable Devs SID:000192600198...........................Done.
 Not Ready Devs...................................................Not Needed.
 Wait for invalid tracks to reach 0...............................Started.
 Wait for invalid tracks to reach 0...............................Done.
 Drain remote data - checkpoint...................................Started.
 Drain remote data - checkpoint...................................Done.
 Suspend SID:000192600198 RDFG:111................................Started.
 Suspend SID:000192600198 RDFG:110................................Started.
```

```
Suspend SID:000192600198 RDFG:111.................................Done.
Suspend SID:000192600198 RDFG:110.................................Done.
Suspend SID:000192600198 RDFG:91..................................Started.
Suspend SID:000192600198 RDFG:90..................................Started.
Suspend SID:000192600198 RDFG:91..................................Done.
Suspend SID:000192600198 RDFG:90..................................Done.
Disable STAR protection...........................................Not Needed.
Deactivate STAR target............................................Not Needed.
Deactivate STAR target............................................Not Needed.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Disable RDF Consistency protection................................Started.
Disable RDF Consistency protection................................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Disable RDF Consistency protection................................Started.
Disable RDF Consistency protection................................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:91...................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:90...................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:91...................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:90...................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:111..................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:110..................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:111..................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:110..................Done.
Halt..............................................................Done.
```

- The following `symstar query` command shows that the SRDF/Star system was successfully halted:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Halted
  2nd_Target_Site                               : Halted
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Halt
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:30:38

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
```

```
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 WD        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 WD        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            WD        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 WD        0        0 NR 00321 111 NR        0        0 C Suspended
  00198 110 WD        0        0 NR 00321 110 NR        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            WD        0        0 NR           NR        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- From this point in the example, all commands are run from the NewJersey control host. This `query` displays the same results from the NewJersey viewpoint. The **Last Action** displayed in a query is specific to the host from which the query is issued, which is the `halt` action at the NewJersey host in this example.

symstar -cg StarProd query

```
Site Name                                       : NewJersey

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF2
```

```
Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Halted
  2nd_Target_Site                               : Halted
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Halt
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_10:34:13

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 WD        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 WD        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            WD        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 WD        0        0 NR 00321 111 NR        0        0 C Suspended
  00198 110 WD        0        0 NR 00321 110 NR        0        0 C Suspended
```

```
   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            WD        0        0 NR           NR        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar switch` command performs the necessary tasks that allow you to use NewJersey as the new workload site in the SRDF/Star configuration:

symstar -cg StarProd switch -site NewJersey -noprompt

```
Switch_NewJersey.....................................................Started.
Update persistent state information..................................Started.
Update persistent state information..................................Done.
SA Write Disable Devs................................................Not Needed.
Not Ready Devs SID:000192600256......................................Started.
Not Ready Devs SID:000192600256......................................Done.
Half Swap SID:000192600256 RDFG:101..................................Started.
Half Swap SID:000192600256 RDFG:100..................................Started.
Half Swap SID:000192600256 RDFG:101..................................Done.
Half Swap SID:000192600256 RDFG:100..................................Done.
Half Delete SID:000192600321 RDFG:111................................Started.
Half Delete SID:000192600321 RDFG:110................................Started.
Half Delete SID:000192600321 RDFG:111................................Done.
Half Delete SID:000192600321 RDFG:110................................Done.
Createpair SID:000192600256 RDFG:102.................................Started.
Createpair SID:000192600256 RDFG:103.................................Started.
Createpair SID:000192600256 RDFG:102.................................Done.
Createpair SID:000192600256 RDFG:103.................................Done.
Update persistent state information..................................Started.
Update persistent state information..................................Done.
Assign Name:London, Recovery RDFG:110 to SID:000192600256 RDFG:102..Started.
Assign Name:London, Recovery RDFG:110 to SID:000192600256 RDFG:102..Done.
Assign Name:London, Recovery RDFG:111 to SID:000192600256 RDFG:103..Started.
Assign Name:London, Recovery RDFG:111 to SID:000192600256 RDFG:103..Done.
SA RW Enable Devs....................................................Not Needed.
Ready Devs SID:000192600256..........................................Started.
Ready Devs SID:000192600256..........................................Done.
SA RW Enable Devs SID:000192600198...................................Started.
SA RW Enable Devs SID:000192600198...................................Done.
Ready Devs...........................................................Not Needed.
Half Delete SID:000192600198 RDFG:111................................Started.
Half Delete SID:000192600198 RDFG:110................................Started.
Half Delete SID:000192600198 RDFG:111................................Done.
Half Delete SID:000192600198 RDFG:110................................Done.
Half Swap SID:000192600198 RDFG:91...................................Started.
Half Swap SID:000192600198 RDFG:90...................................Started.
Half Swap SID:000192600198 RDFG:91...................................Done.
Half Swap SID:000192600198 RDFG:90...................................Done.
Switch_NewJersey.....................................................Done.
```

- The following `symstar query` command shows that NewJersey is now the new workload site, but is currently in the **Disconnected** system state with respect to NewYork and London:

symstar -cg StarProd query

```
Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
```

```
2nd Target Site                                  : London

Composite Group Name                             : StarProd
Composite Group Type                             : RDF1

Workload Data Image Consistent                   : Yes
System State:
  {
  1st_Target_Site                                : Disconnected
  2nd_Target_Site                                : Disconnected
  STAR                                           : Unprotected
  Mode of Operation                              : Concurrent
  }

Last Action Performed                            : Switch_NewJersey
Last Action Status                               : Successful
Last Action Timestamp                            : 07/20/2010_13:35:28

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : NONE
  Synchronous Target Site                        : NewYork
  Asynchronous Target Site                       : London
  Differential Resync Available                  : N/A
  R2 Recoverable                                 : N/A
  Asynchronous Target Site Data most Current     : N/A
  }

1st Target Site Information:
  {
  Source Site Name                               : NewJersey
  Target Site Name                               : NewYork
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : NONE
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 NR 00198  91 WD        0        0 C Suspended
  00256 100 RW        0        0 NR 00198  90 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewJersey
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : NONE
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
```

```
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 NR 00321 104 NR        0        0 C Suspended
  00256 103 RW        0        0 NR 00321 105 NR        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NR        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar connect` command connects NewJersey to London, making its devices read/write (RW) on the links, and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site London -noprompt

 Connect_London.....................................................Started.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Setting Star data consistency indicators...........................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Disable RDF Consistency protection.................................Started.
 Disable RDF Consistency protection.................................Done.
 Set Mode Adaptive Copy.............................................Not Needed.
 Establish SID:000192600256 RDFG:102................................Started.
 Establish SID:000192600256 RDFG:103................................Started.
 Establish SID:000192600256 RDFG:102................................Done.
 Establish SID:000192600256 RDFG:103................................Done.
 SA RW Enable Devs..................................................Not Needed.
 SA RW Enable Devs..................................................Not Needed.
 Ready Devs.........................................................Not Needed.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Connect_London.....................................................Done.
```

- The following `symstar query` command shows that the connection from NewJersey to London was completed successfully. The R1 devices at NewJersey are now Synchronized with the R2 devices at London.

```
symstar -cg StarProd query

Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Disconnected
  2nd_Target_Site                            : Connected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Connect_London
Last Action Status                           : Successful
```

```
Last Action Timestamp                          : 07/20/2010_13:38:59

STAR Information:
  {
  STAR Consistency Capable                     : Yes
  STAR Consistency Mode                        : NONE
  Synchronous Target Site                      : NewYork
  Asynchronous Target Site                     : London
  Differential Resync Available                : N/A
  R2 Recoverable                               : N/A
  Asynchronous Target Site Data most Current   : N/A
  }

1st Target Site Information:
  {
  Source Site Name                             : NewJersey
  Target Site Name                             : NewYork
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : NONE
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 NR 00198  91 WD        0        0 C Suspended
  00256 100 RW        0        0 NR 00198  90 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewJersey
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : NONE
  Site Data Image Consistent                   : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 C Synchronized
  00256 103 RW        0        0 RW 00321 105 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar connect` command connects NewJersey to NewYork, making its devices read/write (RW) on the links, and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site NewYork -noprompt

 Connect_NewYork.....................................................Started.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Setting Star data consistency indicators............................Not Needed.
 Setting Star data consistency indicators............................Not Needed.
 Disable RDF Consistency protection..................................Started.
 Disable RDF Consistency protection..................................Done.
 Set Mode Adaptive Copy..............................................Not Needed.
 Establish SID:000192600256 RDFG:101.................................Started.
 Establish SID:000192600256 RDFG:100.................................Started.
 Establish SID:000192600256 RDFG:101.................................Done.
 Establish SID:000192600256 RDFG:100.................................Done.
 SA RW Enable Devs...................................................Not Needed.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Connect_NewYork.....................................................Done.
```

- The following `symstar query` command shows that the connection from NewJersey to NewYork was completed successfully. The R1 devices at NewJersey are now Synchronized with the R2 devices at NewYork.

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Connected
  2nd_Target_Site                               : Connected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Connect_NewYork
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:42:12

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
```

```
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : NewYork
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 RW 00198  91 WD        0        0 C Synchronized
  00256 100 RW        0        0 RW 00198  90 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 C Synchronized
  00256 103 RW        0        0 RW 00321 105 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command transitions the London link from adaptive copy to asynchronous mode and enables SRDF consistency protection:

```
symstar -cg StarProd protect -site London -noprompt

Protect_London.....................................................Started.
Wait for invalid tracks to reach 30000.............................Started.
Wait for invalid tracks to reach 30000.............................Done.
Set Mode Async SID:000192600256 RDFG:102...........................Started.
Set Mode Async SID:000192600256 RDFG:103...........................Started.
Set Mode Async SID:000192600256 RDFG:102...........................Done.
Set Mode Async SID:000192600256 RDFG:103...........................Done.
Enable RDF Consistency protection..................................Started.
Enable RDF Consistency protection..................................Done.
Wait for invalid tracks to reach 0.................................Started.
Wait for invalid tracks to reach 0.................................Done.
```

```
Wait until RDF consistency is achieved.............................Started.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Update persistent state information................................Started.
Update persistent state information................................Done.
Protect_London.....................................................Done.
```

- The following `symstar query` command shows that London is now Protected, its link is running in asynchronous mode, and its SRDF pairs are consistent:

```
symstar -cg StarProd query

Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Connected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Protect_London
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_13:49:02

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewYork
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewJersey
  Target Site Name                           : NewYork
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : NONE
  Site Data Image Consistent                 : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 RW 00198  91 WD        0        0 C Synchronized
  00256 100 RW        0        0 RW 00198  90 WD        0        0 C Synchronized
```

```
   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 A Consistent
  00256 103 RW        0        0 RW 00321 105 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command transitions the NewYork link from adaptive copy to synchronous mode and enables SRDF consistency protection:

```
symstar -cg starProd protect -site NewYork -noprompt

Protect_NewYork.....................................................Started.
Wait for invalid tracks to reach 30000..............................Started.
Wait for invalid tracks to reach 30000..............................Done.
Set Mode Sync SID:000192600256 RDFG:101.............................Started.
Set Mode Sync SID:000192600256 RDFG:100.............................Started.
Set Mode Sync SID:000192600256 RDFG:101.............................Done.
Set Mode Sync SID:000192600256 RDFG:100.............................Done.
Enable RDF Consistency protection...................................Started.
Enable RDF Consistency protection...................................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Wait until RDF consistency is achieved..............................Started.
Wait until RDF consistency is achieved..............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Protect_NewYork.....................................................Done.
```

- The following `symstar query` command shows that NewYork is now Protected, its link is running in synchronous mode, and its SRDF pairs are Synchronized:

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Protected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Protect_NewYork
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:51:42

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : NewYork
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 RW 00198  91 WD        0        0 S Synchronized
  00256 100 RW        0        0 RW 00198  90 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes
```

```
            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                     M
        RD   A                    N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 A Consistent
  00256 103 RW        0        0 RW 00321 105 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:
```

- The following `symstar enable` command initiates SRDF/Star protection. It initializes the SDDF sessions, and enables SRDF/Star such that it waits for R2-recoverable Star protection before producing the STAR Protected system state.

```
symstar -cg StarProd enable -noprompt

 Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target.................................................Not Needed.
 Create STAR target.................................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Clear STAR target SID:000192600198.................................Started.
 Clear STAR target SID:000192600198.................................Done.
 Clear STAR target..................................................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Activate STAR target SID:000192600198..............................Started.
 Activate STAR target SID:000192600198..............................Done.
 Enable STAR protection.............................................Started.
 Enable STAR protection.............................................Done.
 Wait until R2 Recoverable is achieved..............................Started.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................Done.
 Enable.............................................................Done.
```

- The following `symstar query` command shows the enable action was successful and the System State is now STAR Protected:

```
symstar -cg StarProd query

Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Protected
  Mode of Operation                          : Concurrent
```

```
  }

Last Action Performed                          : Enable
Last Action Status                             : Successful
Last Action Timestamp                          : 07/20/2010_13:55:49

STAR Information:
  {
  STAR Consistency Capable                     : Yes
  STAR Consistency Mode                        : STAR
  Synchronous Target Site                      : NewYork
  Asynchronous Target Site                     : London
  Differential Resync Available                : Yes
  R2 Recoverable                               : Yes
  Asynchronous Target Site Data most Current   : No
  }

1st Target Site Information:
  {
  Source Site Name                             : NewJersey
  Target Site Name                             : NewYork
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : SYNC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 RW 00198  91 WD        0        0 S Synchronized
  00256 100 RW        0        0 RW 00198  90 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewJersey
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : MSC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 A Consistent
  00256 103 RW        0        0 RW 00321 105 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
```

```
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 6: Switching the workload back to the original workload site

A planned switch operation can also move the workload function from one of the remote target sites back to the original workload site. This example switches the workload from NewJersey back to NewYork.

- The following `symstar query` command shows that SRDF/Star is currently running in a normal fashion. The STAR Protected system state allows you to initiate a switch from the sync target site to the original workload site. The following command was issued from the New Jersey control host:

```
symstar query -cg StarProd

Site Name                                    : NewJersey

Workload Site                                : NewJersey
1st Target Site                              : NewYork
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Protected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Enable
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_10:28:44

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : STAR
  Synchronous Target Site                    : NewYork
  Asynchronous Target Site                   : London
  Differential Resync Available              : Yes
  R2 Recoverable                             : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                           : NewJersey
  Target Site Name                           : NewYork
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : SYNC
  Site Data Image Consistent                 : Yes

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
```

```
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 RW 00198  91 WD        0        0 S Synchronized
  00256 100 RW        0        0 RW 00198  90 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                  LI           ST                   M
        RD   A                   N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 RW        0        0 RW 00321 104 NR        0        0 A Consistent
  00256 103 RW        0        0 RW 00321 105 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- You must first STOP the I/O at the current workload site (NewJersey) *BEFORE* performing the following `symstar halt` action:

symstar -cg StarProd halt -noprompt

```
Halt.............................................................Started.
SA Write Disable Devs............................................Not Needed.
Not Ready Devs SID:000192600256..................................Started.
Not Ready Devs SID:000192600256..................................Done.
Wait for invalid tracks to reach 0...............................Started.
Wait for invalid tracks to reach 0...............................Done.
Drain remote data - checkpoint...................................Started.
Drain remote data - checkpoint...................................Done.
Suspend SID:000192600256 RDFG:102................................Started.
Suspend SID:000192600256 RDFG:103................................Started.
Suspend SID:000192600256 RDFG:102................................Done.
Suspend SID:000192600256 RDFG:103................................Done.
Suspend SID:000192600256 RDFG:101................................Started.
Suspend SID:000192600256 RDFG:100................................Started.
Suspend SID:000192600256 RDFG:101................................Done.
Suspend SID:000192600256 RDFG:100................................Done.
Disable STAR protection..........................................Started.
Disable STAR protection..........................................Done.
Deactivate STAR target SID:000192600198..........................Started.
Deactivate STAR target SID:000192600198..........................Done.
Deactivate STAR target...........................................Not Needed.
Setting Star data consistency indicators.........................Started.
Setting Star data consistency indicators.........................Done.
```

```
Disable RDF Consistency protection.................................Started.
Disable RDF Consistency protection.................................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Disable RDF Consistency protection.................................Started.
Disable RDF Consistency protection.................................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:101...................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:100...................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:101...................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:100...................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:102...................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:103...................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:102...................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:103...................Done.
Halt...............................................................Done.
```

- At this point in the example, all commands are run from the NewYork control host. The `symstar query` command shows that the SRDF/Star system was successfully halted. The Last Action fields are unique to the host executing the command, and the value of N/A indicates that no control actions have yet been issued from NewYork.

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF2

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Halted
  2nd_Target_Site                               : Halted
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : N/A
Last Action Status                              : N/A
Last Action Timestamp                           : N/A

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : NewYork
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : Yes

            Source Site                       Target Site
```

```
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 NR        0        0 NR 00198  91 WD        0        0 C Suspended
  00256 100 NR        0        0 NR 00198  90 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NR        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 102 NR        0        0 NR 00321 104 NR        0        0 C Suspended
  00256 103 NR        0        0 NR 00321 105 NR        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NR        0        0 NR           NR        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar switch` command performs the necessary tasks for using NewYork as the workload site in the SRDF/Star configuration. Recall that NewYork was the original workload site before the workload was switched to NewJersey.

```
symstar -cg StarProd switch -site NewYork -noprompt

Switch_NewYork.......................................................Started.
 Update persistent state information..................................Started.
 Update persistent state information..................................Done.
 SA Write Disable Devs SID:000192600198...............................Started.
 SA Write Disable Devs SID:000192600198...............................Done.
 Not Ready Devs.......................................................Not Needed.
 Half Swap SID:000192600198 RDFG:91...................................Started.
 Half Swap SID:000192600198 RDFG:90...................................Started.
 Half Swap SID:000192600198 RDFG:91...................................Done.
 Half Swap SID:000192600198 RDFG:90...................................Done.
 Half Delete SID:000192600321 RDFG:104................................Started.
 Half Delete SID:000192600321 RDFG:105................................Started.
 Half Delete SID:000192600321 RDFG:104................................Done.
 Half Delete SID:000192600321 RDFG:105................................Done.
 Createpair SID:000192600198 RDFG:111.................................Started.
 Createpair SID:000192600198 RDFG:110.................................Started.
 Createpair SID:000192600198 RDFG:111.................................Done.
 Createpair SID:000192600198 RDFG:110.................................Done.
 Update persistent state information..................................Started.
```

```
Update persistent state information.............................Done.
Assign Name:London, Recovery RDFG:105 to SID:000192600198 RDFG:111..Started.
Assign Name:London, Recovery RDFG:105 to SID:000192600198 RDFG:111..Done.
Assign Name:London, Recovery RDFG:104 to SID:000192600198 RDFG:110..Started.
Assign Name:London, Recovery RDFG:104 to SID:000192600198 RDFG:110..Done.
SA RW Enable Devs SID:000192600198..............................Started.
SA RW Enable Devs SID:000192600198..............................Done.
Ready Devs......................................................Not Needed.
SA RW Enable Devs...............................................Not Needed.
Ready Devs SID:000192600256.....................................Started.
Ready Devs SID:000192600256.....................................Done.
Half Delete SID:000192600256 RDFG:102...........................Started.
Half Delete SID:000192600256 RDFG:103...........................Started.
Half Delete SID:000192600256 RDFG:102...........................Done.
Half Delete SID:000192600256 RDFG:103...........................Done.
Half Swap SID:000192600256 RDFG:101.............................Started.
Half Swap SID:000192600256 RDFG:100.............................Started.
Half Swap SID:000192600256 RDFG:101.............................Done.
Half Swap SID:000192600256 RDFG:100.............................Done.
Switch_NewYork..................................................Done.
```

- The following `symstar query` command shows that NewYork is now the workload site, but is currently in the Disconnected system state with respect to New Jersey and London:

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Disconnected
  2nd_Target_Site                            : Disconnected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Switch_NewYork
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_10:57:35

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewYork
  Target Site Name                           : NewJersey
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : NONE
```

```
  Site Data Image Consistent                  : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                     M
        RD   A                    N Rem   RD   A                     O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 RW        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                     M
        RD   A                    N Rem   RD   A                     O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 NR 00321 111 NR        0        0 C Suspended
  00198 110 RW        0        0 NR 00321 110 NR        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NR        0        0 C Suspended
  }
```

- The following `symstar connect` command connects NewYork to London, making its devices read/write (RW) on the links and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site London -noprompt

Connect_London.....................................................Started.
Update persistent state information................................Started.
Update persistent state information................................Done.
Setting Star data consistency indicators...........................Not Needed.
Setting Star data consistency indicators...........................Not Needed.
Disable RDF Consistency protection.................................Started.
Disable RDF Consistency protection.................................Done.
Set Mode Adaptive Copy.............................................Not Needed.
Establish SID:000192600198 RDFG:111................................Started.
Establish SID:000192600198 RDFG:110................................Started.
Establish SID:000192600198 RDFG:111................................Done.
Establish SID:000192600198 RDFG:110................................Done.
SA RW Enable Devs..................................................Not Needed.
SA RW Enable Devs..................................................Not Needed.
Ready Devs.........................................................Not Needed.
Update persistent state information................................Started.
Update persistent state information................................Done.
Connect_London.....................................................Done.
```

- The following `symstar query` command shows that the connection from NewYork to London was successfully completed. The R1 devices at NewYork are now Synchronized with the R2 devices at London.

```
symstar -cg StarProd query

Site Name                                   : NewYork

Workload Site                               : NewYork
1st Target Site                             : NewJersey
2nd Target Site                             : London

Composite Group Name                        : StarProd
Composite Group Type                        : RDF1

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : Disconnected
  2nd_Target_Site                           : Connected
  STAR                                      : Unprotected
  Mode of Operation                         : Concurrent
  }

Last Action Performed                       : Connect_London
Last Action Status                          : Successful
Last Action Timestamp                       : 07/20/2010_11:18:03

STAR Information:
  {
  STAR Consistency Capable                  : Yes
  STAR Consistency Mode                     : NONE
  Synchronous Target Site                   : NewJersey
  Asynchronous Target Site                  : London
  Differential Resync Available             : N/A
  R2 Recoverable                            : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : NewJersey
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : NONE
  Site Data Image Consistent                : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI          ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 NR 00256 101 WD        0        0 C Suspended
  00198  90 RW        0        0 NR 00256 100 WD        0        0 C Suspended

   Totals:  -- -------- -------- --          -- -------- -------- - ------------
            RW        0        0 NR          WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : London
```

```
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar connect` command connects NewYork to NewJersey, making its devices read/write (RW) on the links and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site NewJersey -noprompt

 Connect_NewJersey.....................................................Started.
 Update persistent state information...................................Started.
 Update persistent state information...................................Done.
 Setting Star data consistency indicators..............................Not Needed.
 Setting Star data consistency indicators..............................Not Needed.
 Disable RDF Consistency protection....................................Started.
 Disable RDF Consistency protection....................................Done.
 Set Mode Adaptive Copy................................................Not Needed.
 Establish SID:000192600198 RDFG:91....................................Started.
 Establish SID:000192600198 RDFG:90....................................Started.
 Establish SID:000192600198 RDFG:91....................................Done.
 Establish SID:000192600198 RDFG:90....................................Done.
 SA RW Enable Devs.....................................................Not Needed.
 SA RW Enable Devs.....................................................Not Needed.
 Ready Devs............................................................Not Needed.
 Update persistent state information...................................Started.
 Update persistent state information...................................Done.
 Connect_NewJersey.....................................................Done.
```

- The following `symstar query` command shows that the connection from NewYork to NewJersey was completed successfully. The R1 devices at NewYork are now Synchronized with the R2 devices at NewJersey.

```
symstar query -cg StarProd

Site Name                                     : NewYork

Workload Site                                 : NewYork
1st Target Site                               : NewJersey
2nd Target Site                               : London

Composite Group Name                          : StarProd
Composite Group Type                          : RDF1

Workload Data Image Consistent                : Yes
```

```
System State:
  {
  1st_Target_Site                                  : Connected
  2nd_Target_Site                                  : Connected
  STAR                                             : Unprotected
  Mode of Operation                                : Concurrent
  }

Last Action Performed                              : Connect_NewJersey
Last Action Status                                 : Successful
Last Action Timestamp                              : 07/20/2010_11:22:46

STAR Information:
  {
  STAR Consistency Capable                         : Yes
  STAR Consistency Mode                            : NONE
  Synchronous Target Site                          : NewJersey
  Asynchronous Target Site                         : London
  Differential Resync Available                    : N/A
  R2 Recoverable                                   : N/A
  Asynchronous Target Site Data most Current       : N/A
  }

1st Target Site Information:
  {
  Source Site Name                                 : NewYork
  Target Site Name                                 : NewJersey
  RDF Consistency Capability                       : SYNC
  RDF Consistency Mode                             : NONE
  Site Data Image Consistent                       : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 C Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                                 : NewYork
  Target Site Name                                 : London
  RDF Consistency Capability                       : MSC
  RDF Consistency Mode                             : NONE
  Site Data Image Consistent                       : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
```

```
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command transitions the London link from adaptive copy to asynchronous mode and enables SRDF consistency protection:

```
symstar -cg StarProd protect -site London -noprompt

Protect_London.....................................................Started.
Wait for invalid tracks to reach 30000.............................Started.
Wait for invalid tracks to reach 30000.............................Done.
Set Mode Async SID:000192600198 RDFG:111...........................Started.
Set Mode Async SID:000192600198 RDFG:110...........................Started.
Set Mode Async SID:000192600198 RDFG:111...........................Done.
Set Mode Async SID:000192600198 RDFG:110...........................Done.
Enable RDF Consistency protection..................................Started.
Enable RDF Consistency protection..................................Done.
Wait for invalid tracks to reach 0.................................Started.
Wait for invalid tracks to reach 0.................................Done.
Wait until RDF consistency is achieved.............................Started.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................In Progress.
Wait until RDF consistency is achieved.............................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Update persistent state information................................Started.
Update persistent state information................................Done.
Protect_London.....................................................Done.
```

- The following `symstar query` command shows that London is now Protected, its link is running in asynchronous mode, and its SRDF pairs are Consistent:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Connected
  2nd_Target_Site                               : Protected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Protect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_11:28:28

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
```

```
  Asynchronous Target Site                     : London
  Differential Resync Available                : N/A
  R2 Recoverable                               : N/A
  Asynchronous Target Site Data most Current   : N/A
  }

1st Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : NewJersey
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : NONE
  Site Data Image Consistent                   : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 C Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : NewYork
  Target Site Name                             : London
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : MSC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar protect` command transitions the NewJersey link from adaptive copy to synchronous mode and enables SRDF consistency protection:

```
symstar -cg StarProd protect -site NewJersey -noprompt

 Protect_NewJersey.....................................................Started.
 Wait for invalid tracks to reach 30000...............................Started.
 Wait for invalid tracks to reach 30000...............................Done.
 Set Mode Sync SID:000192600198 RDFG:91...............................Started.
```

```
Set Mode Sync SID:000192600198 RDFG:90.............................Started.
Set Mode Sync SID:000192600198 RDFG:91.............................Done.
Set Mode Sync SID:000192600198 RDFG:90.............................Done.
Enable RDF Consistency protection..................................Started.
Enable RDF Consistency protection..................................Done.
Wait for invalid tracks to reach 0.................................Started.
Wait for invalid tracks to reach 0.................................Done.
Wait until RDF consistency is achieved.............................Started.
Wait until RDF consistency is achieved.............................Done.
Setting Star data consistency indicators...........................Started.
Setting Star data consistency indicators...........................Done.
Update persistent state information................................Started.
Update persistent state information................................Done.
Protect_NewJersey..................................................Done.
```

- The following `symstar query` command shows that NewJersey is now Protected, its link is running in synchronous mode, and its SRDF pairs are Synchronized:

```
symstar -cg starProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Protect_NewJersey
Last Action Status                           : Successful
Last Action Timestamp                        : 07/20/2010_13:04:36

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewYork
  Target Site Name                           : NewJersey
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : SYNC
  Site Data Image Consistent                 : Yes

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
```

```
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                  LI           ST                   M
        RD   A                   N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar enable` command initiates SRDF/Star protection. It initializes the SDDF sessions, and enables SRDF/Star such that it waits for R2-recoverable STAR protection before producing the STAR Protected system state.

```
symstar -cg StarProd enable -noprompt

 Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target.................................................Not Needed.
 Create STAR target.................................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Clear STAR target SID:000192600256.................................Started.
 Clear STAR target SID:000192600256.................................Done.
 Clear STAR target..................................................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Activate STAR target SID:000192600256..............................Started.
 Activate STAR target SID:000192600256..............................Done.
 Enable STAR protection.............................................Started.
 Enable STAR protection.............................................Done.
 Wait until R2 Recoverable is achieved..............................Started.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................Done.
 Enable.............................................................Done.
```

- The following `symstar query` command shows that the enable action was successful producing the STAR Protected system state:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Protected
  STAR                                          : Protected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Enable
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_13:09:40

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : STAR
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : Yes
  R2 Recoverable                                : Yes
  Asynchronous Target Site Data most Current    : No
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
```

```
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 7: Disabling SRDF/Star for a device reconfiguration

This example disables SRDF/Star protection in order to return the system to its pre-setup condition. Doing this allows you to reconfigure devices in the `StarProd` composite group and perform a new setup operation. You issue all commands at the NewYork workload site control host.

- The following `symstar disable` command disables SRDF/Star protection and terminates the SDDF sessions:

```
symstar -cg StarProd disable -noprompt

 Disable.............................................................Started.
 Disable STAR protection.............................................Started.
 Disable STAR protection.............................................Done.
 Deactivate STAR target SID:000192600256.............................Started.
 Deactivate STAR target SID:000192600256.............................Done.
 Deactivate STAR target..............................................Not Needed.
 Disable.............................................................Done.
```

- The following `symstar query` command indicates that the `disable` action was successful:

```
symstar -cg StarProd query

Site Name                                     : NewYork

Workload Site                                 : NewYork
1st Target Site                               : NewJersey
2nd Target Site                               : London

Composite Group Name                          : StarProd
Composite Group Type                          : RDF1

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : Protected
  STAR                                        : Unprotected
```

```
  Mode of Operation                              : Concurrent
  }

Last Action Performed                            : Disable
Last Action Status                               : Successful
Last Action Timestamp                            : 07/20/2010_14:26:13

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : NONE
  Synchronous Target Site                        : NewJersey
  Asynchronous Target Site                       : London
  Differential Resync Available                  : N/A
  R2 Recoverable                                 : N/A
  Asynchronous Target Site Data most Current     : N/A
  }

1st Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : NewJersey
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : SYNC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : MSC
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 A Consistent
  00198 110 RW        0        0 RW 00321 110 NR        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 A Consistent
  }

Legend:
```

```
Modes:
   Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar unprotect` command disables SRDF consistency protection for the London site:

```
symstar -cg StarProd unprotect -site London -noprompt

Unprotect_London.....................................................Started.
Update persistent state information..................................Started.
Update persistent state information..................................Done.
Setting Star data consistency indicators.............................Started.
Setting Star data consistency indicators.............................Done.
Disable RDF Consistency protection...................................Started.
Disable RDF Consistency protection...................................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:111.....................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:110.....................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:111.....................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:110.....................Done.
Unprotect_London.....................................................Done.
```

- The following `symstar query` command indicates that the `unprotect` action was successful:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Connected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Unprotect_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_16:01:57

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes
```

```
            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar unprotect` command disables RDF consistency protection at the NewJersey site:

```
symstar -cg StarProd unprotect -site NewJersey -noprompt

Unprotect_NewJersey.............................................Started.
Update persistent state information.............................Started.
Update persistent state information.............................Done.
Setting Star data consistency indicators........................Started.
Setting Star data consistency indicators........................Done.
Disable RDF Consistency protection..............................Started.
Disable RDF Consistency protection..............................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:91.................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:90.................Started.
Set Mode Adaptive Copy SID:000192600198 RDFG:91.................Done.
Set Mode Adaptive Copy SID:000192600198 RDFG:90.................Done.
Unprotect_NewJersey.............................................Done.
```

- The following `symstar query` command indicates that the `unprotect` action was successful:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Connected
  2nd_Target_Site                               : Connected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Unprotect_NewJersey
Last Action Status                              : Successful
Last Action Timestamp                           : 07/20/2010_16:05:09

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 C Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No
```

```
            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                     M
        RD   A                    N Rem   RD   A                     O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 111 RW        0        0 RW 00321 111 NR        0        0 C Synchronized
  00198 110 RW        0        0 RW 00321 110 NR        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           NR        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar setup -remove` command cleans up the internal metadata. The system is now at its pre-setup condition, which allows you to reconfigure devices in the `StarProd` composite group (for example, add or remove devices), and start a new setup operation.

```
symstar -cg StarProd setup -options options.StarProd -remove -noprompt

Setup.............................................................Started.
Terminate STAR target SID:000194900198............................Started.
Terminate STAR target SID:000194900198............................Done.
Terminate STAR target SID:000190300256............................Started.
Terminate STAR target SID:000190300256............................Done.
Terminate STAR target SID:000194900321............................Started.
Terminate STAR target SID:000194900321............................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Deleting persistent state information.............................Started.
Deleting persistent state information.............................Done.
Deleting distributed setup information............................Started.
Deleting distributed setup information............................Done.
Deleting local setup information..................................Started.
Deleting local setup information ..................................Done.
Setup.............................................................Done.
```

Example 8: Dynamically modifying a concurrent SRDF/Star CG

This example shows you how to dynamically add and remove devices from a concurrent SRDF/Star consistency group while still maintaining its consistency protection. In this example, the concurrent SRDF/Star CG, MILKYWAY, is defined at sitea, siteb, and sitec.

For a comprehensive overview of this feature, see "Dynamic modification of SRDF/Star consistency groups" on page 53.

- The following `symstar modifycg -add` command moves device pairs 80 and 8f from RDFG 129 and RDFG 229 in the staging area to RDFG 128 and RDFG 228 in the `MILKYWAY` SRDF/Star CG on Symmetrix 000192603088:

```
<sitea> symstar -cg MILKYWAY -sid 000192603088 modifycg -add -cg_rdfg 128,228
-stg_rdfg 129,229 -devs 80,8f

A STAR ModifyCG operation is
in progress for composite group MILKYWAY. Please wait...

 ModifyCGAdd.......................................................Started.
 Suspend SID:000192603088 RDFG:129.................................Started.
 Suspend SID:000192603088 RDFG:129.................................Done.
 Suspend SID:000192603088 RDFG:229.................................Started.
 Suspend SID:000192603088 RDFG:229.................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Move SID:000192603088 RDFG:129 to RDFG:128........................Started.
 Move SID:000192603088 RDFG:129 to RDFG:128........................Done.
 Move SID:000192603088 RDFG:229 to RDFG:228........................Started.
 Move SID:000192603088 RDFG:229 to RDFG:228........................Done.
 Add devs to CG....................................................Started.
 Add devs to CG....................................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Restore - Resume SID:000192603088 RDFG:128........................Started.
 Restore - Resume SID:000192603088 RDFG:128........................Done.
 Restore - Resume SID:000192603088 RDFG:228........................Started.
 Restore - Resume SID:000192603088 RDFG:228........................Done.
 Distributing setup information to remote sites....................Started.
 Distributing setup information to remote sites....................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 ModifyCGAdd.......................................................Done.
```

Note: GNS is running on sitea, siteb, and sitec. GNS propagates the new `MILKYWAY` CG definition to all control hosts on sitea but not to siteb and sitec. You must manually update this CG definition on both siteb and sitec. GNS then propagates the `MILKYWAY` CG definition to all hosts of siteb and sitec. If GNS was not running on siteb and sitec, you would have to manually update each host on siteb and sitec with this new `MILKYWAY` CG definition.

- Because the `MILKYWAY` CG definition was changed at `sitea` but not at `siteb` and `sitec`, the following appears when you query this CG at either `siteb` or `sitec`:

```
<siteb> symstar -cg MILKYWAY query

Failed to query cg: MILKYWAY
```

- To update the `MILKYWAY` CG definition at `siteb` and `sitec` to match the one at `sitea`, issue the following `symstar buildcg -update` command at each site:

```
<siteb> symstar -cg MILKYWAY buildcg -update -site siteb

A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG...........................................................Started.
 BuildCG...........................................................Done.

<sitec> symstar -cg MILKYWAY buildcg -update -site sitec
```

```
A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG.............................................................Started.
 BuildCG.............................................................Done.
```

- The following `query` shows that both target sites are in the Connected state, the ModifyAdd was successful, and the `MILKYWAY` device pairs are operating in adaptive copy mode. The symstar modifycg add operation fails when these device pairs are not in adaptive copy mode when in the Connected state. In this case, you can reset the device pairs in `MILKYWAY` to adaptive copy by issuing the `symstar configure -reset rdf_modes` command at `sitea`.

```
<sitea> symstar -cg MILKYWAY query

Site Name                                     : sitea

Workload Site                                 : sitea
1st Target Site                               : siteb
2nd Target Site                               : sitec

Composite Group Name                          : MILKYWAY
Composite Group Type                          : RDF1
Composite Group State                         : Valid

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Connected
  2nd_Target_Site                             : Connected
  STAR                                        : Unprotected
  Mode of Operation                           : Concurrent
  }

Last Action Performed                         : ModifyAdd
Last Action Status                            : Successful
Last Action Timestamp                         : 04/04/2011_16:26:20

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : NONE
  Synchronous Target Site                     : siteb
  Asynchronous Target Site                    : sitec
  Differential Resync Available               : N/A
  R2 Recoverable                              : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : siteb
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------
```

```
  00282 128 RW        0        0 RW 03139 128 WD        0        0 C Synchronized
  03088 128 RW        0        0 RW 03076 128 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : sitec
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 228 RW        0        0 RW 04045 228 WD        0        0 C Synchronized
  03088 228 RW        0        0 RW 03156 228 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar modifycg -remove` command moves device pairs 80 and 8f from the `MILKYWAY` CG back to RDFG 129 and RDFG 229 in the staging area:

```
<sitea> symstar -cg MILKYWAY -sid 000192603088 modifycg -remove -cg_rdfg 128,228
-stg_rdfg 129,229 -devs 80,8f

A STAR ModifyCG operation is
in progress for composite group MILKYWAY. Please wait...

 ModifyCGRem.......................................................Started.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Remove devs from CG...............................................Started.
 Remove devs from CG...............................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Suspend SID:000192603088 RDFG:228.................................Started.
 Suspend SID:000192603088 RDFG:228.................................Done.
 Suspend SID:000192603088 RDFG:128.................................Started.
 Suspend SID:000192603088 RDFG:128.................................Done.
 Move SID:000192603088 RDFG:128 to RDFG:129........................Started.
 Move SID:000192603088 RDFG:128 to RDFG:129........................Done.
 Move SID:000192603088 RDFG:228 to RDFG:229........................Started.
 Move SID:000192603088 RDFG:228 to RDFG:229........................Done.
 Terminate STAR target.............................................Not Needed.
 Terminate STAR target.............................................Not Needed.
 Terminate STAR target.............................................Not Needed.
 Distributing setup information to remote sites....................Started.
 Distributing setup information to remote sites....................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
```

```
 ModifyCGRem.......................................................Done.
```

- To update the `MILKYWAY` CG definition at `siteb` and `sitec` to match the one at `sitea`, issue the following `symstar buildcg -update` command at each site:

<siteb> **symstar -cg MILKYWAY buildcg -update -site siteb**

```
A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG...........................................................Started.
 BuildCG...........................................................Done.
```

<sitec> **symstar -cg MILKYWAY buildcg -update -site sitec**

```
A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG...........................................................Started.
 BuildCG...........................................................Done.
```

- The following `query` shows the ModifyRemove was successful:

<sitea> **symstar -cg MILKYWAY query**

```
Site Name                                     : sitea

Workload Site                                 : sitea
1st Target Site                               : siteb
2nd Target Site                               : sitec

Composite Group Name                          : MILKYWAY
Composite Group Type                          : RDF1
Composite Group State                         : Valid

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Connected
  2nd_Target_Site                             : Connected
  STAR                                        : Unprotected
  Mode of Operation                           : Concurrent
  }

Last Action Performed                         : ModifyRemove
Last Action Status                            : Successful
Last Action Timestamp                         : 04/04/2011_16:26:39

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : NONE
  Synchronous Target Site                     : siteb
  Asynchronous Target Site                    : sitec
  Differential Resync Available               : N/A
  R2 Recoverable                              : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : siteb
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No
```

```
            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 128 RW        0        0 RW 03139 128 WD        0        0 C Synchronized
  03088 128 RW        0        0 RW 03076 128 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : sitec
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 228 RW        0        0 RW 04045 228 WD        0        0 C Synchronized
  03088 228 RW        0        0 RW 03156 228 WD        0        0 C Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 C Synchronized
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Concurrent SRDF/Star CG with R22 devices

- The following `query` shows a fully protected concurrent SRDF/Star configuration:

```
symstar -cg MILKYWAY query

Site Name                                     : sitea

Workload Site                                 : sitea
1st Target Site                               : siteb
2nd Target Site                               : sitec

Composite Group Name                          : MILKYWAY
Composite Group Type                          : RDF1
Composite Group State                         : Valid

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : Protected
```

```
  STAR                                          : Protected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Enable
Last Action Status                              : Successful
Last Action Timestamp                           : 04/06/2011_16:34:59

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : STAR
  Synchronous Target Site                       : siteb
  Asynchronous Target Site                      : sitec
  Differential Resync Available                 : Yes
  R2 Recoverable                                : Yes
  Asynchronous Target Site Data most Current    : No
  }

1st Target Site Information:
  {
  Source Site Name                              : sitea
  Target Site Name                              : siteb
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03088 128 RW        0        0 RW 03076 128 WD        0        0 S Synchronized
  00282 128 RW        0        0 RW 03139 128 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : sitea
  Target Site Name                              : sitec
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03088 228 RW        0        0 RW 03156 228 WD        0        0 A Consistent
  00282 228 RW        0        0 RW 04045 228 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:
```

```
 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar modifycg -add` command moves device pairs 80 and 81 from RDFG 129 and RDFG 229 in the staging area to RDFG 128 and RDFG 228 in the `MILKYWAY` CG. Since `MILKYWAY` contains R22 devices, this command performs a createpair operation between `siteb` and `sitec` using recovery link RDFG 178, as shown in the highlighted text.

```
symstar -cg MILKYWAY -sid 088 modifycg -add -cg_rdfg 128,228
-stg_rdfg 129,229 -devs 80,81

A STAR ModifyCG operation is
in progress for composite group MILKYWAY. Please wait...

 ModifyCGAdd.......................................................Started.
 Suspend SID:000192603088 RDFG:129.................................Started.
 Suspend SID:000192603088 RDFG:129.................................Done.
 Suspend SID:000192603088 RDFG:229.................................Started.
 Suspend SID:000192603088 RDFG:229.................................Done.
 Create STAR target SID:000192603076...............................Started.
 Create STAR target SID:000192603076...............................Done.
 Create STAR target SID:000192603156...............................Started.
 Create STAR target SID:000192603156...............................Done.
 Deactivate STAR target............................................Not Needed.
 Deactivate STAR target............................................Not Needed.
 Clear STAR target SID:000192603076................................Started.
 Clear STAR target SID:000192603076................................Done.
 Clear STAR target SID:000192603156................................Started.
 Clear STAR target SID:000192603156................................Done.
 Activate STAR target SID:000192603076.............................Started.
 Activate STAR target SID:000192603076.............................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Wait for persistent data to be updated............................Started.
 Wait for persistent data to be updated............................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Move SID:000192603088 RDFG:129 to RDFG:128........................Started.
 Move SID:000192603088 RDFG:129 to RDFG:128........................Done.
 Move SID:000192603088 RDFG:229 to RDFG:228........................Started.
 Move SID:000192603088 RDFG:229 to RDFG:228........................Done.
 Set Mode Sync SID:000192603088 RDFG:128...........................Started.
 Set Mode Sync SID:000192603088 RDFG:128...........................Done.
 SA Write Disable Devs SID:000192603156............................Started.
 SA Write Disable Devs SID:000192603156............................Done.
 Createpair SID:000192603076 RDFG:178..............................Started.
 Createpair SID:000192603076 RDFG:178..............................Done.
 SA RW Enable Devs SID:000192603156................................Started.
 SA RW Enable Devs SID:000192603156................................Done.
 Add devs to CG....................................................Started.
 Add devs to CG....................................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Enable RDF Consistency protection.................................Started.
 Enable RDF Consistency protection.................................Done.
 Wait for persistent data to be updated............................Started.
 Wait for persistent data to be updated............................Done.
 Restore - Resume SID:000192603088 RDFG:128........................Started.
 Restore - Resume SID:000192603088 RDFG:128........................Done.
 Restore - Resume SID:000192603088 RDFG:228........................Started.
 Restore - Resume SID:000192603088 RDFG:228........................Done.
 Wait for invalid tracks to reach 0................................Started.
 Wait for invalid tracks to reach 0................................Done.
```

```
 Wait for invalid tracks to reach 0..................................Started.
 Wait for invalid tracks to reach 0..................................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Wait until R2 Recoverable is achieved...............................Started.
 Wait until R2 Recoverable is achieved...............................Done.
 Set STAR target SID:000192603076....................................Started.
 Set STAR target SID:000192603076....................................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Distributing setup information to remote sites......................Started.
 Distributing setup information to remote sites......................Done.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 ModifyCGAdd........................................................Done.
```

- The following `query` shows the ModifyAdd was successful:

```
symstar -cg MILKYWAY query

Site Name                                    : sitea

Workload Site                                : sitea
1st Target Site                              : siteb
2nd Target Site                              : sitec

Composite Group Name                         : MILKYWAY
Composite Group Type                         : RDF1
Composite Group State                        : Valid

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Protected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : ModifyAdd
Last Action Status                           : Successful
Last Action Timestamp                        : 04/06/2011_16:38:22

STAR Information:
STAR Consistency Capable                   : Yes
STAR Consistency Mode                      : STAR
```

- The following `symstar modifycg -remove` command moves device pairs 80 and 81 from the `MILKYWAY` CG back to RDFG 129 and RDFG 229 in the staging area. This command deletes the R22s for those devices being removed, as shown in the highlighted text.

```
symstar -cg MILKYWAY -sid 000192603088 modifycg -remove -cg_rdfg 128,228
-stg_rdfg 129,229 -devs 80,81

A STAR ModifyCG operation is
in progress for composite group MILKYWAY. Please wait...

 ModifyCGRem........................................................Started.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
```

```
 Remove devs from CG.................................................Started.
 Remove devs from CG.................................................Done.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Cleanup Control Data SID:000192603088 RDFG:128......................Started.
 Cleanup Control Data SID:000192603088 RDFG:128......................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Suspend SID:000192603088 RDFG:228...................................Started.
 Suspend SID:000192603088 RDFG:228...................................Done.
 Suspend SID:000192603088 RDFG:128...................................Started.
 Suspend SID:000192603088 RDFG:128...................................Done.
 Delete SID:000192603076 RDFG:178....................................Started.
 Delete SID:000192603076 RDFG:178....................................Done.
 Move SID:000192603088 RDFG:128 to RDFG:129..........................Started.
 Move SID:000192603088 RDFG:128 to RDFG:129..........................Done.
 Move SID:000192603088 RDFG:228 to RDFG:229..........................Started.
 Move SID:000192603088 RDFG:228 to RDFG:229..........................Done.
 Set Mode Adaptive Copy SID:000192603088 RDFG:129....................Started.
 Set Mode Adaptive Copy SID:000192603088 RDFG:129....................Done.
 Set Mode Adaptive Copy SID:000192603088 RDFG:229....................Started.
 Set Mode Adaptive Copy SID:000192603088 RDFG:229....................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Terminate STAR target...............................................Not Needed.
 Terminate STAR target SID:000192603076..............................Started.
 Terminate STAR target SID:000192603076..............................Done.
 Terminate STAR target SID:000192603156..............................Started.
 Terminate STAR target SID:000192603156..............................Done.
 Wait for persistent data to be updated..............................Started.
 Wait for persistent data to be updated..............................Done.
 Distributing setup information to remote sites......................Started.
 Distributing setup information to remote sites......................Done.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 ModifyCGRem.........................................................Done.
```

- The following `query` shows the ModifyRemove was successful:

```
symstar -cg MILKYWAY query

Site Name                                    : sitea

Workload Site                                : sitea
1st Target Site                              : siteb
2nd Target Site                              : sitec

Composite Group Name                         : MILKYWAY
Composite Group Type                         : RDF1
Composite Group State                        : Valid

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Protected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : ModifyRemove
Last Action Status                           : Successful
Last Action Timestamp                        : 04/06/2011_16:44:57

STAR Information:
  {
```

```
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : NONE
  Synchronous Target Site                     : siteb
  Asynchronous Target Site                    : sitec
  Differential Resync Available               : N/A
  R2 Recoverable                              : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : siteb
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03088 128 RW        0        0 RW 03076 128 WD        0        0 S Synchronized
  00282 128 RW        0        0 RW 03139 128 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : sitec
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03088 228 RW        0        0 RW 03156 228 WD        0        0 A Consistent
  00282 228 RW        0        0 RW 04045 228 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

CHAPTER 4
Implementing Cascaded SRDF/Star

This chapter provides examples of setting up and managing cascaded SRDF/Star configurations. This chapter contains the following:

- Overview 186
- Example 1: Setting up a cascaded SRDF/Star configuration 187
- Example 2: Reconfiguring for a transient fault on the async site 198
- Example 3: Switching to the sync target site after a disaster 209
- Example 4: Dynamically adding devices to a consistency group 221
- Example 5: Recovering from a failed dynamic add operation 227

The commands in this chapter were executed using Solutions Enabler V7.2 and higher.

Overview

Cascaded SRDF is a three-site disaster recovery configuration where data from the workload site is synchronously replicated to the synchronous target site, and then asynchronously replicated to the asynchronous target site. It uses a dual role SRDF R1/R2 device (referred to as SRDF R21 device) on the synchronous target site that acts as both an R2 to the workload site and an R1 to the asynchronous target site.

As shown in Figure 41, in the event of losing the synchronous target site, cascaded SRDF/Star provides differential resynchronization capabilities between the workload site and the asynchronous target through a recovery group. This is achieved by using SDDF technology at the workload site that keeps track of the data difference between workload and asynchronous target site.

Examples 1 through 3 in this chapter use the cascaded SRDF/Star hardware configuration, shown in Figure 41, consisting of the following sites:

- NewYork site: R1 devices connecting to NewJersey in synchronous mode
- NewJersey site: R21 devices connecting to NewYork in synchronous mode and to London in asynchronous mode
- London site: R2 devices connecting to NewJersey in asynchronous mode

Commands are executed from a control host at the workload site.

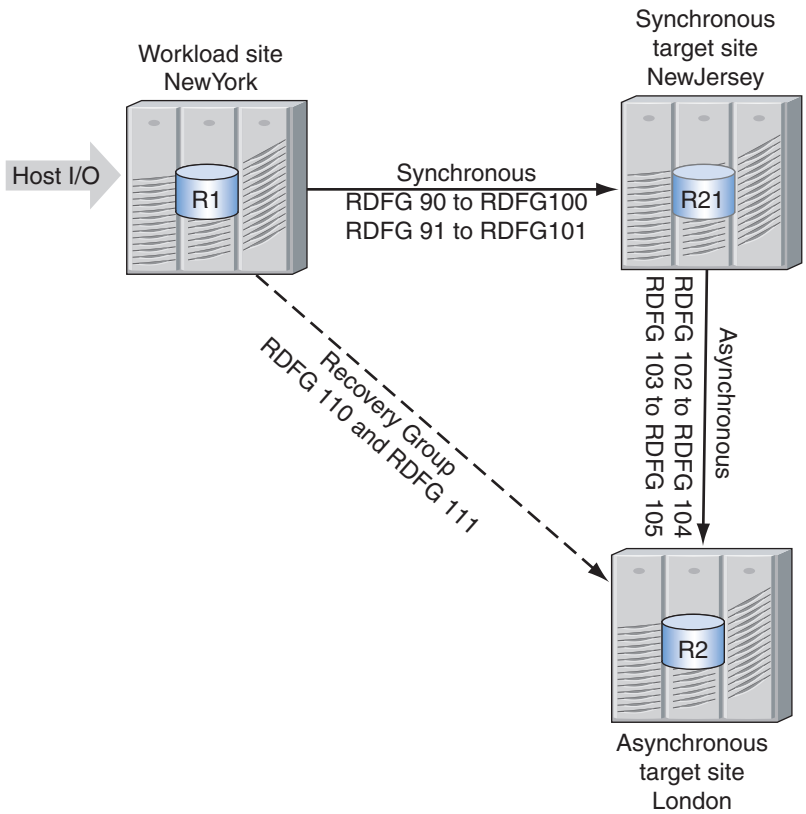

Figure 41 Connectivity using a cascaded SRDF/Star setup

Example 1: Setting up a cascaded SRDF/Star configuration

Creating the configuration

In this example, the following `symcg create` command creates a composite group named `StarProd` of type RDF1. The `-rdf_consistency` parameter adds `StarProd` to the consistency database for SRDF/Star consistency protection.

```
symcg create StarProd -rdf_consistency -type rdf1
```

The following commands add all devices to `StarProd` from the two groups comprising the cascaded SRDF/Star configuration:

```
symcg -cg StarProd -sid 000192600198 addall dev -rdfg 90
symcg -cg StarProd -sid 000192600198 addall dev -rdfg 91
```

Note: When building a cascaded SRDF/Star configuration, you only add the name and recovery group information for NewJersey. This is unlike building a concurrent configuration where you must add the name and recovery group information for both NewJersey and London.

The following `symcg set -name` command creates a remote SRDF group name named `NewJersey` required for the cascaded SRDF/Star configuration. The NewYork workload site is connected to NewJersey through the synchronous SRDF groups 90 and 91.

The parameter `-recovery_rdfg` adds a corresponding unique *recovery* SRDF group at the remote site for each *source* SRDF group that you added to the composite group. For example, the SRDF group 110 is an empty static or dynamic group configured as the SRDF recovery group for the SRDF group 90 on Symmetrix 198 (NewYork).

```
symcg -cg StarProd -rdfg 000192600198:90,91 set -name NewJersey
symcg -cg StarProd -rdfg 000192600198:90 set -recovery_rdfg 110
symcg -cg StarProd -rdfg 000192600198:91 set -recovery_rdfg 111
```

It is strongly recommended that you add BCVs at the sync and async target sites for mirroring the R2 data. The BCVs retain a consistent restartable image of the R2 data volumes during periods of resynchronization between the sites. The following `symbcv` commands add BCV devices for the async target site (London) to the composite group:

```
symbcv -cg StarProd -sid 000192600198 -rdfg 90 -remote_rdfg 102 -hop2 addall dev -range 250:253
symbcv -cg StarProd -sid 000192600198 -rdfg 91 -remote_rdfg 103 -hop2 addall dev -range 254:257
```

Showing the composite group contents

The following `symcg show` command displays the contents of the `StarProd` composite group as it was created and configured using the preceding commands:

```
symcg show StarProd

Composite Group Name:  StarProd

  Composite Group Type                                : RDF1
  Valid                                               : Yes
  CG in PowerPath                                     : No
  CG in GNS                                           : Yes
  RDF Consistency Protection Allowed                  : Yes
  RDF Consistency Mode                                : NONE
  Concurrent RDF                                      : No
```

```
  Cascaded RDF                                        : Yes

  Number of RDF (RA) Groups                           :    2
  Number of STD Devices                               :    8
  Number of CRDF STD Devices                          :    0
  Number of BCV's (Locally-associated)                :    0
  Number of VDEV's (Locally-associated)               :    0
  Number of TGT's Locally-associated                  :    0
  Number of CRDF TGT Devices                          :    0
  Number of RVDEV's (Remotely-associated VDEV)        :    0
  Number of RBCV's (Remotely-associated STD-RDF)      :    0
  Number of BRBCV's (Remotely-associated BCV-RDF)     :    0
  Number of RRBCV's (Remotely-associated RBCV)        :    0
  Number of RTGT's (Remotely-associated)              :    0
  Number of Hop2 BCV's (Remotely-assoc'ed Hop2 BCV)   :    8
  Number of Hop2 VDEV's (Remotely-assoc'ed Hop2 VDEV):    0
  Number of Hop2 TGT's (Remotely-assoc'ed Hop2 TGT)   :    0
  Number of Device Groups                             :    0
  Device Group Names                                  : N/A

  Number of RDFG Names (1):
    {

    1) RDFG Name                                      : NewJersey
       Consistency Mode                               : NONE
    }

  Number of Symmetrix Units (1):
    {

    1) Symmetrix ID                                    : 000192600198
       Microcode Version                               : 5875
       Number of STD Devices                           :    8
       Number of CRDF STD Devices                      :    0
       Number of BCV's (Locally-associated)            :    0
       Number of VDEV's (Locally-associated)           :    0
       Number of TGT's Locally-associated              :    0
       Number of CRDF TGT Devices                      :    0
       Number of RVDEV's (Remotely-associated VDEV)    :    0
       Number of RBCV's (Remotely-associated STD_RDF)  :    0
       Number of BRBCV's (Remotely-associated BCV-RDF):    0
       Number of RTGT's (Remotely-associated)          :    0
       Number of RRBCV's (Remotely-associated RBCV)    :    0
       Number of Hop2BCV's (Remotely-assoc'ed Hop2BCV):    8
       Number of Hop2VDEVs(Remotely-assoc'ed Hop2VDEV):    0
       Number of Hop2TGT's (Remotely-assoc'ed Hop2TGT):    0

       Number of RDF (RA) Groups (2):
         {

         1) RDF (RA) Group Number  :  90            (59)
            Remote Symmetrix ID    : 000192600256
            Microcode Version      : 5875
            Recovery RA Group      : 110            (6D)
            RA Group Name          : NewJersey

            STD Devices (4):
              {

-------------------------------------------------------------------------------------------
                                                        Sym  Device           Flags    Cap
            LdevName    PdevName                         Dev  Config       Sts   CSRT    (MB)

-------------------------------------------------------------------------------------------
            DEV001      N/A                             0220 RDF1+R-5      RW    .--1    4314
            DEV002      N/A                             0221 RDF1+R-5      RW    .--1    4314
```

```
            DEV003     N/A                                0222 RDF1+R-5     RW   .--1    4314
            DEV004     N/A                                0223 RDF1+R-5     RW   .--1    4314
              }

            Number of Hop 2 RDF (RA) Groups (1):
              {

               1) Hop-2 RDF (RA) Group Number  : 102            (65)
                  Remote Symmetrix ID          : 000192600321
                  Microcode Version            : 5875

                  Hop2 BCV Devices Remotely-associated (4):
                  {

-------------------------------------------------------------------------------------------
                                                      Sym  Device          Flags    Cap
               LdevName   PdevName                     Dev  Config      Sts  CSRT    (MB)

-------------------------------------------------------------------------------------------
                2BCV001    N/A                          0250 BCV+R-5     RW   ----    4314
                2BCV002    N/A                          0251 BCV+R-5     RW   ----    4314
                2BCV003    N/A                          0252 BCV+R-5     RW   ----    4314
                2BCV004    N/A                          0253 BCV+R-5     RW   ----    4314
                  }
              }

         2) RDF (RA) Group Number  :  91            (5A)
            Remote Symmetrix ID    : 000192600256
            Microcode Version      : 5875
            Recovery RA Group      : 111            (6E)
            RA Group Name          : NewJersey

            STD Devices (4):
              {

-------------------------------------------------------------------------------------------
                                                      Sym  Device          Flags    Cap
            LdevName   PdevName                       Dev  Config      Sts  CSRT    (MB)

-------------------------------------------------------------------------------------------
            DEV005     N/A                                0224 RDF1+R-5     RW   .--1    4314
            DEV006     N/A                                0225 RDF1+R-5     RW   .--1    4314
            DEV007     N/A                                0226 RDF1+R-5     RW   .--1    4314
            DEV008     N/A                                0227 RDF1+R-5     RW   .--1    4314
              }

            Number of Hop 2 RDF (RA) Groups (1):
              {

               1) Hop-2 RDF (RA) Group Number  : 103            (66)
                  Remote Symmetrix ID          : 000192600321
                  Microcode Version            : 5875

                  Hop2 BCV Devices Remotely-associated (4):
                  {

-------------------------------------------------------------------------------------------
                                                      Sym  Device          Flags    Cap
               LdevName   PdevName                     Dev  Config      Sts  CSRT    (MB)

-------------------------------------------------------------------------------------------
                2BCV005    N/A                          0254 BCV+R-5     RW   ----    4314
                2BCV006    N/A                          0255 BCV+R-5     RW   ----    4314
                2BCV007    N/A                          0256 BCV+R-5     RW   ----    4314
                2BCV008    N/A                          0257 BCV+R-5     RW   ----    4314
                  }
```

```
                }
            }
        }

Legend:
  RDFA Flags:
       C(onsistency)   : X = Enabled, . = Disabled, - = N/A
       (RDFA) S(tatus) : A = Active, I = Inactive, - = N/A
       R(DFA Mode)     : S = Single-session mode, M = MSC mode, - = N/A
       (Mirror) T(ype) : 1 = R1, 2 = R2, - = N/A
```

Configuring the options file

The following command displays the contents of a cascaded SRDF/Star options text file named `CascadedStar.option`. In this file, you enter the parameters and values that specify the site names. Note that you must set the `SYMCLI_STAR_ALLOW_CASCADED_CONFIGURATION` to `Yes`. As required, the name chosen for the sync target site (NewJersey) must match the name previously specified in the `symcg set -name` command. This options file is specified in the `setup` command shown next.

```
cat CascadedStar.option

SYMCLI_STAR_WORKLOAD_SITE_NAME    = NewYork
SYMCLI_STAR_SYNCTARGET_SITE_NAME  = NewJersey
SYMCLI_STAR_ASYNCTARGET_SITE_NAME = London
SYMCLI_STAR_ADAPTIVE_COPY_TRACKS  = 30000
SYMCLI_STAR_ACTION_TIMEOUT        = 1800
SYMCLI_STAR_ALLOW_CASCADED_CONFIGURATION = Yes
SYMCLI_STAR_COMPATIBILITY_MODE=v70
SYMCLI_STAR_AUTO_DISTRIBUTE_INTERNAL_FILE=Yes
```

Setting up cascaded SRDF/Star

The following `symstar setup` command builds an SRDF/Star definition file that defines the R1 composite group at the workload site. This file is saved in a directory on the host (UNIX:`/var/symapi/config/STAR/def`, Windows: `/Program Files/EMC/SYMAPI/config/STAR/def`) as well as in a Symmetrix File System (SFS) directory at each site. The SRDF/Star definition file in SFS allows you to build CGs at the remote target sites. In previous releases of Solutions Enabler, this file had to be copied from the workload site to the remote target sites. This is no longer necessary. Note the highlighted distribution step in the following output.

```
symstar -cg StarProd setup -options CascadedStar.option -noprompt

Setup.............................................................Started.
 Analyzing  Host Composite Grp: StarProd...........................Started.
 Syncing    Symmetrix information.................................Started.
 Syncing    Symmetrix information.................................Done.
 Gathering  Symmetrix SID: 000192600198 RDFG: 90..................Started.
 Gathering  Symmetrix SID: 000192600198 RDFG: 90..................Done.
 Gathering  Symmetrix SID: 000192600198 RDFG: 110.................Started.
 Gathering  Symmetrix SID: 000192600198 RDFG: 110.................Done.
 Gathering  Symmetrix SID: 000192600198 RDFG: 91..................Started.
 Gathering  Symmetrix SID: 000192600198 RDFG: 91..................Done.
 Gathering  Symmetrix SID: 000192600198 RDFG: 111.................Started.
 Gathering  Symmetrix SID: 000192600198 RDFG: 111.................Done.
 Validating Host Composite Grp: StarProd...........................Started.
 Validating Symmetrix SID: 000192600198............................Started.
 Validating Symmetrix SID: 000192600198............................Done.
 Validating RDF Group SID: 000192600198 RDFG: 91..................Started.
```

```
Validating RDF Group SID: 000192600198 RDFG: 91.....................Done.
Validating RDF Group SID: 000192600198 RDFG: 91 Devices.............Started.
Validating RDF Group SID: 000192600198 RDFG: 91 Devices.............Done.
Validating Symmetrix SID: 000192600256..............................Started.
Validating Symmetrix SID: 000192600256..............................Done.
Validating RDF Group SID: 000192600256 RDFG: 101....................Started.
Validating RDF Group SID: 000192600256 RDFG: 101....................Done.
Validating RDF Group SID: 000192600256 RDFG: 101 Devices............Started.
Validating RDF Group SID: 000192600256 RDFG: 101 Devices............Done.
Validating RDF Group SID: 000192600256 RDFG: 103....................Started.
Validating RDF Group SID: 000192600256 RDFG: 103....................Done.
Validating RDF Group SID: 000192600198 RDFG: 90.....................Started.
Validating RDF Group SID: 000192600198 RDFG: 90.....................Done.
Validating RDF Group SID: 000192600198 RDFG: 90 Devices.............Started.
Validating RDF Group SID: 000192600198 RDFG: 90 Devices.............Done.
Validating RDF Group SID: 000192600256 RDFG: 100....................Started.
Validating RDF Group SID: 000192600256 RDFG: 100....................Done.
Validating RDF Group SID: 000192600256 RDFG: 100 Devices............Started.
Validating RDF Group SID: 000192600256 RDFG: 100 Devices............Done.
Validating RDF Group SID: 000192600256 RDFG: 102....................Started.
Validating RDF Group SID: 000192600256 RDFG: 102....................Done.
Validating RDF Group SID: 000192600198 RDFG: 111....................Started.
Validating RDF Group SID: 000192600198 RDFG: 111....................Done.
Validating RDF Group SID: 000192600198 RDFG: 111 Devices............Started.
Validating RDF Group SID: 000192600198 RDFG: 111 Devices............Done.
Validating Symmetrix SID: 000192600321..............................Started.
Validating Symmetrix SID: 000192600321..............................Done.
Validating RDF Group SID: 000192600321 RDFG: 111....................Started.
Validating RDF Group SID: 000192600321 RDFG: 111....................Done.
Validating RDF Group SID: 000192600321 RDFG: 111 Devices............Started.
Validating RDF Group SID: 000192600321 RDFG: 111 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 105....................Started.
Validating RDF Group SID: 000192600321 RDFG: 105....................Done.
Validating RDF Group SID: 000192600198 RDFG: 110....................Started.
Validating RDF Group SID: 000192600198 RDFG: 110....................Done.
Validating RDF Group SID: 000192600198 RDFG: 110 Devices............Started.
Validating RDF Group SID: 000192600198 RDFG: 110 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 110....................Started.
Validating RDF Group SID: 000192600321 RDFG: 110....................Done.
Validating RDF Group SID: 000192600321 RDFG: 110 Devices............Started.
Validating RDF Group SID: 000192600321 RDFG: 110 Devices............Done.
Validating RDF Group SID: 000192600321 RDFG: 104....................Started.
Validating RDF Group SID: 000192600321 RDFG: 104....................Done.
Validating Host Composite Grp: StarProd.............................Done.
Gathering  Recovery Path Connection Information.....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 103....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 103....................Done.
Validating Symmetrix SID: 000192600256 RDFG: 103....................Started.
Validating Symmetrix SID: 000192600256 RDFG: 103....................Done.
Gathering  Symmetrix SID: 000192600256 RDFG: 102....................Started.
Gathering  Symmetrix SID: 000192600256 RDFG: 102....................Done.
Validating Symmetrix SID: 000192600256 RDFG: 102....................Started.
Validating Symmetrix SID: 000192600256 RDFG: 102....................Done.
Gathering  Recovery Path Connection Information.....................Done.
Analyzing  Host Composite Grp: StarProd.............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Setting Star data consistency indicators............................Done.
Distributing setup information to remote sites......................Started.
Distributing setup information to remote sites......................Done.
Update persistent state information.................................Started.
```

```
Update persistent state information.............................Done.
Setup...........................................................Done.
```

Querying the connectivity

The following symstar query command shows that the current System State for both remote target sites is Disconnected. The 1st Target Site lists RDF Consistency Capability as SYNC, while the 2nd Target Site lists RDF Consistency Capability as MSC.

symstar -cg StarProd query -detail

```
Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Disconnected
  2nd_Target_Site                               : Disconnected
  STAR                                          : Unprotected
  Mode of Operation                             : Cascaded
  }

Last Action Performed                           : SetupInit
Last Action Status                              : Successful
Last Action Timestamp                           : 07/07/2010_11:18:13

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

                 Source Site                                    Target Site
  ------------------------------------------ -- ------------------------------------------------- - ------------
                  ST                         LI                  ST                                M
                RD  A                         N Remote        RD  A                                O
  Symmetrix     F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID            G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600198  91 RW        0   276120 S..R. NR 000192600256 101 WD        0        0 T..R.  111 S Suspended
   000192600198  90 RW        0   276120 S..R. NR 000192600256 100 WD        0        0 T..R.  110 S Suspended

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0   552240 S..R. NR                  WD        0        0 T..R.      S Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

                 Source Site                                    Target Site
  ------------------------------------------ -- ------------------------------------------------- - ------------
                  ST                         LI                  ST                                M
                RD  A                         N Remote        RD  A                                O
  Symmetrix     F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID            G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600256 103 RW        0   276120 S..R. NR 000192600321 105 WD        0        0 T..R.  111 C Suspended
  000192600256 102 RW        0   276120 S..R. NR 000192600321 104 WD        0        0 T..R.  110 C Suspended

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0   552240 S..R. NR                  WD        0        0 T..R.      C Suspended
```

```
  }

Legend:

  Flags:
    T(ype of Device)          : S = Source (R1) ,    T = Target (R2),    M = Mixed,  . = N/A
    R(ecovery Capability)     : A = Async Target,    S = Sync Target,    M = Mixed,  . = N/A
    (Recovery) S(tate)        : A = Active,          I = Inactive,       C = Clear,  M = Mixed,  . = None
    (RDF) G(roup Star Mode)   : N = Normal,          R = Recovery,       M = Mixed,  . = None
    (M)SC Cleanup Required    : X = Required,        . = Not Required

  Modes:
    Mode of Operation         : A = Async, C = Adaptive Copy, S = Sync, O = Other, M = Mixed
```

Verifying the mode of operation

To see if you are running a cascaded or concurrent SRDF/Star configuration, check the Mode of Operation under the System State fields in the following `symstar query` output:

symstar -cg StarProd query -detail

```
Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Disconnected
  2nd_Target_Site                               : Disconnected
  STAR                                          : Unprotected
  Mode of Operation                             : Cascaded
  }

Last Action Performed                           : SetupInit
Last Action Status                              : Successful
Last Action Timestamp                           : 07/07/2010_11:18:13

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

                 Source Site                                    Target Site
  ------------------------------------------ -- ------------------------------------------------- - ------------
                  ST                          LI                  ST                                M
               RD   A                          N Remote       RD   A                                O
  Symmetrix     F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID            G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600198  91 RW        0   276120 S..R. NR 000192600256 101 WD        0        0 T..R.  111 S Suspended
  000192600198  90 RW        0   276120 S..R. NR 000192600256 100 WD        0        0 T..R.  110 S Suspended

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0   552240 S..R. NR                  WD        0        0 T..R.      S Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

                 Source Site                                    Target Site
  ------------------------------------------ -- ------------------------------------------------- - ------------
```

```
                 ST                        LI                 ST                              M
             RD   A                         N Remote       RD   A                              O
  Symmetrix   F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID          G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600256 103 RW        0   276120 S..R. NR 000192600321 105 WD        0        0 T..R.  111 C Suspended
  000192600256 102 RW        0   276120 S..R. NR 000192600321 104 WD        0        0 T..R.  110 C Suspended

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0   552240 S..R. NR                  WD        0        0 T..R.      C Suspended
  }

Legend:

  Flags:
    T(ype of Device)         : S = Source (R1) ,    T = Target (R2),    M = Mixed,  . = N/A
    R(ecovery Capability)    : A = Async Target,    S = Sync Target,    M = Mixed,  . = N/A
    (Recovery) S(tate)       : A = Active,          I = Inactive,       C = Clear,  M = Mixed,  . = None
    (RDF) G(roup Star Mode)  : N = Normal,          R = Recovery,       M = Mixed,  . = None
    (M)SC Cleanup Required   : X = Required,        . = Not Required

  Modes:
    Mode of Operation        : A = Async, C = Adaptive Copy, S = Sync, O = Other, M = Mixed
```

Building a composite group

You now have the option of using the `symstar buildcg` command to build a matching R2 composite group at each site. If the SRDF/Star options file, used at setup time, contains `SYMCLI_STAR_AUTO_DISTRIBUTE_INTERNAL_FILE=YES`, you can execute `symstar buildcg` from any control host that has access to the SRDF/Star definition file located in the SFS of a Symmetrix array. If this SRDF/Star option is set to `NO`, you can execute this command from any control host with access to the SRDF/Star definition file. The following shows the output that is generated when building the two R2 composite groups.

The following command, executed at the NewJersey host, builds the composite group `StarProd` at the NewJersey site:

```
symstar -cg StarProd buildcg -site NewJersey -noprompt

BuildCG.............................................................Started.
BuildCG.............................................................Done.
```

The following command, executed at the London host, builds the composite group `StarProd` at the London site:

```
symstar -cg StarProd buildcg -site London -noprompt

BuildCG.............................................................Started.
BuildCG.............................................................Done.
```

Connecting the sites

The following `symstar connect` commands bring the devices to read/write (RW) on the SRDF link:

```
symstar -cg StarProd connect -site London -noprompt

A STAR Connect operation is
in progress for composite group StarProd. Please wait...

 Connect_London.....................................................Started.
 Setting Star data consistency indicators...........................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Disable RDF Consistency protection.................................Started.
 Disable RDF Consistency protection.................................Done.
 Set Mode Adaptive Copy.............................................Not Needed.
 Establish SID:000192600256 RDFG:103................................Started.
```

```
 Establish SID:000192600256 RDFG:102.................................Started.
 Establish SID:000192600256 RDFG:103.................................Done.
 Establish SID:000192600256 RDFG:102.................................Done.
 SA RW Enable Devs...................................................Not Needed.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Connect_London......................................................Done.
```

symstar -cg StarProd connect -site NewJersey -noprompt

```
 Connect_NewJersey...................................................Started.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Setting Star data consistency indicators............................Not Needed.
 Setting Star data consistency indicators............................Not Needed.
 Disable RDF Consistency protection..................................Started.
 Disable RDF Consistency protection..................................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:91.....................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:90.....................Done.
 Establish SID:000192600198 RDFG:91..................................Started.
 Establish SID:000192600198 RDFG:90..................................Started.
 Establish SID:000192600198 RDFG:91..................................Done.
 Establish SID:000192600198 RDFG:90..................................Done.
 SA RW Enable Devs...................................................Not Needed.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Connect_NewJersey...................................................Done.
```

Protecting the sites

When running SRDF/Star in cascaded mode, you must issue the `protect` command for the synchronous target site before issuing the `protect` command for the asynchronous target site. If you do not, the following error message displays:

symstar -cg StarProd protect -site London -noprompt

```
A STAR Protect operation is
in progress for composite group StarProd. Please wait...

The operation is not allowed in the current Star state.
```

The following `symstar protect` command brings up NewJersey, setting synchronous mode, and turning on RDF consistency protection for each link:

symstar -cg StarProd protect -site NewJersey -noprompt

```
 Protect_NewJersey...................................................Started.
 Wait for invalid tracks to reach 30000..............................Started.
 Wait for invalid tracks to reach 30000..............................Done.
 Set Mode Sync SID:000192600198 RDFG:91..............................Started.
 Set Mode Sync SID:000192600198 RDFG:90..............................Started.
 Set Mode Sync SID:000192600198 RDFG:91..............................Done.
 Set Mode Sync SID:000192600198 RDFG:90..............................Done.
 Enable RDF Consistency protection...................................Started.
 Enable RDF Consistency protection...................................Done.
 Wait for invalid tracks to reach 0..................................Started.
 Wait for invalid tracks to reach 0..................................Done.
 Wait until RDF consistency is achieved..............................Started.
 Wait until RDF consistency is achieved..............................Done.
```

```
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Update persistent state information...............................Started.
Update persistent state information...............................Done.
Protect_NewJersey.................................................Done.
```

The following `symstar protect` command brings up London, setting asynchronous mode and turns on SRDF consistency protection for each link:

```
symstar -cg StarProd protect -site London -noprompt

Protect_London....................................................Started.
Wait for invalid tracks to reach 30000............................Started.
Wait for invalid tracks to reach 30000............................Done.
Set Mode Async SID:000192600256 RDFG:103..........................Started.
Set Mode Async SID:000192600256 RDFG:102..........................Started.
Set Mode Async SID:000192600256 RDFG:103..........................Done.
Set Mode Async SID:000192600256 RDFG:102..........................Done.
Enable RDF Consistency protection.................................Started.
Enable RDF Consistency protection.................................Done.
Wait for invalid tracks to reach 0................................Started.
Wait for invalid tracks to reach 0................................Done.
Wait until RDF consistency is achieved............................Started.
Wait until RDF consistency is achieved............................In Progress.
Wait until RDF consistency is achieved............................In Progress.
Wait until RDF consistency is achieved............................Done.
Setting Star data consistency indicators..........................Started.
Setting Star data consistency indicators..........................Done.
Update persistent state information...............................Started.
Update persistent state information...............................Done.
Protect_London....................................................Done.
```

Querying sites for SRDF consistency

The following `symstar query` command shows the **1st Target Site and 2nd Target Site are** now **Protected**. Note the **Last Action Performed** was to **Protect_London**. The 1st Target Site lists the RDF Consistency Mode as **SYNC**, while the 2nd Target Site lists the RDF Consistency Capability Mode as **MSC**.

```
symstar -cg StarProd query -detail

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Protected
  STAR                                       : Unprotected
  Mode of Operation                          : Cascaded
  }

Last Action Performed                        : Protect_London
Last Action Status                           : Successful
Last Action Timestamp                        : 07/07/2010_14:05:12

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current : N/A
  }

1st Target Site Information:
```

```
  {
  Source Site Name                          : NewYork
  Target Site Name                          : NewJersey
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : SYNC
  Site Data Image Consistent                : Yes

                 Source Site                                  Target Site
  ---------------------------------------- -- ---------------------------------------------- - ------------
                   ST                       LI                  ST                             M
                RD  A                        N Remote       RD   A                             O
  Symmetrix      F  T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID             G  E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600198  91 RW        0        0 S..N. RW 000192600256 101 WD        0        0 T..N.  111 S Synchronized
  000192600198  90 RW        0        0 S..N. RW 000192600256 100 WD        0        0 T..N.  110 S Synchronized

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0        0 S..N. RW                  WD        0        0 T..N.      S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                          : NewJersey
  Target Site Name                          : London
  RDF Consistency Capability                : MSC
  RDF Consistency Mode                      : MSC
  Site Data Image Consistent                : Yes

                 Source Site                                  Target Site
  ---------------------------------------- -- ---------------------------------------------- - ------------
                   ST                       LI                  ST                             M
                RD  A                        N Remote       RD   A                             O
  Symmetrix      F  T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID             G  E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192600256 103 RW        0        0 S..N. RW 000192600321 105 WD        0        0 T..N.  111 A Consistent
  000192600256 102 RW        0        0 S..N. RW 000192600321 104 WD        0        0 T..N.  110 A Consistent

          Totals:  -- -------- -------- ----- --                  -- -------- -------- -----      - ------------
                   RW        0        0 S..N. RW                  WD        0        0 T..N.      A Consistent
  }

Legend:

  Flags:
    T(ype of Device)         : S = Source (R1) ,    T = Target (R2),    M = Mixed,  . = N/A
    R(ecovery Capability)    : A = Async Target,    S = Sync Target,    M = Mixed,  . = N/A
    (Recovery) S(tate)       : A = Active,          I = Inactive,       C = Clear,  M = Mixed,  . = None
    (RDF) G(roup Star Mode)  : N = Normal,          R = Recovery,       M = Mixed,  . = None
    (M)SC Cleanup Required   : X = Required,        . = Not Required

  Modes:
    Mode of Operation        : A = Async, C = Adaptive Copy, S = Sync, O = Other, M = Mixed
```

Enabling the cascaded SRDF/Star configuration

The following `symstar enable` command completes the set up of the cascaded SRDF/Star configuration:

```
symstar -cg StarProd enable -noprompt

Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target SID:000192600198................................Started.
 Create STAR target SID:000192600198................................Done.
 Create STAR target SID:000192600321................................Started.
 Create STAR target SID:000192600321................................Done.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Clear STAR target SID:000192600198.................................Started.
 Clear STAR target SID:000192600198.................................Done.
 Clear STAR target SID:000192600321.................................Started.
 Clear STAR target SID:000192600321.................................Done.
 Setting Star data consistency indicators...........................Not Needed.
 Activate STAR target SID:000192600198..............................Started.
 Activate STAR target SID:000192600198..............................Done.
 Enable STAR protection.............................................Started.
 Enable STAR protection.............................................Done.
 Wait until R2 Recoverable is achieved..............................Started.
```

```
Wait until R2 Recoverable is achieved.............................In Progress.
Wait until R2 Recoverable is achieved.............................In Progress.
Wait until R2 Recoverable is achieved.............................Done.
Enable............................................................Done.
```

Example 2: Reconfiguring for a transient fault on the async site

When you have a transient failure (unplanned interruption) on the links from NewJersey to London, you can reconfigure the cascaded mode to concurrent mode, and then use the healthy SRDF connection from NewYork to London.

In this example, the RDF groups representing the links to the async target site (London) have experienced a transient fault. Commands are executed from the control host at the workload site.

Querying the devices

The following `symstar query` command shows all R1 devices linked to the London site are in the Suspended/Partitioned state. The System State shows that the sync target site is still protected but that the path to the async site has failed and that SRDF/Star protection was tripped.

```
symstar -cg StarProd

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : PathFail
  STAR                                          : Tripped
  Mode of Operation                             : Cascaded
  }

Last Action Performed                           : Enable
Last Action Status                              : Successful
Last Action Timestamp                           : 07/15/2010_11:37:34

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : STAR
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : Yes
  R2 Recoverable                                : Yes
  Asynchronous Target Site Data most Current    : No
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
```

```
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                       Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : London
  RDF Consistency Capability                    : MSC
  RDF Consistency Mode                          : MSC
  Site Data Image Consistent                    : Yes

            Source Site                       Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
        RD   A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

00256 103 RW        0     3948 NR 00321 105 WD        0        0 A Suspended
00256 102 RW        0     3899 NR 00321 104 WD        0        0 A Suspended

Totals:    -- -------- -------- --           -- -------- -------- - ------------
           RW        0     7847 NR           WD        0        0 A Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
}
```

Note: This query was performed in a non-failure scenario for demonstration purposes only. Typically, you do not reconfigure from a Suspended state because you could just reset and come back in the same Star mode.

Reconfiguring the London site

Even before the cause of the transient fault is corrected, you can begin steps to recover the London site. The following `symstar reconfigure` command reconfigures the mode of operation from cascaded to concurrent, and cleans up the internal metadata at London. Note that you must use the `-force` option with the following command. You then use the healthy SRDF connection from NewYork to London.

symstar reconfigure -site London -path NewYork:London -reset -noprompt

```
A STAR Reconfigure operation is
in progress for composite group StarProd. Please wait...

Operation can not be performed except if force flag is used.
```

symstar reconfigure -site London -path NewYork:London -reset -noprompt -force

```
A STAR Reconfigure operation is
in progress for composite group StarProd. Please wait...

 Reconfigure.......................................................Started.
 MSC Cleanup.......................................................Not Needed.
 Setting Star data consistency indicators..........................Started.
 Setting Star data consistency indicators..........................Done.
 Setting Star data consistency indicators..........................Started.
 Setting Star data consistency indicators..........................Done.
 Disable STAR protection...........................................Started.
 Disable STAR protection...........................................Done.
 Disable RDF Consistency protection................................Started.
 Disable RDF Consistency protection................................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:103..................Started.
 Set Mode Adaptive Copy SID:000192600256 RDFG:102..................Started.
 Set Mode Adaptive Copy SID:000192600256 RDFG:103..................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:102..................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Suspend...........................................................Not Needed.
 Half Delete SID:000192600321 RDFG:105.............................Started.
 Half Delete SID:000192600321 RDFG:104.............................Started.
 Half Delete SID:000192600321 RDFG:105.............................Done.
 Half Delete SID:000192600321 RDFG:104.............................Done.
 Suspend...........................................................Not Needed.
 Half Delete SID:000192600256 RDFG:103.............................Started.
 Half Delete SID:000192600256 RDFG:102.............................Started.
 Half Delete SID:000192600256 RDFG:103.............................Done.
 Half Delete SID:000192600256 RDFG:102.............................Done.
 Createpair SID:000192600198 RDFG:110..............................Started.
 Createpair SID:000192600198 RDFG:111..............................Started.
 Createpair SID:000192600198 RDFG:110..............................Done.
 Createpair SID:000192600198 RDFG:111..............................Done.
 Setting Star data consistency indicators..........................Not Needed.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 SA RW Enable Devs.................................................Not Needed.
 Ready Devs........................................................Not Needed.
 Assign Name:NewJersey, Recovery RDFG:103 to SID:000192600198 RDFG:91Started.
 Assign Name:NewJersey, Recovery RDFG:103 to SID:000192600198 RDFG:91Done.
 Assign Name:NewJersey, Recovery RDFG:102 to SID:000192600198 RDFG:90Started.
 Assign Name:NewJersey, Recovery RDFG:102 to SID:000192600198 RDFG:90Done.
 Assign Name:London, Recovery RDFG:104 to SID:000192600198 RDFG:110..Started.
 Assign Name:London, Recovery RDFG:104 to SID:000192600198 RDFG:110..Done.
 Assign Name:London, Recovery RDFG:105 to SID:000192600198 RDFG:111..Started.
 Assign Name:London, Recovery RDFG:105 to SID:000192600198 RDFG:111..Done.
 Deactivate STAR target............................................Not Needed.
 Deactivate STAR target SID:000192600198...........................Started.
 Deactivate STAR target SID:000192600198...........................Done.
 Deactivate STAR target............................................Not Needed.
 Reconfigure.......................................................Done.
```

Verifying the configuration

The following `symstar query` command shows an updated status of this SRDF/Star configuration. The Last Action status line shows that reconfiguring the async target site with the `-reset` option was successful. The System State shows that the 1st_Target sync site is still Protected but that the 2nd_Target async site is Disconnected and thus unprotected. The Mode of Operation indicates StarProd is now operating in concurrent mode.

```
symstar -cg StarProd query

Site Name                                    : NewYork

Workload Site                                : NewYork
1st Target Site                              : NewJersey
2nd Target Site                              : London

Composite Group Name                         : StarProd
Composite Group Type                         : RDF1

Workload Data Image Consistent               : Yes
System State:
  {
  1st_Target_Site                            : Protected
  2nd_Target_Site                            : Disconnected
  STAR                                       : Unprotected
  Mode of Operation                          : Concurrent
  }

Last Action Performed                        : Reconfigure_London
Last Action Status                           : Successful
Last Action Timestamp                        : 07/15/2010_13:15:47

STAR Information:
  {
  STAR Consistency Capable                   : Yes
  STAR Consistency Mode                      : NONE
  Synchronous Target Site                    : NewJersey
  Asynchronous Target Site                   : London
  Differential Resync Available              : N/A
  R2 Recoverable                             : N/A
  Asynchronous Target Site Data most Current : N/A
  }

1st Target Site Information:
  {
  Source Site Name                           : NewYork
  Target Site Name                           : NewJersey
  RDF Consistency Capability                 : SYNC
  RDF Consistency Mode                       : SYNC
  Site Data Image Consistent                 : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
```

```
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 110 RW        0     5584 NR 00321 110 WD        0        0 C Suspended
  00198 111 RW        0     5584 NR 00321 111 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0    11168 NR           WD        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Connecting, protecting and enabling

Now that you have reconfigured the async target site to use the recovery SRDF links (you are now operating in concurrent SRDF mode), you can enable Star protection again by using the commands in the following steps.

Step 1

The following `symstar connect` command sets the mode to adaptive copy (if not in that mode already) and brings the devices to read/write (RW) on the SRDF link. If no change is needed, it is marked Not Needed, as shown below.

```
symstar -cg StarProd connect -site London -noprompt

 Connect_London.......................................................Started.
 Setting Star data consistency indicators............................Not Needed.
 Setting Star data consistency indicators............................Not Needed.
 Disable RDF Consistency protection..................................Started.
 Disable RDF Consistency protection..................................Done.
 Set Mode Adaptive Copy..............................................Not Needed.
 Establish SID:000192600198 RDFG:110.................................Started.
 Establish SID:000192600198 RDFG:111.................................Started.
 Establish SID:000192600198 RDFG:110.................................Done.
 Establish SID:000192600198 RDFG:111.................................Done.
 SA RW Enable Devs...................................................Not Needed.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Update persistent state information.................................Started.
 Update persistent state information.................................Done.
 Connect_London......................................................Done.
```

Step 2

The following `symstar protect` command transitions the London link from adaptive copy mode to asynchronous mode and enables SRDF consistency protection.

```
symstar -cg StarProd protect -site London -noprompt

 Protect_London.....................................................Started.
 Wait for invalid tracks to reach 30000.............................Started.
 Wait for invalid tracks to reach 30000.............................Done.
 Set Mode Async SID:000192600198 RDFG:110...........................Started.
 Set Mode Async SID:000192600198 RDFG:111...........................Started.
 Set Mode Async SID:000192600198 RDFG:110...........................Done.
 Set Mode Async SID:000192600198 RDFG:111...........................Done.
 Enable RDF Consistency protection..................................Started.
 Enable RDF Consistency protection..................................Done.
 Wait for invalid tracks to reach 0.................................Started.
 Wait for invalid tracks to reach 0.................................934
 Wait for invalid tracks to reach 0.................................Done.
 Wait until RDF consistency is achieved.............................Started.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................Done.
 Setting Star data consistency indicators...........................Started.
 Setting Star data consistency indicators...........................Done.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Protect_London.....................................................Done.
```

Step 3

The following `symstar enable` command initiates SRDF/Star consistency protection. It initializes the SDDF sessions and enables SRDF/Star such that it waits for R2-recoverable Star protection before producing the STAR Protected system state.

```
symstar -cg StarProd enable -noprompt

 Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target SID:000192600256................................Started.
 Create STAR target SID:000192600256................................Done.
 Create STAR target.................................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Clear STAR target SID:000192600256.................................Started.
 Clear STAR target SID:000192600256.................................Done.
 Clear STAR target..................................................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Activate STAR target SID:000192600256..............................Started.
 Activate STAR target SID:000192600256..............................Done.
 Enable STAR protection.............................................Started.
 Enable STAR protection.............................................Done.
 Wait until R2 Recoverable is achieved..............................Started.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................In Progress.
 Wait until R2 Recoverable is achieved..............................Done.
 Enable.............................................................Done.
```

Checking the SRDF/Star configuration

SRDF/Star is now running in concurrent mode.

The following `symstar query` command shows that London was successfully protected. The SRDF pairs for London are now Consistent and running in async mode (A). It also shows that the enable action was successful and the System State is now STAR Protected.

```
symstar -cg StarProd query

Site Name                                   : NewYork

Workload Site                               : NewYork
1st Target Site                             : NewJersey
2nd Target Site                             : London

Composite Group Name                        : StarProd
Composite Group Type                        : RDF1

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : Protected
  2nd_Target_Site                           : Protected
  STAR                                      : Protected
  Mode of Operation                         : Concurrent
  }

Last Action Performed                       : Enable
Last Action Status                          : Successful
Last Action Timestamp                       : 07/15/2010_14:24:16

STAR Information:
  {
  STAR Consistency Capable                  : Yes
  STAR Consistency Mode                     : STAR
  Synchronous Target Site                   : NewJersey
  Asynchronous Target Site                  : London
  Differential Resync Available             : Yes
  R2 Recoverable                            : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : NewJersey
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : SYNC
  Site Data Image Consistent                : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI          ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --          -- -------- -------- - ------------
            RW        0        0 RW          WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : London
```

```
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 110 RW        0        0 RW 00321 110 WD        0        0 A Consistent
  00198 111 RW        0        0 RW 00321 111 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Reconfiguring SRDF mode to cascaded

When the network issue between NewJersey and London is repaired, use the following procedure to reconfigure the SRDF mode of operation to cascaded without disturbing the workload.

The reconfiguration is done by injecting an error between NewYork and London in order for it to go into a pathfail state. When in the pathfail state, use the `reconfigure` command to transition from concurrent to cascaded with the ability to incrementally resynchronize between NewJersey and London.

Note: During the reconfiguration, STAR protection is shut down and then restarted, resulting in a loss of full Star protection within that time.

Step 1

To begin the reconfiguration, issue the following command to place London in a pathfail state:

```
symstar -cg StarProd disconnect -trip -site London -noprompt

 Disconnect_London.....................................................Started.
 Suspend SID:000192600198 RDFG:110....................................Started.
 Suspend SID:000192600198 RDFG:111....................................Started.
 Suspend SID:000192600198 RDFG:110....................................Done.
 Suspend SID:000192600198 RDFG:111....................................Done.
 Disconnect_London.....................................................Done.

symstar -cg StarProd query


Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
```

```
Composite Group Type                          : RDF1

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : PathFail
  STAR                                        : Tripped
  Mode of Operation                           : Concurrent
  }

Last Action Performed                         : Disconnect_London
Last Action Status                            : Successful
Last Action Timestamp                         : 07/15/2010_16:08:16

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : STAR
  Synchronous Target Site                     : NewJersey
  Asynchronous Target Site                    : London
  Differential Resync Available               : Yes
  R2 Recoverable                              : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : NewJersey
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 110 RW        0        0 NR 00321 110 WD        0        0 A Suspended
```

```
  00198 111 RW        0        0 NR 00321 111 WD        0        0 A Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 A Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Step 2

Perform the following command to reset the mode of operation to cascaded SRDF/Star:

```
symstar -cg StarProd -site London -path NewJersey:London reconfigure -reset

 Reconfigure.......................................................Started.
 MSC Cleanup.......................................................Not Needed.
 Setting Star data consistency indicators..........................Started.
 Setting Star data consistency indicators..........................Done.
 Disable STAR protection...........................................Started.
 Disable STAR protection...........................................Done.
 Disable RDF Consistency protection................................Started.
 Disable RDF Consistency protection................................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:110..................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:111..................Started.
 Set Mode Adaptive Copy SID:000192600198 RDFG:110..................Done.
 Set Mode Adaptive Copy SID:000192600198 RDFG:111..................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Suspend...........................................................Not Needed.
 Half Delete SID:000192600321 RDFG:110.............................Started.
 Half Delete SID:000192600321 RDFG:111.............................Started.
 Half Delete SID:000192600321 RDFG:110.............................Done.
 Half Delete SID:000192600321 RDFG:111.............................Done.
 Suspend...........................................................Not Needed.
 Half Delete SID:000192600198 RDFG:110.............................Started.
 Half Delete SID:000192600198 RDFG:111.............................Started.
 Half Delete SID:000192600198 RDFG:110.............................Done.
 Half Delete SID:000192600198 RDFG:111.............................Done.
 Createpair SID:000192600256 RDFG:103..............................Started.
 Createpair SID:000192600256 RDFG:102..............................Started.
 Createpair SID:000192600256 RDFG:103..............................Done.
 Createpair SID:000192600256 RDFG:102..............................Done.
 Setting Star data consistency indicators..........................Not Needed.
 SA RW Enable Devs.................................................Not Needed.
 Ready Devs SID:000192600256.......................................Started.
 Ready Devs SID:000192600256.......................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 SA RW Enable Devs.................................................Not Needed.
 Ready Devs........................................................Not Needed.
 Assign Name:NewJersey, Recovery RDFG:111 to SID:000192600198 RDFG:91Started.
 Assign Name:NewJersey, Recovery RDFG:111 to SID:000192600198 RDFG:91Done.
 Assign Name:NewJersey, Recovery RDFG:110 to SID:000192600198 RDFG:90Started.
 Assign Name:NewJersey, Recovery RDFG:110 to SID:000192600198 RDFG:90Done.
 Deactivate STAR target SID:000192600256...........................Started.
 Deactivate STAR target SID:000192600256...........................Done.
 Deactivate STAR target............................................Not Needed.
 Deactivate STAR target............................................Not Needed.
 Reconfigure.......................................................Done
```

Step 3

Execute the following query to verify the Mode of Operation changed to Cascaded, and the reconfiguration of London was successful:

```
symstar -cg StarProd query

Site Name                                       : NewYork

Workload Site                                   : NewYork
1st Target Site                                 : NewJersey
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Protected
  2nd_Target_Site                               : Disconnected
  STAR                                          : Unprotected
  Mode of Operation                             : Cascaded
  }

Last Action Performed                           : Reconfigure_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/15/2010_16:17:06

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewJersey
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewYork
  Target Site Name                              : NewJersey
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : SYNC
  Site Data Image Consistent                    : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 RW        0        0 RW 00256 101 WD        0        0 S Synchronized
  00198  90 RW        0        0 RW 00256 100 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                              : NewJersey
```

```
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : No

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 103 RW        0       60 NR 00321 105 WD        0        0 C Suspended
  00256 102 RW        0       60 NR 00321 104 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0      120 NR           WD        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Performing connect, protect, and enable

The following commands `connect`, `protect` and `enable` Star consistency for `StarProd` at the London site:

```
symstar -cg StarProd -site London connect -noprompt

symstar -cg StarProd -site London protect -noprompt

symstar -cg StarProd enable
```

Page 202 shows sample output of the above commands.

TimeFinder BCVs

If you are protecting SRDF/Star data with TimeFinder BCVs at the London site and you split them after the `reset` action, you can now reestablish them.

Example 3: Switching to the sync target site after a disaster

This example illustrates a switch to the sync target site (NewJersey) and reconfigures SRDF/Star to concurrent mode when a disaster fault has occurred at the workload site (NewYork). As a result of the failure at NewYork, all commands are run from the NewJersey control host.

Note: You can tell if you are running a cascaded or concurrent configuration by checking the Mode of Operation in the `symstar query` output.

Querying the state of SRDF/Star

The following `symstar query` command displays the state of the SRDF/Star system. STAR has been **Tripped**, and the state of the links to both remote target sites is **PathFail**.

When running in cascaded SRDF/Star mode, the asynchronous target site never has data that is more current than the synchronous target site. Therefore, you are blocked from issuing `-keep_data London`.

```
symstar -cg StarProd query

Site Name                                   : NewJersey

Workload Site                               : NewYork
1st Target Site                             : NewJersey
2nd Target Site                             : London

Composite Group Name                        : StarProd
Composite Group Type                        : RDF21

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : PathFail
  2nd_Target_Site                           : PathFail
  STAR                                      : Tripped
  Mode of Operation                         : Cascaded
  }

Last Action Performed                       : None
Last Action Status                          : N/A
Last Action Timestamp                       : N/A

STAR Information:
  {
  STAR Consistency Capable                  : Yes
  STAR Consistency Mode                     : STAR
  Synchronous Target Site                   : NewJersey
  Asynchronous Target Site                  : London
  Differential Resync Available             : Yes
  R2 Recoverable                            : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                          : NewYork
  Target Site Name                          : NewJersey
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : SYNC
  Site Data Image Consistent                : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI          ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198  91 NA       NA       NA NR 00256 101 WD        0        0 S Partitioned
  00198  90 NA       NA       NA NR 00256 100 WD        0        0 S Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NA       NA       NA NR           WD        0        0 S Partitioned
  }

2nd Target Site Information:
  {
  Source Site Name                          : NewJersey
  Target Site Name                          : London
```

```
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 103 RW        0        0 NR 00321 105 NA       NA       NA A Partitioned
  00256 102 RW        0        0 NR 00321 104 NA       NA       NA A Partitioned

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           NA       NA       NA A Partitioned
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Switching the workload site to NewJersey

The following `symstar switch` command performs the tasks necessary to start the workload site at NewJersey:

```
symstar -cg StarProd switch -site NewJersey -keep_data NewJersey -noprompt

 Switch_NewJersey.....................................................Started.
 Update persistent state information..................................Started.
 Update persistent state information..................................Done.
 Suspend.............................................................Not Needed.
 Suspend.............................................................Not Needed.
 Cleanup Control Data SID:000192600256 RDFG:103......................Started.
 Cleanup Control Data SID:000192600256 RDFG:102......................Started.
 Cleanup Control Data SID:000192600256 RDFG:103......................Done.
 Cleanup Control Data SID:000192600256 RDFG:102......................Done.
 RA RW Enable R2 Devs SID:000192600256 RDFG:101......................Started.
 RA RW Enable R2 Devs SID:000192600256 RDFG:100......................Started.
 RA RW Enable R2 Devs SID:000192600256 RDFG:101......................Done.
 RA RW Enable R2 Devs SID:000192600256 RDFG:100......................Done.
 Update persistent state information..................................Started.
 Update persistent state information..................................Done.
 Switch_NewJersey.....................................................Done.
```

Verifying the switch

SRDF/Star was operating in cascaded mode before the switch to NewJersey. The switch does not change the SRDF operating modes. In the following display, the 1st and 2nd Target Site information shows cascaded connections from NewJersey to NewYork to London.

The following `symstar query` command shows that the `switch` action was successful and that NewJersey is the current workload site:

```
symstar -cg StarProd query

Site Name                                     : NewJersey

Workload Site                                 : NewJersey
```

```
1st Target Site                                  : NewYork
2nd Target Site                                  : London

Composite Group Name                             : StarProd
Composite Group Type                             : RDF21

Workload Data Image Consistent                   : Yes
System State:
  {
  1st_Target_Site                                : Disconnected
  2nd_Target_Site                                : Disconnected
  STAR                                           : Unprotected
  Mode of Operation                              : Cascaded
  }

Last Action Performed                            : Switch_NewJersey
Last Action Status                               : Successful
Last Action Timestamp                            : 07/16/2010_09:06:42

STAR Information:
  {
  STAR Consistency Capable                       : Yes
  STAR Consistency Mode                          : NONE
  Synchronous Target Site                        : NewYork
  Asynchronous Target Site                       : London
  Differential Resync Available                  : Yes
  R2 Recoverable                                 : N/A
  Asynchronous Target Site Data most Current     : N/A
  }

1st Target Site Information:
  {
  Source Site Name                               : NewJersey
  Target Site Name                               : NewYork
  RDF Consistency Capability                     : SYNC
  RDF Consistency Mode                           : NONE
  Site Data Image Consistent                     : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 RW        0        0 NR 00198  91 RW        0     4689 S Split
  00256 100 RW        0        0 NR 00198  90 RW        0     4683 S Split

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           RW        0     9372 S Split
  }

2nd Target Site Information:
  {
  Source Site Name                               : NewYork
  Target Site Name                               : London
  RDF Consistency Capability                     : MSC
  RDF Consistency Mode                           : NONE
  Site Data Image Consistent                     : No

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
```

```
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 110 NA       NA       NA NA 00321 110 NA       NA       NA O N/A
  00198 111 NA       NA       NA NA 00321 111 NA       NA       NA O N/A

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NA       NA       NA NA           NA       NA       NA O N/A
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Reconfiguring London to concurrent mode

The following command reconfigures the London site to concurrent mode:

```
symstar -cg StarProd -site London reconfigure -path NewJersey:London -noprompt

 Reconfigure.............................................................Started.
 Update persistent state information.....................................Started.
 Update persistent state information.....................................Done.
 Cleanup Control Data SID:000192600256 RDFG:101.........................Started.
 Cleanup Control Data SID:000192600256 RDFG:100.........................Started.
 Cleanup Control Data SID:000192600256 RDFG:101.........................Done.
 Cleanup Control Data SID:000192600256 RDFG:100.........................Done.
 Half Swap SID:000192600256 RDFG:101....................................Started.
 Half Swap SID:000192600256 RDFG:100....................................Started.
 Half Swap SID:000192600256 RDFG:101....................................Done.
 Half Swap SID:000192600256 RDFG:100....................................Done.
 Suspend.................................................................Not Needed.
 Cleanup Control Data....................................................Not Needed.
 Half Delete.............................................................Not Needed.
 Suspend.................................................................Not Needed.
 Cleanup Control Data....................................................Not Needed.
 Half Delete.............................................................Not Needed.
 Setting Star data consistency indicators................................Started.
 Setting Star data consistency indicators................................Done.
 Update persistent state information.....................................Started.
 Update persistent state information.....................................Done.
 MSC Cleanup.............................................................Not Needed.
 Setting Star data consistency indicators................................Started.
 Setting Star data consistency indicators................................Done.
 Disable STAR protection................................................Started.
 Disable STAR protection................................................Done.
 Disable RDF Consistency protection.....................................Started.
 Disable RDF Consistency protection.....................................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:103.......................Started.
 Set Mode Adaptive Copy SID:000192600256 RDFG:102.......................Started.
 Set Mode Adaptive Copy SID:000192600256 RDFG:103.......................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:102.......................Done.
 Half Swap SID:000192600198 RDFG:91.....................................Started.
 Half Swap SID:000192600198 RDFG:90.....................................Started.
 Half Swap SID:000192600198 RDFG:91.....................................Done.
 Half Swap SID:000192600198 RDFG:90.....................................Done.
 MSC Cleanup.............................................................Not Needed.
 Setting Star data consistency indicators................................Started.
 Setting Star data consistency indicators................................Done.
 Disable STAR protection................................................Started.
 Disable STAR protection................................................Done.
 Disable RDF Consistency protection.....................................Started.
 Disable RDF Consistency protection.....................................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:101.......................Started.
```

```
 Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Started.
 Set Mode Adaptive Copy SID:000192600256 RDFG:101....................Done.
 Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Done.
 SA RW Enable Devs...................................................Not Needed.
 Ready Devs..........................................................Not Needed.
 Deactivate STAR target SID:000192600198.............................Started.
 Deactivate STAR target SID:000192600198.............................Done.
 Deactivate STAR target..............................................Not Needed.
 Deactivate STAR target..............................................Not Needed.
 Reconfigure.........................................................Done.
```

Verifying mode of operation

The following command verifies that the Mode of Operation for NewJersey is **Concurrent**:

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Disconnected
  2nd_Target_Site                               : Disconnected
  STAR                                          : Unprotected
  Mode of Operation                             : Concurrent
  }

Last Action Performed                           : Reconfigure_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/16/2010_09:19:10

STAR Information:
  {
  STAR Consistency Capable                      : Yes
  STAR Consistency Mode                         : NONE
  Synchronous Target Site                       : NewYork
  Asynchronous Target Site                      : London
  Differential Resync Available                 : N/A
  R2 Recoverable                                : N/A
  Asynchronous Target Site Data most Current    : N/A
  }

1st Target Site Information:
  {
  Source Site Name                              : NewJersey
  Target Site Name                              : NewYork
  RDF Consistency Capability                    : SYNC
  RDF Consistency Mode                          : NONE
  Site Data Image Consistent                    : No

            Source Site                      Target Site
  ----------------------------- -- ----------------------------- - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------
```

```
  00256 101 RW        0        0 NR 00198  91 WD     4689        0 C Suspended
  00256 100 RW        0        0 NR 00198  90 WD     4683        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD     9372        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 103 RW        0        0 NR 00321 105 WD        0        0 C Suspended
  00256 102 RW        0        0 NR 00321 104 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 NR           WD        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Connecting to London

The following `symstar connect` command connects NewJersey to London, making its devices read/write (RW) on the links and synchronizing the devices between these two sites:

```
symstar -cg StarProd connect -site London -noprompt

Connect_London.......................................................Started.
 Update persistent state information..................................Started.
 Update persistent state information..................................Done.
 Setting Star data consistency indicators.............................Not Needed.
 Setting Star data consistency indicators.............................Not Needed.
 Disable RDF Consistency protection...................................Started.
 Disable RDF Consistency protection...................................Done.
 Set Mode Adaptive Copy...............................................Not Needed.
 Establish SID:000192600256 RDFG:103..................................Started.
 Establish SID:000192600256 RDFG:102..................................Started.
 Establish SID:000192600256 RDFG:103..................................Done.
 Establish SID:000192600256 RDFG:102..................................Done.
 SA RW Enable Devs....................................................Not Needed.
 SA RW Enable Devs....................................................Not Needed.
 Ready Devs...........................................................Not Needed.
 Update persistent state information..................................Started.
 Update persistent state information..................................Done.
 Connect_London.......................................................Done.
```

Protecting London

The following command protects London:

```
symstar -cg StarProd protect -site London -noprompt

 Protect_London.....................................................Started.
 Wait for invalid tracks to reach 30000.............................Started.
 Wait for invalid tracks to reach 30000.............................Done.
 Set Mode Async SID:000192600256 RDFG:103...........................Started.
 Set Mode Async SID:000192600256 RDFG:102...........................Started.
 Set Mode Async SID:000192600256 RDFG:103...........................Done.
 Set Mode Async SID:000192600256 RDFG:102...........................Done.
 Enable RDF Consistency protection..................................Started.
 Enable RDF Consistency protection..................................Done.
 Wait for invalid tracks to reach 0.................................Started.
 Wait for invalid tracks to reach 0.................................Done.
 Wait until RDF consistency is achieved.............................Started.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................In Progress.
 Wait until RDF consistency is achieved.............................Done.
 Setting Star data consistency indicators...........................Started.
 Setting Star data consistency indicators...........................Done.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Protect_London.....................................................Done.
```

Connecting to NewYork

The following command connects NewJersey to NewYork:

```
symstar -cg StarProd connect -site NewYork -noprompt

 Connect_NewYork....................................................Started.
 Setting Star data consistency indicators...........................Not Needed.
 Setting Star data consistency indicators...........................Not Needed.
 Disable RDF Consistency protection.................................Started.
 Disable RDF Consistency protection.................................Done.
 Set Mode Adaptive Copy.............................................Not Needed.
 Refresh R2 SID:000192600198 RDFG:91................................Started.
 Refresh R2 SID:000192600198 RDFG:90................................Started.
 Refresh R2 SID:000192600198 RDFG:91................................Done.
 Refresh R2 SID:000192600198 RDFG:90................................Done.
 Establish SID:000192600256 RDFG:101................................Started.
 Establish SID:000192600256 RDFG:100................................Started.
 Establish SID:000192600256 RDFG:101................................Done.
 Establish SID:000192600256 RDFG:100................................Done.
 SA RW Enable Devs..................................................Not Needed.
 SA RW Enable Devs..................................................Not Needed.
 Ready Devs.........................................................Not Needed.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Connect_NewYork....................................................Done.
```

Protecting NewYork

The following command protects NewYork:

```
symstar -cg StarProd protect -site NewYork -noprompt

 Protect_NewYork....................................................Started.
 Wait for invalid tracks to reach 30000.............................Started.
 Wait for invalid tracks to reach 30000.............................Done.
 Set Mode Sync SID:000192600256 RDFG:101............................Started.
```

```
Set Mode Sync SID:000192600256 RDFG:100.............................Started.
Set Mode Sync SID:000192600256 RDFG:101.............................Done.
Set Mode Sync SID:000192600256 RDFG:100.............................Done.
Enable RDF Consistency protection...................................Started.
Enable RDF Consistency protection...................................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Wait until RDF consistency is achieved..............................Started.
Wait until RDF consistency is achieved..............................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Protect_NewYork.....................................................Done.
```

Halting SRDF/Star at NewJersey

At the NewJersey control host, the following `symstar halt` starts the process of reconfiguring the mode to cascaded and switching the workload site back to NewYork:

Note: All I/Os must be stopped before issuing the `symstar halt` command.

```
symstar -cg StarProd halt -nop

Halt................................................................Started.
SA Write Disable Devs...............................................Not Needed.
Not Ready Devs SID:000192600256.....................................Started.
Not Ready Devs SID:000192600256.....................................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Drain remote data - checkpoint......................................Started.
Drain remote data - checkpoint......................................Done.
Suspend SID:000192600256 RDFG:103...................................Started.
Suspend SID:000192600256 RDFG:102...................................Started.
Suspend SID:000192600256 RDFG:103...................................Done.
Suspend SID:000192600256 RDFG:102...................................Done.
Suspend SID:000192600256 RDFG:101...................................Started.
Suspend SID:000192600256 RDFG:100...................................Started.
Suspend SID:000192600256 RDFG:101...................................Done.
Suspend SID:000192600256 RDFG:100...................................Done.
Disable STAR protection.............................................Not Needed.
Deactivate STAR target..............................................Not Needed.
Deactivate STAR target..............................................Not Needed.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Disable RDF Consistency protection..................................Started.
Disable RDF Consistency protection..................................Done.
Setting Star data consistency indicators............................Started.
Setting Star data consistency indicators............................Done.
Disable RDF Consistency protection..................................Started.
Disable RDF Consistency protection..................................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:101....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:101....................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:100....................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:103....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:102....................Started.
Set Mode Adaptive Copy SID:000192600256 RDFG:103....................Done.
Set Mode Adaptive Copy SID:000192600256 RDFG:102....................Done.
Halt................................................................Done.
```

Reconfiguring London to cascaded mode

At the NewJersey control host, the following command reconfigures London to a cascaded mode of operation:

```
symstar -cg StarProd -site London reconfigure -path NewYork:London -noprompt

 Reconfigure.......................................................Started.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Suspend...........................................................Not Needed.
 Delete SID:000192600256 RDFG:103..................................Started.
 Delete SID:000192600256 RDFG:102..................................Started.
 Delete SID:000192600256 RDFG:103..................................Done.
 Delete SID:000192600256 RDFG:102..................................Done.
 Createpair SID:000192600198 RDFG:110..............................Started.
 Createpair SID:000192600198 RDFG:111..............................Started.
 Createpair SID:000192600198 RDFG:110..............................Done.
 Createpair SID:000192600198 RDFG:111..............................Done.
 Setting Star data consistency indicators..........................Not Needed.
 SA Write Disable Devs SID:000192600198............................Started.
 SA Write Disable Devs SID:000192600198............................Done.
 Not Ready Devs....................................................Not Needed.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Assign Name:NewYork, Recovery RDFG:103 to SID:000192600256 RDFG:101.Started.
 Assign Name:NewYork, Recovery RDFG:103 to SID:000192600256 RDFG:101.Done.
 Assign Name:NewYork, Recovery RDFG:102 to SID:000192600256 RDFG:100.Started.
 Assign Name:NewYork, Recovery RDFG:102 to SID:000192600256 RDFG:100.Done.
 Deactivate STAR target............................................Not Needed.
 Deactivate STAR target............................................Not Needed.
 Deactivate STAR target............................................Not Needed.
 Reconfigure.......................................................Done.
```

Querying the configuration

The following `symstar query` command shows the two target sites as Halted and the Mode of Operation as Cascaded:

```
symstar -cg StarProd query

Site Name                                       : NewJersey

Workload Site                                   : NewJersey
1st Target Site                                 : NewYork
2nd Target Site                                 : London

Composite Group Name                            : StarProd
Composite Group Type                            : RDF1

Workload Data Image Consistent                  : Yes
System State:
  {
  1st_Target_Site                               : Halted
  2nd_Target_Site                               : Halted
  STAR                                          : Unprotected
  Mode of Operation                             : Cascaded
  }

Last Action Performed                           : Reconfigure_London
Last Action Status                              : Successful
Last Action Timestamp                           : 07/16/2010_10:00:50

STAR Information:
  {
```

```
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : NONE
  Synchronous Target Site                     : NewYork
  Asynchronous Target Site                    : London
  Differential Resync Available               : N/A
  R2 Recoverable                              : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                            : NewJersey
  Target Site Name                            : NewYork
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00256 101 NR        0        0 NR 00198  91 WD        0        0 C Suspended
  00256 100 NR        0        0 NR 00198  90 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            NR        0        0 NR           WD        0        0 C Suspended
  }

2nd Target Site Information:
  {
  Source Site Name                            : NewYork
  Target Site Name                            : London
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : NONE
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00198 110 WD        0        0 NR 00321 110 WD        0        0 C Suspended
  00198 111 WD        0        0 NR 00321 111 WD        0        0 C Suspended

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            WD        0        0 NR           WD        0        0 C Suspended
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Switching back to NewYork

After halting SRDF/Star at NewJersey and setting a cascaded mode of operation from NewYork to NewJersey to London, it is time to perform the planned switch back to NewYork.

At the NewYork control host, the following `symstar switch` command switches the workload site back to NewYork:

```
symstar -cg StarProd switch -site NewYork -noprompt

 Switch_NewYork.....................................................Started.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 Half Delete SID:000192600198 RDFG:110..............................Started.
 Half Delete SID:000192600198 RDFG:111..............................Started.
 Half Delete SID:000192600198 RDFG:110..............................Done.
 Half Delete SID:000192600198 RDFG:111..............................Done.
 SA Write Disable Devs SID:000192600198.............................Started.
 SA Write Disable Devs SID:000192600198.............................Done.
 Not Ready Devs.....................................................Not Needed.
 Swap SID:000192600198 RDFG:91......................................Started.
 Swap SID:000192600198 RDFG:90......................................Started.
 Swap SID:000192600198 RDFG:91......................................Done.
 Swap SID:000192600198 RDFG:90......................................Done.
 Half Delete SID:000192600321 RDFG:110..............................Started.
 Half Delete SID:000192600321 RDFG:111..............................Started.
 Half Delete SID:000192600321 RDFG:110..............................Done.
 Half Delete SID:000192600321 RDFG:111..............................Done.
 Createpair SID:000192600256 RDFG:103...............................Started.
 Createpair SID:000192600256 RDFG:102...............................Started.
 Createpair SID:000192600256 RDFG:103...............................Done.
 Createpair SID:000192600256 RDFG:102...............................Done.
 Update persistent state information................................Started.
 Update persistent state information................................Done.
 SA RW Enable Devs SID:000192600198.................................Started.
 SA RW Enable Devs SID:000192600198.................................Done.
 Ready Devs.........................................................Not Needed.
 SA RW Enable Devs..................................................Not Needed.
 Ready Devs SID:000192600256........................................Started.
 Ready Devs SID:000192600256........................................Done.
 Switch_NewYork.....................................................Done.
```

Performing connect, protect and enable

The following commands `connect` and `protect` from NewYork to NewJersey, and then from NewYork to London. Page 202 shows examples of the output of the `connect` and `protect` commands.

```
symstar -cg StarProd -site NewJersey connect -noprompt

symstar -cg StarProd -site London connect -noprompt

symstar -cg StarProd -site NewJersey protect -noprompt

symstar -cg StarProd -site London protect -noprompt
```

Finally, the following command, executed at the NewYork host, enables SRDF/Star protection for `StarProd`:

```
symstar -cg StarProd enable -noprompt

 Enable.............................................................Started.
 Deactivate STAR target.............................................Not Needed.
 Create STAR target.................................................Not Needed.
 Create STAR target.................................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Deactivate STAR target.............................................Not Needed.
 Clear STAR target SID:000192600198.................................Started.
 Clear STAR target SID:000192600198.................................Done.
```

```
 Clear STAR target.....................................................Not Needed.
 Setting Star data consistency indicators..............................Not Needed.
 Activate STAR target SID:000192600198................................Started.
 Activate STAR target SID:000192600198................................Done.
 Enable STAR protection...............................................Started.
 Enable STAR protection...............................................Done.
 Wait until R2 Recoverable is achieved................................Started.
 Wait until R2 Recoverable is achieved................................In Progress.
 Wait until R2 Recoverable is achieved................................In Progress.
 Wait until R2 Recoverable is achieved................................In Progress.
 Wait until R2 Recoverable is achieved................................Done.
 Enable...............................................................Done.
```

Example 4: Dynamically adding devices to a consistency group

This example shows you how to dynamically add devices to a cascaded SRDF/Star consistency group while retaining its consistency protection. In this example and example 5, the cascaded SRDF/Star CG, MILKYWAY, is defined at sitea, siteb, and sitec.

- The following `query` shows the `MILKYWAY` CG before device pairs were added to it:

```
<sitea> symstar -cg MILKYWAY query

Site Name                                     : sitea

Workload Site                                 : sitea
1st Target Site                               : siteb
2nd Target Site                               : sitec

Composite Group Name                          : MILKYWAY
Composite Group Type                          : RDF1
Composite Group State                         : Valid

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : Protected
  STAR                                        : Protected
  Mode of Operation                           : Cascaded
  }

Last Action Performed                         : Enable
Last Action Status                            : Successful
Last Action Timestamp                         : 07/14/2011_14:29:14

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : STAR
  Synchronous Target Site                     : siteb
  Asynchronous Target Site                    : sitec
  Differential Resync Available               : Yes
  R2 Recoverable                              : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : siteb
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes
```

```
            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 128 RW        0        0 RW 03139 128 WD        0        0 S Synchronized
  00199 128 RW        0        0 RW 03076 128 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : siteb
  Target Site Name                            : sitec
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03139 178 RW        0        0 RW 04045 178 WD        0        0 A Consistent
  03076 178 RW        0        0 RW 03156 178 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- The following `symstar modifycg -add` command moves device pairs 80 and 8f from RDFG 129 and RDFG 179 in the staging area to RDFG 128 and RDFG 178 in the `MILKYWAY` CG.

```
<sitea> symstar -cg MILKYWAY -sid 000195700199 modifycg -add -cg_rdfg 128 -cg_r21_rdfg
   178 -stg_rdfg 129 -stg_r21_rdfg 179 -devs 80,8F

A STAR ModifyCG operation is
in progress for composite group MILKYWAY. Please wait...

 ModifyCGAdd.......................................................Started.
 Suspend SID:000195700199 RDFG:129.................................Started.
 Suspend SID:000195700199 RDFG:129.................................Done.
 Suspend SID:000192603076 RDFG:179.................................Started.
 Suspend SID:000192603076 RDFG:179.................................Done.
 Update persistent state information...............................Started.
 Update persistent state information...............................Done.
 Create STAR target SID:000192603076...............................Started.
 Create STAR target SID:000192603076...............................Done.
 Clear STAR target SID:000192603076................................Started.
 Clear STAR target SID:000192603076................................Done.
 Create STAR target SID:000192603156...............................Started.
```

```
Create STAR target SID:000192603156.................................Done.
Clear STAR target SID:000192603156..................................Started.
Clear STAR target SID:000192603156..................................Done.
Create STAR target SID:000195700199.................................Started.
Create STAR target SID:000195700199.................................Done.
Activate STAR target SID:000195700199...............................Started.
Activate STAR target SID:000195700199...............................Done.
Wait for persistent data to be updated..............................Started.
Wait for persistent data to be updated..............................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Move SID:000195700199 RDFG:129 to RDFG:128..........................Started.
Move SID:000195700199 RDFG:129 to RDFG:128..........................Done.
Move SID:000192603076 RDFG:179 to RDFG:178..........................Started.
Move SID:000192603076 RDFG:179 to RDFG:178..........................Done.
Set Mode Sync SID:000195700199 RDFG:128.............................Started.
Set Mode Sync SID:000195700199 RDFG:128.............................Done.
SA Write Disable Devs SID:000192603156..............................Started.
SA Write Disable Devs SID:000192603156..............................Done.
Createpair SID:000195700199 RDFG:228................................Started.
Createpair SID:000195700199 RDFG:228................................Done.
SA RW Enable Devs SID:000192603156..................................Started.
SA RW Enable Devs SID:000192603156..................................Done.
Add devs to CG......................................................Started.
Add devs to CG......................................................Done.
Enable RDF Consistency protection...................................Started.
Enable RDF Consistency protection...................................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
Wait for persistent data to be updated..............................Started.
Wait for persistent data to be updated..............................Done.
Restore - Resume SID:000195700199 RDFG:128..........................Started.
Restore - Resume SID:000195700199 RDFG:128..........................Done.
Restore - Resume SID:000192603076 RDFG:178..........................Started.
Restore - Resume SID:000192603076 RDFG:178..........................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Wait for invalid tracks to reach 0..................................Started.
Wait for invalid tracks to reach 0..................................Done.
Wait for persistent data to be updated..............................Started.
Wait for persistent data to be updated..............................Done.
Wait until R2 Recoverable is achieved...............................Started.
Wait until R2 Recoverable is achieved...............................In Progress.
Wait until R2 Recoverable is achieved...............................Done.
Set STAR target SID:000195700199....................................Started.
Set STAR target SID:000195700199....................................Done.
Distributing setup information to remote sites......................Started.
Distributing setup information to remote sites......................Done.
Wait for persistent data to be updated..............................Started.
Wait for persistent data to be updated..............................Done.
Update persistent state information.................................Started.
Update persistent state information.................................Done.
ModifyCGAdd.........................................................Done.
```

Note: GNS is running on sitea, siteb, and sitec. GNS propagates the new `MILKYWAY` CG definition to all hosts on sitea but not to siteb and sitec. You must manually update this CG definition on both siteb and sitec. GNS then propagates the `MILKYWAY` CG definition to all hosts of siteb and sitec. If GNS was not running on siteb and sitec, you would have to manually update each control host on siteb and sitec with this new `MILKYWAY` CG definition.

- Because the `MILKYWAY` CG definition was changed at `sitea` but not at `siteb`, the following appears when you query this CG at `siteb`:

```
<siteb> symstar -cg MILKYWAY query

Failed to query cg: MILKYWAY
```

- To update the `MILKYWAY` CG definition at `siteb` to match the one at `sitea`, issue the following `symstar buildcg -update` command:

```
<siteb> symstar -cg MILKYWAY buildcg -update -site siteb

A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG.............................................................Started.
 BuildCG.............................................................Done.
```

- The following `query` shows that the `MILKYWAY` CG at `siteb` is now in a valid state:

```
<siteb> symstar -cg MILKYWAY query

Site Name                                     : siteb

Workload Site                                 : sitea
1st Target Site                               : siteb
2nd Target Site                               : sitec

Composite Group Name                          : MILKYWAY
Composite Group Type                          : RDF21
Composite Group State                         : Valid

Workload Data Image Consistent                : Yes
System State:
  {
  1st_Target_Site                             : Protected
  2nd_Target_Site                             : Protected
  STAR                                        : Protected
  Mode of Operation                           : Cascaded
  }

Last Action Performed                         : None
Last Action Status                            : N/A
Last Action Timestamp                         : N/A

STAR Information:
  {
  STAR Consistency Capable                    : Yes
  STAR Consistency Mode                       : STAR
  Synchronous Target Site                     : siteb
  Asynchronous Target Site                    : sitec
  Differential Resync Available               : Yes
  R2 Recoverable                              : Yes
  Asynchronous Target Site Data most Current  : No
  }

1st Target Site Information:
  {
  Source Site Name                            : sitea
  Target Site Name                            : siteb
  RDF Consistency Capability                  : SYNC
  RDF Consistency Mode                        : SYNC
  Site Data Image Consistent                  : Yes

            Source Site                     Target Site
  ------------------------------ -- ------------------------------ - ------------
```

```
            ST                    LI           ST                    M
       RD    A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv   K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks   S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 128 RW        0        0 RW 03139 128 WD        0        0 S Synchronized
  00199 128 RW        0        0 RW 03076 128 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                            : siteb
  Target Site Name                            : sitec
  RDF Consistency Capability                  : MSC
  RDF Consistency Mode                        : MSC
  Site Data Image Consistent                  : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                    LI           ST                    M
       RD    A                     N Rem   RD   A                    O
  Symm   F   T   R1 Inv   R2 Inv   K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks   S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  03139 178 RW        0        0 RW 04045 178 WD        0        0 A Consistent
  03076 178 RW        0        0 RW 03156 178 WD        0        0 A Consistent

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 A Consistent
  }

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

- Because the `MILKYWAY` CG definition was changed at `sitea` but not at `sitec`, the following appears when you query this CG at `sitec`:

```
<sitec> symstar -cg MILKYWAY query

Failed to query cg: MILKYWAY
```

- To update the `MILKYWAY` CG definition at `sitec` to match both `sitea` and `siteb`, issue the following `symstar buildcg -update` command at `sitec`:

```
<sitec> symstar -cg MILKYWAY  buildcg -update -site sitec

A STAR BuildCG operation is
in progress for composite group MILKYWAY. Please wait...

 BuildCG.............................................................Started.
 BuildCG.............................................................Done.
```

- The following `query` shows that the `MILKYWAY` CG at `sitec` is now in a valid state:

```
<sitec> symstar -cg MILKYWAY query

Site Name                                     : sitec

Workload Site                                 : sitea
```

```
1st Target Site                                : siteb
2nd Target Site                                : sitec

Composite Group Name                           : MILKYWAY
Composite Group Type                           : RDF2
Composite Group State                          : Valid

Workload Data Image Consistent                 : Yes
System State:
  {
  1st_Target_Site                              : Protected
  2nd_Target_Site                              : Protected
  STAR                                         : Protected
  Mode of Operation                            : Cascaded
  }

Last Action Performed                          : None
Last Action Status                             : N/A
Last Action Timestamp                          : N/A

STAR Information:
  {
  STAR Consistency Capable                     : Yes
  STAR Consistency Mode                        : STAR
  Synchronous Target Site                      : siteb
  Asynchronous Target Site                     : sitec
  Differential Resync Available                : Yes
  R2 Recoverable                               : Yes
  Asynchronous Target Site Data most Current   : No
  }

1st Target Site Information:
  {
  Source Site Name                             : sitea
  Target Site Name                             : siteb
  RDF Consistency Capability                   : SYNC
  RDF Consistency Mode                         : SYNC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
  Symm   F   T   R1 Inv   R2 Inv  K Symm   F   T   R1 Inv   R2 Inv D RDF Pair
  ID     G   E   Tracks   Tracks  S ID     G   E   Tracks   Tracks E STATE
  ----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

  00282 128 RW        0        0 RW 03139 128 WD        0        0 S Synchronized
  00199 128 RW        0        0 RW 03076 128 WD        0        0 S Synchronized

   Totals:  -- -------- -------- --           -- -------- -------- - ------------
            RW        0        0 RW           WD        0        0 S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                             : siteb
  Target Site Name                             : sitec
  RDF Consistency Capability                   : MSC
  RDF Consistency Mode                         : MSC
  Site Data Image Consistent                   : Yes

            Source Site                      Target Site
  ------------------------------ -- ------------------------------ - ------------
            ST                   LI           ST                   M
        RD   A                    N Rem   RD   A                   O
```

```
Symm    F   T   R1 Inv   R2 Inv  K Symm    F   T   R1 Inv   R2 Inv D RDF Pair
ID      G   E   Tracks   Tracks  S ID      G   E   Tracks   Tracks E STATE
----- --- -- -------- -------- -- ----- --- -- -------- -------- - ------------

03139 178 RW        0        0 RW 04045 178 WD        0        0 A Consistent
03076 178 RW        0        0 RW 03156 178 WD        0        0 A Consistent

 Totals:  -- -------- -------- --           -- -------- -------- - ------------
          RW        0        0 RW           WD        0        0 A Consistent
}

Legend:

 Modes:
    Mode of Operation: A=Async, C=Adaptive Copy, S=Sync, O=Other, M=Mixed
```

Example 5: Recovering from a failed dynamic add operation

In this example, `sitec` had a trip event while the dynamic symstar modifycg add operation was running at `sitea`. This event caused the command to terminate, requiring a recovery operation. A recovery either completes the modifycg add operation or rolls back all actions performed by modifycg add before the failure, placing the CG into its original state.

- The following query shows that the state of the `MILKYWAY` CG requires a recovery of the ModifyAdd action:

<sitea> **symstar -cg MILKYWAY query -detail**

```
Site Name                                   : sitea

Workload Site                               : sitea
1st Target Site                             : siteb
2nd Target Site                             : sitec

Composite Group Name                        : MILKYWAY
Composite Group Type                        : RDF1
Composite Group State                       : RecoveryRequired

Workload Data Image Consistent              : Yes
System State:
  {
  1st_Target_Site                           : Protected
  2nd_Target_Site                           : PathFail
  STAR                                      : Unprotected
  Mode of Operation                         : Cascaded
  }

Last Action Performed                       : ModifyAdd
Last Action Status                          : Restore - Resume Not Done.
Last Action Timestamp                       : 07/12/2011_18:04:34

STAR Information:
  {
  STAR Consistency Capable                  : Yes
  STAR Consistency Mode                     : NONE
  Synchronous Target Site                   : siteb
  Asynchronous Target Site                  : sitec
  Differential Resync Available             : N/A
  R2 Recoverable                            : N/A
  Asynchronous Target Site Data most Current  : N/A
  }

1st Target Site Information:
  {
  Source Site Name                          : sitea
  Target Site Name                          : siteb
  RDF Consistency Capability                : SYNC
  RDF Consistency Mode                      : SYNC
  Site Data Image Consistent                : Yes

                 Source Site                                  Target Site
  ------------------------------------------ -- ------------------------------------------- - ------------
                  ST                         LI                  ST                                M
              RD   A                          N Remote       RD   A                                O
  Symmetrix    F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID           G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------
```

```
  000192600282 128 RW        0        0 SSAN. RW 000192603139 128 WD        0        0 TSCN.  228 S Synchronized
  000195700199 128 RW        0        0 SSAN. RW 000192603076 128 WD        0        0 TSCN.  228 S Synchronized

          Totals:  -- -------- -------- ----- --                 -- -------- -------- -----      - ------------
                   RW        0        0 SSAN. RW                 WD        0        0 TSCN.      S Synchronized
  }

2nd Target Site Information:
  {
  Source Site Name                          : siteb
  Target Site Name                          : sitec
  RDF Consistency Capability                : MSC
  RDF Consistency Mode                      : MSC
  Site Data Image Consistent                : Yes

                 Source Site                                    Target Site
  ---------------------------------------- -- ---------------------------------------------- - ------------
                   ST                       LI                   ST                             M
               RD   A                        N Remote       RD   A                             O
  Symmetrix     F   T   R1 Inv   R2 Inv Flags  K Symmetrix     F   T   R1 Inv   R2 Inv Flags Rcvy D RDF Pair
  ID            G   E   Tracks   Tracks TRSGM  S ID            G   E   Tracks   Tracks TRSGM RDFG E STATE
  ------------ --- -- -------- -------- ----- -- ------------ --- -- -------- -------- ----- ---- - ------------

  000192603139 178 RW        0     6513 SSCN. NR 000192604045 178 WD        0        0 TACN.  228 A Suspended
  000192603076 178 RW        0     6612 SSCN. NR 000192603156 178 WD        0        0 TACN.  228 A Suspended

          Totals:  -- -------- -------- ----- --                 -- -------- -------- -----      - ------------
                   RW        0    13125 SSCN. NR                 WD        0        0 TACN.      A Suspended
  }

Legend:

  Flags:
    T(ype of Device)         : S = Source (R1) ,    T = Target (R2),    M = Mixed,  . = N/A
    R(ecovery Capability)    : A = Async Target,    S = Sync Target,    M = Mixed,  . = N/A
    (Recovery) S(tate)       : A = Active,          I = Inactive,       C = Clear,  M = Mixed,  . = None
    (RDF) G(roup Star Mode)  : N = Normal,          R = Recovery,       M = Mixed,  . = None
    (M)SC Cleanup Required   : X = Required,        . = Not Required

  Modes:
    Mode of Operation        : A = Async, C = Adaptive Copy, S = Sync, O = Other, M = Mixed
```

- The following `recover -force` command was able to successfully complete the modifycg add operation:

```
<sitea> symstar -cg MILKYWAY recover -force

A STAR Recover operation is
in progress for composite group MILKYWAY. Please wait...

 RecoverAdd.............................................................Started.
 Suspend................................................................Not Needed.
 Suspend................................................................Not Needed.
 Update persistent state information....................................Started.
 Update persistent state information....................................Done.
 Clear STAR target......................................................Not Needed.
 Wait for persistent data to be updated.................................Started.
 Wait for persistent data to be updated.................................Done.
 Update persistent state information....................................Started.
 Update persistent state information....................................Done.
 Move...................................................................Not Needed.
 Move...................................................................Not Needed.
 Set Mode Sync..........................................................Not Needed.
 Createpair.............................................................Not Needed.
 Add devs to CG.........................................................Started.
 Add devs to CG.........................................................Not Needed.
 Enable RDF Consistency protection......................................Not Needed.
 Update persistent state information....................................Started.
 Update persistent state information....................................Done.
 Wait for persistent data to be updated.................................Started.
 Wait for persistent data to be updated.................................Done.
 Restore - Resume.......................................................Not Needed.
 Restore - Resume.......................................................Not Needed.
 Wait for invalid tracks to reach 0.....................................Not Needed.
 Wait for invalid tracks to reach 0.....................................Started.
 Wait for invalid tracks to reach 0.....................................Done.
 Wait for persistent data to be updated.................................Started.
 Wait for persistent data to be updated.................................Done.
```

```
 Set STAR target SID:000195700199.................................Started.
 Set STAR target SID:000195700199.................................Done.
 Distributing setup information to remote sites...................Started.
 Distributing setup information to remote sites...................Done.
 Wait for persistent data to be updated...........................Started.
 Wait for persistent data to be updated...........................Done.
 Update persistent state information..............................Started.
 Update persistent state information..............................Done.
 RecoverAdd.......................................................Done.
```

- Since the following `recover -force` command cannot complete the modifycg add operation, it must roll back this operation, removing any devices added to the `MILKYWAY` CG before failure:

```
<sitea> symstar -cg MILKYWAY recover -force

A STAR Recover operation is
in progress for composite group MILKYWAY. Please wait...

 RecoverRollBack..................................................Started.
 Remove devs from CG..............................................Started.
 Remove devs from CG..............................................Not needed.
 Delete...........................................................Not Needed.
 Terminate STAR target............................................Not Needed.
 Terminate STAR target SID:000192603076...........................Started.
 Terminate STAR target SID:000192603076...........................Done.
 Terminate STAR target SID:000192603156...........................Started.
 Terminate STAR target SID:000192603156...........................Done.
 Move.............................................................Not Needed.
 Move.............................................................Not Needed.
 Set Mode Adaptive Copy...........................................Not Needed.
 Set Mode Adaptive Copy...........................................Not Needed.
 Wait for persistent data to be updated...........................Started.
 Wait for persistent data to be updated...........................Done.
 Update persistent state information..............................Started.
 Update persistent state information..............................Done.
 RecoverRollBack..................................................Done.
```