



Global Distributed Storage Engineering
CTI Global Engineering

Open Systems SRDF/Star for Open Systems (5772 & SE 6.4)

GDSE-06050-RN

Release Notes

Version 2.0

VERSION CONTROL

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CONTENTS

1	DOCUMENT SCOPE	4
1.1	Introduction	4
1.2	Scope of certification activities	5
1.2.1	New topics for this recertification (5772 / SE6.4)	5
1.2.2	Out of certification scope	5
2	CERTIFICATION MATRIX	6
2.1	Configurations	6
2.2	Certified versions	6
2.3	Known Issues	8
2.3.1	New issue - Unplanned switch when Transmit Idle active	8
2.3.2	New issue – RDF daemon issues	8
3	APPENDIX A - TEST CONFIGURATION	9
3.1	RAID 1+0 Configuration	9
3.1.1	Output from symstar show -cg flexcg –detail	10
4	APPENDIX B - DETAILED RESULTS FROM BASIC TEST PLAN	11

1 Document Scope

1.1 Introduction

SRDF/Star is a three-site DR solution from EMC for Symmetrix storage arrays that uses concurrent data replication technology to replicate data from a primary production site to both a nearby remote site and a distant remote site. Data is transferred in SRDF/Synchronous (SRDF/S) mode to the nearby remote and in SRDF/Asynchronous (SRDF/A) mode to the distant remote site.

This brief document covers basic certification information for SRDF/Star only. The main document for SRDF/Star deployment is the **SRDF/Star for Open Systems Solutions Guide** referenced below.

The **Open Systems SRDF/Star Evaluation and Test Results** document covers in great detail the testing undertaken as part of the original evaluation and certification exercise and that test information is not repeated here. Only 5772 / SE6.4 testing is covered in this document.

Key documentation to be read in conjunction with these Release Notes is indicated below.

Document	Location
Key document	
SRDF/Star for Open Systems Solutions Guide And references therein.	http://engineering.ti.citigroup.net/gdse/products/platforms/symmetrix/stdsdocs/06050-sg.pdf
Other documents	
SRDF/Star Scalability testing – Key findings	http://engineering.citigroup.net/gdse/products/platforms/symmetrix/techinfo/08012-tr.pdf
Open Systems SRDF/Star (SE6.3) – Evaluation and Test results V2	http://engineering.ti.citigroup.net/gdse/products/platforms/symmetrix/stdsdocs/06018-tr.pdf
EMC Solutions Enabler Symmetrix SRDF Family CLI Product guide	Available from EMC. Chapter 4 and Appendix B refer to SRDF/Star.
SRDF/A for Long Distance Replication Solutions Guide And references therein.	http://engineering.ti.citigroup.net/gdse/products/platforms/symmetrix/stdsdocs/05002-sg.pdf
EMC Solutions Enabler: Using SYMCLI to Implement SRDF/Star Technical Notes	Available from EMC.

1.2 Scope of certification activities

Evaluation and certification of SRDF/Star covered functional and performance testing in multiple configurations and the production of a Solutions Guide describing how to deploy SRDF/Star for Open Systems within Citigroup.

This document covers the 5772 microcode / V6.4 SRDF/Star recertification testing, and the results can be found in the Appendices.

1.2.1 New topics for this recertification (5772 / SE6.4)

Certification testing included retesting of functionality previously supported with 5771 & SE6.3. IN addition the following new functionality is now supported.

- Support for SRDF/Star with 5772 microcode
- Support for SRDF/Star with SE6.4
- Support for SRDF/Star with Transmit Idle
- Support for SRDF/Star with Delta Set Expansion DSE

Scalability testing of SE6.4 / 5772 was also tested in conjunction with EMC and is covered in a separate document

SRDF/Star Scalability testing – Key findings

<http://engineering.citigroup.net/gdse/products/platforms/symmetrix/techinfo/08012-tr.pdf>

1.2.2 Out of certification scope

The following were out of scope of the Open Systems SRDF/Star certification exercise:

- SRDF/Star control from platforms other than Solaris
- Mainframe SRDF/Star (Different product)

2 Certification Matrix

2.1 Configurations

The two configurations that have been certified for SRDF/Star are:

- Single RDF group per Star Session (standard deployment)
- Multiple RDF groups per Star session (more complex - not preferred)

A full description of each certified configuration can be found in the **SRDF/Star for Open Systems Solutions Guide**. Scalability limitations are also covered in the Solutions Guide.

There are no restrictions on host type that can be connected to an SRDF/Star-enabled DMX, other than existing Citigroup Distributed Systems SAN SOE limitations. SRDF/Star is only supported on DMX with 5671 microcode and hence all hosts connecting must conform to a Host SAN stack that is compatible with the relevant microcode.

2.2 Certified versions and scalability

SRDF/Star is certified with the following component versions and scalability limits

Component Matrix	
Storage hardware	
Symmetrix hardware	DMX only
Microcode	DMX2: 5671.5459 (minimum) DMX3 or 4: 5771.8795 (minimum) DMX3 or 4: 5772.83.75 (minimum)
Cache	Minimum cache will depend on IO workload. See SRDF/A Solutions Guide for more details
RA requirements	RA requirements will depend on number of RDF groups to be used. See SRDF/Star Solutions Guide for more details
SRDF/Star management servers	
Server type	Sun
Operating System	Solaris (see Solutions Enabler docs for supported version)
Solutions Enabler version	6.4.2.3 Build 845, patched with hot fix 1256 (Service Alert 1193)

Scalability	
# Star sessions per source DMX	32 *
# Star sessions per primary Star control server	32 **
# Star sessions per <u>active pair</u> of storrdfd daemons (one per SE host)	32 ***

* If TimeFinder is in use at Site B then this will be reduced to 30.

** A single server could control either 32 Star sessions on a single DMX array or, for example, 16 on each of two DMX arrays.

*** Cycle switching will not occur reliably with less than 2 RDF daemons running when 32 Star sessions are active.

2.3 Known Issues

A summary of the major deployment and operational constraints is listed in the **SRDF/Star for Open Systems Solutions Guide** in the planning section of that document.

Further details information on all issues encountered during the original evaluation/certification are documented in detail in the **Open Systems SRDF/Star Evaluation and Test Results** document referenced earlier.

5772/V6.4 testing results and issues can be found in the Appendices of the present document.

2.3.1 New issue - Unplanned switch when Transmit Idle active

With 5772, Transmit Idle is used by default on the SRDF/A leg. In an unplanned failure of the production Symmetrix/site, the SRDF/A leg between Site A and Site C may appear to be in Transmit Idle mode as seen from Site C, and the 2nd Target_Site will have Star state protected. As a consequence, it is not possible to execute a switch to Site C as Star is not in the correct state.

The undocumented workaround is to first force the SRDF/A leg into suspended state from Site C with a command of the following form:

```
SiteC# symrdf -cg <CGname> suspend -immediate -rdfg name:<SiteA nickname> -star  
-force -nop
```

The Citi SRDF/Star Solutions Guide has been updated to include this extra step. At the time of writing, this step does not appear in any EMC documentation.

2.3.2 New issue – RDF daemon issues

The GA build of SE6.4 has two known issues:

OPT 276455: RDF daemon (storrdfd) core dumps due to contention

OPT 265634: RDF daemon (storrdfd) SDDF clearing bug

EMC have produced a hot fix for SE6.4.2.3 Build 845 to address these issues. This hot fix should be applied to SE 6.4 servers controlling Star.

The hot fix takes the form of a patched version of SE6.4.2.3 that should be applied to all servers running storrdfd daemon that control SRDF/A cycling switching of Star sessions.

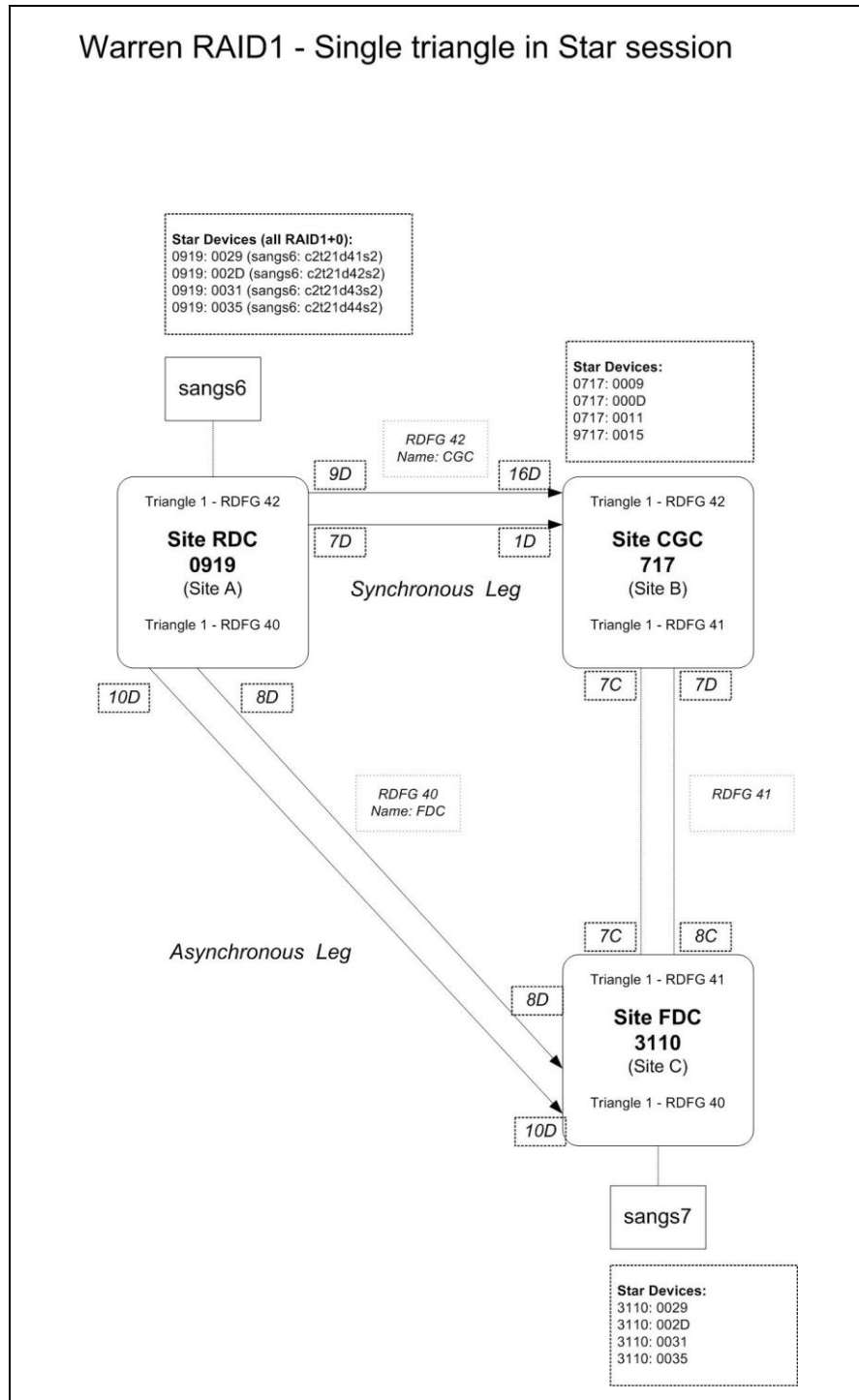
SE Hot fix ID: 1256

Service Alert: 1193

The patched version of SE is available from EMC or the author on request.

3 Appendix A - Test configuration

3.1 RAID 1+0 Configuration



Configuration 2 involves a single triangle (application) in the star session. The configuration applies where complete independence is required between applications so that if one fails, SRDF replication for the others is not affected. Each application would have its own star session.

This application uses a small number of RAID1+0 disks (4* 33GB LUNs). Choice of RAID protection was simply down to requirement for availability of same RAID type and volume sizes in all 3 arrays.

Each side of the triangle runs over both RA links shown in the above diagram. Transmit Idle was enabled for all RDF groups. Delta Set Expansion (DSE) was enabled for RDF group 40.

The composite group associated with this configuration is **flexcg**.

3.1.1 Output from symstar show -cg flexcg –detail

```
Composite Group Name      : flexcg

Synchronous Target Site Information:
{
-----
Source (R1) View          Target (R2) View
-----
Symmetrix      RD      Symmetrix      RD      Rcvy
ID             F       ID             F       RDFG
              G       G       Dev
-----
000190100919  42    0029  000190300717  42    0009    41
                  002D                  000D
                  0031                  0011
                  0035                  0015
-----
}

Asynchronous Target Site Information:
{
-----
Source (R1) View          Target (R2) View
-----
Symmetrix      RD      Symmetrix      RD      Rcvy
ID             F       ID             F       RDFG
              G       G       Dev
-----
000190100919  40    0029  000190103110  40    0029    41
                  002D                  002D
                  0031                  0031
                  0035                  0035
-----
}

Option file settings:
{
WorkloadSite      : rdc
SyncTargetSite    : cgc
AsyncTargetSite   : fdc
Adaptive_Copy_Tracks : 30000
Action_Timeout    : 1800
Term_Sddf         : NO
}
```

4 Appendix B - Detailed results from Basic Test Plan

Task	Success Criteria	PASS/FAIL (Date)	Notes
Test 1 - Setting Up SRDF/Star			
Step 1 - Verify Symmetrix Settings	All settings in POC match Star 6.2 requirements	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	For all Symms # symcfg list -v -sid <SID> - Concurrent RDF Configuration State is enabled - Dynamic RDF Configuration State is enabled - Concurrent Dynamic RDF Configuration is enabled - RDF Data Mobility Configuration State is disabled # symcfg list -rdfg <RDFG> - Prevent Auto Link Recovery is enabled - Prevent RAs Online is enabled
Step 2 - Create concurrent SRDF environment	All required RDF triangles set up successfully using dynamic RDF commands	N/A 5772/V6.4 PASS (3 rd Jan 2008)	Reusing the existing RDF triangles from the Beta testing. Not part of Star per se and hence no need to rebuild.
Step 3 - Create SRDF/Star Composite Groups	CGs required by Star set up correctly at R1 site.	V6.2 PASS (10 th April) V6.3 Reused V6.2 CGs 5772/V6.4 PASS (3 rd Jan 2008)	Script: create_newcg_cg Note also can be removed with script remove_newcg
Step 4 - Create the SRDF/star Option file	Options file created	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	File: newcg_opt
Step 5 - Perform the symstar setup operation	Star setup executes without error and resulting configuration matches design specification	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4	Also need to ftp file /usr/emc/API/symapi/config/STAR/def/newcg to other Star control servers (all sites)

		PASS (3 rd Jan 2008)	
Step 6 - Create R2 Composite Groups	R2 CGs created	V6.2 PASS (10 th April) V6.3 Reused V6.2 CGs 5772/V6.4 PASS (3 rd Jan 2008)	Created using symstar buildcg –site london
Step 7 - Add BCV devices to the SRDF/Star configuration	BCV successfully added to Composite Groups	5772/V6.4 PASS (9 th Jan 2008)	Sangs6#: symbcv –cg flexcg –sid 919 addocaiteall dev –range 0049:0055 –rdf –rdfg 40 Sangs7# symbcv –cg flexcf –sid 3110 associaet dev –range 0049:0055 Sangs6# SYMCLI_CLONE_EMULATION=ENABLED export SYMCLI_CLONE_EMULATION Sangs6# symmir –cg flexcf establish –star –full –rdf –opt_rag –rdfg name:fdc
Step 8 - Bringing up SRDF/Star for Normal Operations	Star Protected status reached.	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	Requires each site to be connected, then protected and then star enabled V6.2 Protect -site NewJersey (23.3s) Protect –site London (2m26.2s) Enable (4m 41.4s) V6.3 Protect -site NewJersey Protect –site London (Already in that state) Enable
Test 2 – Status Commands			
Step 1 - Run sysmtar show	Command runs correctly and output reflects configuration set up in Test 1	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	Shows setup of star configuration, not current status. -detail option also shows the devices in each RDF group
Step 2 - Run symstar query	Command runs correctly and output reflects configuration set up in Test 1	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	Shows current status of Star -detail also shows flags and recovery rdf groups V6.2 Queries take 10s. V6.3 Queries take 0.9s V6.4 Queries take 1.0s.

		2008)	
Test 3 – Isolating SRDF/Star sites			
Test 3a – Isolating Sync Site			
Step 1 - Isolate protected sync site	Sync site isolated	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	NewJersey RDF now in split state 1 st Target site – Isolated 2 nd target site - protected V6.2 Disable (36s) Isolate –site NewJersey (35.2s) V6.3 Disable (5.7s) Isolate –site NewJersey (9.6s) V6.4 Disable (4.6s) Isolate –site cgc (7.4s)
Step 2 - Rejoin isolated sync site	Sync site Star protected again	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (3 rd Jan 2008)	Script: join_isolated_sync_newcg V6.2 Disconnect –site NewJersey (12.7s) Connect –site NewJersey (28.3s) Protect –site NewJersey (34.7s) Enable (5m 35.2s) V6.3 Disconnect –site NewJersey (4.2s) Connect –site NewJersey (10.8s) Protect –site NewJersey (11.2s) Enable (2m 13s) V6.4 Script join_isolated_sync_flexcg Disconnect –site cgc (3.4s) Connect –site cgc (8.9s) Protect –site cgc (8.4s) Enable (2m 10s)
Step 3 – Isolate disconnected sync site	Sync site isolated	V6.2 PASS (10 th April) 5772/V6.4 PASS (3 rd Jan 2008)	First connect and protect before isolating site. Then the isolating process is the same as for protect site
Step 4 - Rejoin isolated sync site	Sync site Star protected again	V6.2 PASS (10 th April) 5772/V6.4 PASS (3 rd Jan 2008)	As per Step 2
Test 3b – Isolating Async Site			
Step 1 - Isolate protected Async site	Async site isolated	V6.2 PASS (10 th April)	London isolated. RDF pair state is split

		V6.2 Disable (36.3s) Isolate – site London (3m 12.6s) V6.3 INITIAL FAIL (3rd Oct) PASS (3rd Oct) 5772/V6.4 PASS (3rd Jan 2008)	V6.2 Disable (36.3s) Isolate – site London (3m 12.6s) V6.3 Disable (5.9s) Isolate – site London (3m 16s then timed out) Split failed. "The SRDF/A session could not be successfully dropped" Issue was due to the fact that no RDF daemons were running after the SE upgrade. These were then installed with # stord daemon install storrdfd –autostart Isolate then worked correctly. V6.4 Disable (6.6s) Isolate – site fdc (1m 6s)
Step 2 - Rejoin isolated Async site	Async site Star protected again	V6.2 PASS (10th April) V6.3 PASS (3rd Oct) 5772/V6.4 PASS (3rd Jan 2008)	Script: join_isolated_async_newcgc V6.2 Disconnect –site London (13.7s) Connect –site London(28.3s) Protect –site London (34.7s) Enable (5m 35.2s) V6.3 Disconnect –site London (4.2s) Connect –site London(11.7s) Protect –site London (2m15s) Enable (2m15s) V6.4 Disconnect –site cgc (3.6s) Connect –site cgc (8.1s) Protect –site cgc (1m09s) Enable (2m10s)
Step 3 – Isolate disconnected Async site	Async site isolated	V6.2 PASS (10th April) 5772/V6.4 PASS (3rd Jan 2008)	
Step 4 – Rejoin isolated Async site	Async site Star protected again	V6.2 PASS (10th April) 5772/V6.4 PASS (3rd Jan 2008)	V6.2 & V6.3 Script: join_isolated_async_newcgc V6.4 Script: join_isolated_async_flexcgc As per Step 2
Test 4 – Responding to Transient Remote Faults & rolling disasters			

Test 4a – Fault on Sync Leg

Script:
V6.2 & V6.3 Transient_fault_sync_newcg
V6.4 Transient_fault_sync_flexcg

Step 1 – Trigger fault on Sync leg	Sync leg in PathFail state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	Sync RAs offlined Sync leg → PathFail Async leg → Protected (replicating) Star → Tripped V6.4 Ports in fabric used by 919 (Site A) for replication to Site B disabled. Sync leg → PathFail Async leg → Protected (replicating) Star → Tripped
Step 2 – Clean up Sync site (reset)	Sync leg in Disconnected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Reset –site NewJersey (43s) V6.3 Reset –site NewJersey (10.6s) V6.4 Reset –site cgc (10.4)
Step 3 – Connect Sync site	Sync leg in Connected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Connect –site NewJersey (18s) V6.3 Connect –site NewJersey (5.9s) V6.4 Connect –site cgc (6.4)
Step 4 – Protect Sync site	Sync let in protected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Protect –site NewJersey (33.6s) V6.3 Protect –site NewJersey (11.9s) V6.4 Protect –site cgc (13.2)
Step 5 - Star-protect Star configuration	Star session Star-protected	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Enable (4m 08s) V6.3 Enable (2m 15s) V6.4 Enable (13.2s) (sic!)

Test 4b – Fault on Async Leg Script: V6.2 & V6.3 Transient_fault_async_newcg V6.4 Transient_fault_async_flexcg			
Step 1 – Trigger fault on Async leg	Async leg in PathFail state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	Async RAs offlined Sync leg → Protected (replicating) Async leg → PathFail Star → Tripped V6.4 Ports in fabric used by 919 (Site A) for replication to Site C disabled. Sync leg → Protected Async leg → Protected (Transidle RDF state) Star → Protected
Step 2 – Clean up Async site (reset)	Async leg in Disconnected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Reset –site London (35s) V6.3 Reset –site London (26s) V6.4 N/A if SRDF/A did not drop. When forced to drop, then Reset –site fdc
Step 3 – Connect Async site	Async leg in Connected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Connect –site London(17.6s) V6.3 Connect –site London(6.6s) V6.4 N/A if SRDF/A did not drop. When forced to drop, then Reset –site fdc
Step 4 – Protect Async site	Async let in protected state	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Protect –site London(2m 26s) V6.3 Protect –site London(2m 15s) V6.4 N/A if SRDF/A did not drop. When forced to drop, then Protect –site fdc
Step 5 – Enable Star protection	Star session Star-protected	V6.2 PASS (10 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 Enable (4m 08s) V6.3 Enable (2m 15s) V6.4 N/A if SRDF/A did not drop.

		2008)	When forced to drop, then Enable
Test 4c – Rolling disaster test Scripts: V6.2 & V6.3 rolling_newcg & rolling_reset_newcg V6.4 rolling_flexcg & rolling_reset_flexcg			
Step 1 – Start I/O to R1 disks	Iorate shows I/O to disks	V6.2 PASS (11 th April) 5772/V6.4 PASS (4 rd Jan 2008)	./run_iorate.ksh starload GDSE star V6.4 On sangs6 /opt/iorate/runcac.ksh
Step 2 – Offline all RAs supporting Sync leg	Sync RAs offlines and 1 st Target in PathFail state	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	
Step 3 – After short delay, offline Async connections	Async RAs offlines and 2 nd Target in PathFail state	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 1 st Target site: PathFail 2 nd Target site: PathFail; CleanReq Star: Tripped ALL RDFs pair states partitioned When delay between off-lining Sync and Async was 60 seconds, Async was not ahead of sync. When delay extended to ~2 minutes, then the asyns ended up ahead of sync site. V6.3 1 st Target site: PathFail 2 nd Target site: PathFail; CleanReq Star: Tripped ALL RDFs pair states partitioned V6.4 1 st Target site: PathFail 2 nd Target site: PathFail Star: Tripped ALL RDFs pair states partitioned
Step 4 – Online all RAs	All RAs on line	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 rd Jan 2008)	V6.2 & V6.3 Script: rolling_reset_newcg Query shows that states are now: 1 st Target site: PathFail 2 nd Target site: PathFail; CleanReq Star: Tripped RDF pair states suspended

			V6.4 1 st Target site: PathFail 2 nd Target site: PathFail Star: Tripped ALL RDFs pair states suspended
Step 5 – Reset paths	Paths change from PathFail to Disconnected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct)	When in PathFail state, and a switch is not required, it is necessary to perform a reset on each path to bring them back into disconnected state. Note that a connect, disconnect or halt operation is not possible with in PathFail state.
Step 6 – Connect both legs, protect both legs and enable star	Star session Star-protected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (4 th Jan 2008)	V6.4 See script rolling_reset_flexcg for specific steps required.

Test 5 – Responding to Disaster Faults

Test 5a – Switching workload to Synchronous Target Site (keeping Sync data) [KEEP LOCAL DATA]

Use flexcg (Configuration 2)

Step 1 – Disable Workload site	Star session in tripped state	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Star tipped by offlining ALL RAs on 0822 to deliverabately isolate it Script: down_all_ras
Step 2 – Cleanup Asyn c site	Async leg in PathFail state	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Script:./flexcg_switch_to_sync_keep_sync V6.2 Clean –site asynctgt (9.5s) Switch –site synctgt –keep_data synctgt (20.0s) Connect –site asynctgt (3m 06s) Protect –site asynctgt (3m 36s) V6.3 Clean –site asynctgt (15.5s) Switch –site synctgt –keep_data synctgt (13.1s) Connect –site asynctgt (1m 31s) Protect –site asynctgt (2m 24s)
Step 3 – Switch to Sync keeping Sync data	Switch to Sync site successful	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	
Step 4 – Connect to remaining Site (Site C; former async target)	Site C connected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	
Step 5 – Protect remaining Site (Site C; former async target)	Site C protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	

Step 6 – Bring Workload Symm available again	RAs on workload symm are back on line.	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Script: up_all_ras
Step 7 – Connect original workload site (now Adaptive Copy Mode target)	Site A connected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	V6.3 Connect –site workload
Step 8 - Protect original workload site	Original workload site protected	See test 5g	Note that this is possible as we are at sync target and hence sync replication back to workload site can be done!
Step 9 – Enable Star Protection	Star session star protected	V6.2 PASS awarded after stress testing of SE 6.2.0.3 V6.4 Not tested as not supported in Citi	
Test 5b – Switching workload back from original Sync target to original workload Site			
Step 1 – Halt Star	Star session halted	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Must be run from current workload site (Sync Site) All RDF groups suspended 1 st Target: Halted 2 nd Target: Halted V6.2 Halt (2m 22.2s) V6.3 Halt (5m 09s)
Step 2 – Switch to Original workload site	Switch to original workload site successful	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Script: flexcg_planned_switch_from_sync_to_workload V6.2 switch –site workload (2m 41.9s) connect –site synctgt (36.6s) connect –site asynctgt (38.0s) protect –site synctgt (1m 19.5s) protect –site asynctgt (2m 17.7s) enable (4m 17.5s)

Step 3 – Connect other two sites	Remaining two sites connected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	TOTAL: 11m 51s Note: This test failed on a retest on 4 th May. However, subsequent upgrade to SE6.2.0.3 and overnight stress testing appeared to fix the issue (see Appendix K). V6.3 switch –site workload (1m 7s) connect –site synctgt (25s) connect –site asynctgt (25s) protect –site synctgt (1m 08s) protect –site asynctgt (3m 10s) enable (2m 14s) TOTAL: 8m 30s
Step 4 – Protect other two sites	Remaining two sites protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	
Step 5 – Enable Star Protection	Star session star protected	V6.2.0.0 PASS (13 th April) FAIL (4 th May SE 6.2.0.0) V6.2.0.3 PASS (10 th May) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	
Test 5c – Switching workload to Asynchronous Target Site (Keeping Async data)) [KEEP <u>LOCAL</u> DATA] Assumes Site A not available initially, and restarts SRDF/A from Site C to Site B. When Site A becomes available, Adaptive copy is used to update Site A prior to a switching back to processing to Site A.			
Step 1 – Disable Workload site	Star session in tripped state	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 th Jan 2008)	Star tipped by offlining ALL RAs on 0822 to deliverabately isolate it SP2# ./down_all_ras V6.4 Used script sangs6: ./rolling_flexcg (to force Site C to be more up to date than Site B)
Step 2 – Cleanup Asyn c site	Async leg in PathFail state	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct)	CT1# symstar –cg newcg clean –site London (V6.2 10.5s; V6.3 20.7s)

		5772/V6.4 PASS (9 rd Jan 2008)	
Step 3 – Switch to Async keeping Async data	Switch to async site successful	P V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	Workload now London 1 st target now NewYork (disconnected; RDF=partitioned; mode=S) 2 nd target now NewJersey (disconnected; RDF=N/A; mode=0) CT1# symstar –cg newcg switch –site London – keep_data London (V6.2 35.9s; V6.3 20.9s) V6.4 EMC supplied an undocumented workaround. Before running the switch as Site C, force the Asyn c link down from Transidle to Partitioned state with the following command (sangs7 is at Site C aka fdc) Sangs7: symrdf –cg flexcg suspend –immediate – rdfg name:rdc –nop –star –force Sangs7: symstar –cg flexcg switch –site fdc –keep fdc –nop
Step 4 – Connect to remaining Site (Site B; former sync target)	Site B connected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	1 st target NewYork (disconnected; RDF=partitioned; mode=S) 2 nd target NewJersey (connected ; RDF=Synchronized; mode=C) CT1# symstar –cg newcg connect –site NewJersey (V6.2 2m 50s; V6.3 1m 12s) V6.4 Sangs7# symstar –cg flexcg connect –site cgc
Step 5 – Protect remaining Site (Site B; former sync target)	Site B protected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	1 st target NewYork (disconnected; RDF=partitioned; mode=S) 2 nd target NewJersey (protected ; RDF=Consistent; mode=A) CT1# symstar –cg newcg protect –site NewJersey (V6.3 2m 25s) V6.4 Sangs7# symstar –cg flexcg protect –site cgc
Step 6 – Bring Workload Symm available again	RA's on workload symm are back on line.	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	SP2#: ./up_all_ras V6.4 Sangs6: ./up_all_ras

		2008)	
Step 7 – Connect original workload site (now Adaptive Copy Mode target)	Site A connected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	1 st target NewYork (connected; RDF=Synchronized; mode=C) CT1# symstar –cg newcg connect –site NewYork (V6.2 - 1m 19.6s?; V6.3 – 9m 22s) Note: Appendix F has performance information for V6.3 after the SFS issues was fixed. V6.4 Sangs7# symstar –cg flexcg connect –site rdc
Step 8 – Confirm we cannot Protect original workload site (now Adaptive Copy Mode target)	Protect operation should fail	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct)	Fails (as expected) as NewJersey is running in Async mode. CT1# symstar –cg newcg protect –site NewYork Fails as expected
Step 9 – Confirm we cannot enable Star protection	Check Star consistency capable = No	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct)	“Star Consistency Capable” = No i.e. it will not be possible to enable Star, as expected
Test 5d – Switching workload back from original Async target to original workload Site			
Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	Must be run from current workload site (Async Site) All RDF groups suspended 1 st Target: Halted 2 nd Target: Halted CT1# symstar –cg newcg halt –nop V6.4 ./planned_flexcg_switch_from_async_to_workload For all of the following steps
Step 2 – Switch to Original workload site	Switch completed successfully	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	Must be run from site to which workload is to be switched to (in this case the original workload site) After switch: Workload now NewYork 1 st target now NewJersey (disconnected; RDF=suspended; mode=C) 2 nd target now NewJersey (disconnected; RDF=suspended; mode=C) SP2# symstar –cg newcg switch – site NewYork (V6.2 – 3m 36s; V6.3 – 2m 07s)
Step 3 – Connect other two sites	Sites both connected	V6.2 PASS (11 th April)	Script: newcg_planned_switch_from_async_to_workload

		V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	Timings: SP2# symstar -cg newcg Connect -site NewJersey (V6.2 - 37.7s; V6.3 - 10.6s) SP2# symstar -cg newcg connect -site London (V6.2 - 34.3s; V6.3 - 10.6s)
Step 4 – Protect other two sites	Sites both protected	V6.2 PASS (11 th April) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	SP2# symstar -cg newcg protect -site NewJersey (V6.2 - 1m 30.5s; V6.3 - 1m 09s) SP2# symstar -cg newcg protect -site London (V6.2 - 3m 24.4s; V6.3 - 3m 12s)
Step 5 – Enable Star Protection	Star session protected	V 6.2.0.0 FAIL (11 th April) V6.2.0.3 PASS awarded after stress testing of SE 6.2.0.3 (see Appendix K) V6.3 PASS (3 rd Oct) 5772/V6.4 PASS (9 rd Jan 2008)	Enable – FAILED (32m 34s) – TIMED OUT!! Timed out in "Wait until R2 Recoverable is achieved". Symstat showed MSC had not converged for the two consistency bound SRDF/A sessions. RDF daemon was running. Starting and stopping the RDF daemon fixed the problem i.e. MSC then converged. SP2# symstar -cg newcg enable (V6.3 - 2m 13s)
Test 5e – Switching workload to Asynchronous Target Site (Keeping Sync data) [USE REMOTE DATA] Assumes Site A not available initially, and restarts SRDF/A from Site C to Site B. When Site A becomes available, Adaptive copy is used to update Site A prior to a switching back to processing to Site A.			
Step 1 – Disable Workload site	Star session in tripped state	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	V6.2 & V6.3 Script: SP2: ./down_all_ras V6.4 Block all RA ports on Symm 919 • MDS01 FC11/1 (sync) • MDS01 FC11/2 (async) • MDS01 FC12/1 (sync) • MDS01 FC12/2 (async) Query shows that sync leg is in Partitioned state and async leg is in Transmit Idle state (as seen from Site A). Star system state for 2 nd target_site is down as Protected (as Transmit Idle is in place still). From Site C, same states visible.

Step 2 – Cleanup Async c site	Async leg in PathFail state	V6.2 PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 PASS (7rd Jan 2008)	Script CT1: ./ newcg_switch_to_async_keeping_sync SE6.2 CT1# symstar –cg newcg clean – 26.8s SE6.3 CT1# symstar –cg newcg clean – 20.8s V6.4 Symstar –cg flexcg clean –site fdc –nop (already in requested state)
Step 3 – Switch to Async keeping Sync data	Switch to async site successful	V6.2 PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 FAIL (7rd Jan 2008) 5772/V6.4 PASS (9rd Jan 2008)	V6.2 CT1# symstar –cg newcg switch –site London – keep_data NewJersey (3m 10s) V6.3 CT1# symstar –cg newcg switch –site London – keep_data NewJersey (1m 10s) V6.4 Fails as RDF 3110 RDF group 40 is in TransmitIdle state and a switch cannot be performed when in this state. Then took the RAs off line at Site A Symm 919. Then the 2nd target_site was marked as PathFail and RDF pair state changed to Partitioned when viewed from Site A, but still marked as marked as protected and Transmit Idle respectively when seen from Site C, where failover has to take place. Also it was not possible to disable Transmit Idle (via symconfigure) when in Transmit Idle state. Switch only possible when Transmit Idle disabled on Async leg V6.4 EMC supplied an undocumented workaround. Before running the switch as Site C, force the Async link down from TransIdle to Partitioned state with the following command (sang7 is at Site C aka fdc) Sang7: symrdf –cg flexcg suspend –immediate – rdfg name:rdc –nop –star –force Sang7: symstar –cg flexcg switch –site fdc –keep cgc –nop
Step 4 – Connect to remaining Site (Site B; former sync target)	Site B connected	V6.2 PASS (11th April) V6.3 PASS (5th Oct)	V6.2 CT1# symstar –cg newcg connect –site NewJersey (10.8s) NOTE: ALREADY CONNECTED AS WE USED

		V6.4 5772/V6.4 PARTIAL FAIL (7 rd Jan 2008)	REMOTE DATA V6.4 Only possible when Transmit Idle disabled on Async leg or SRDF/A manually suspended symstar -cg flexcg connect -site cgc
Step 5 – Protect remaining Site (Site B; former sync target)	Site B protected	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct)) 5772/V6.4 PARTIAL FAIL (7 rd Jan 2008)	V6.2 CT1# symstar -cg newcg protect -site NewJersey (2m 40s) V6.3 CT1# symstar -cg newcg protect -site NewJersey (2m 25s) V6.4 Only possible when Transmit Idle disabled on Async leg or SRDF/A manually suspended symstar -cg flexcgprotect -site cgc End of ./ newcg_switch_to_async_keeping_sync
Step 6 – Bring Workload Symm available again	RAs on workload symm are back on line.	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) (11 th April) 5772/V6.4 PASS (7 rd Jan 2008)	Script: up_all_ras (and unblock any blocked ports)
Step 7 – Connect original workload site (now Adaptive Copy Mode target)	Site A connected	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	Note that this is important, partly because it updates Site A *via adapative copy) but also as it is necessary to get Star into a valid state for running halt prior to the switch back to Site A V6.3 CT1: symstar -cg newcg connect -site NewYork -nop (9m 21s!!!) Note: Appendix F has performance information for V6.3 after the SFS issues was fixed. V6.4 Symrdf -cg flexcg connect -site rdc -nop
Step 8 – Confirm we cannot Protect original workload site (now Adaptive Copy Mode target)	Protect operation should fail	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct)	Fails (as expected) as NewJersey is running in Async mode. V6.3 CT1: symstar -cg newcg connect -site NewYork -nop (No time recorded as supposed to fail)
Step 9 – Confirm we cannot enable	Check Star consistency	V6.2	"Star Consistency Capable" = No

Star protection	capable = No	PASS (11 th April) V6.3 PASS (5 th Oct)	i.e. it will not be possible to enable Star, as expected
Test 5f – Switching workload back from original Async target to original workload Site			
Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	V6.2 CT1: symstar –cg newcg halt (2m 11.5s) V6.3 CT1: symstar –cg newcg halt (5m 02s) Applications must be down before a halt is run. Halt gets all 3 sites synced up. It also write disables or Not Readys the current workload site so applications will fail. Note: Appendix F has performance information for V6.3 after the SFS issues was fixed. V6.4 Sangs7: symstar –cg flexcg halt (1m 44s)
Step 2 – Switch to Original workload site	Switch completed successfully	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	Script on SP2: ./newcg_planned_switch_from_async_to_workload V6.2 SP2: symstar –cg newcg switch –site NewYork(3m 36s) V6.3 SP2: symstar –cg newcg switch –site NewYork (2m 07s) V6.4 Sangs6: sysmtar –cg flexg switch –site rdc (35s) planned_flexcg_switch_async_to_workload (6m 00s end-to-end)
Step 3 – Connect other two sites	Sites both connected	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	V6.2 SP2: symstar –cg newcg connect –site NewJersey (37.7s) SP2: symstar –cg newcg connect –site London (34.5s) V6.3 SP2: symstar –cg newcg connect –site NewJersey (10.6s) SP2: symstar –cg newcg connect –site London (10.6s) V6.4 Fsangs5 symstar –cg flexcg connect –site cgc (9.2s) sangs6: symstar –cg flexcg connect –site rdc (8.8s)
Step 4 – Protect other two sites	Sites both protected	V6.2	V6.2

		PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 PASS (7rd Jan 2008)	SP2: symstar -cg new protect -site NewJersey (1m 30.1s) SP2: symstar -cg new protect -site London (2m 24.9s) V6.3 SP2: symstar -cg new protect -site NewJersey (1m 09s) SP2: symstar -cg new protect -site London (3m 12s) Note: Appendix F has performance information for V6.3 after the SFS issues was fixed. V6.4 Fsangs5 symstar -cg flexcg protect -site cgc (1m8s) sangs6: symstar -cg flexcg protect -site rdc (2m8s)
Step 5 – Enable Star Protection	Star session Star protected	FAIL (11th April SE 6.2.0.3) PASS awarded after stress testing of SE 6.2.0.3 (see Appendix K) 5772/V6.4 PASS (7rd Jan 2008)	V6.2 SP2: symstar -cg newcg enable – FAILED Symstat showed MSC had not converged for the two consistency bound SRDF/A sessions. RDF daemon was running. Starting and stopping the RDF daemon fixed the problem i.e. MSC then converged. V6.3 SP2: symstar -cg newcg enable (2m 13s) V6.4 Sangs6: symstar -cg flexcg enable (2m 10s)
Test 5g – Switching workload to Synchronous Target Site (keeping Async data) [USE REMOTE DATA] Use flexcg (Configuration 2)			
Step 1 – Disable Workload site	Star session in tripped state	V6.2 PASS (13th April) (4th May) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	Star tipped by offlining ALL RAs on 0822 to deliverabately isolate it Script: down_all_ras SP2: ./down_all_ras
Step 2 – Cleanup Async site	Async leg in PathFail state	V6.2 PASS (13th April) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	V6.3 CT1: symstar -cg flexcg clean -site asynctgt (22.5s)

Step 3 – Switch to Sync keeping Async data	Switch to Sync site successful	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct)	V6.2 CT1: symstar –cg flexcg switch –site synctgt –keep_data asynctgt –nop (3m 10.6s) V6.3 CT1: symstar –cg flexcg switch –site synctgt –keep_data asynctgt –nop (1m 11s)
Step 4 – Connect to remaining Site (Site C; former async target)	Site C connected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	V6.2 CT1: symstar –cg flexcg connect –site asynctgt (22s) V6.3 CT1: symstar –cg flexcg connect –site asynctgt NOTE: ALREADY CONNECTED AS WE USED REMOTE DATA
Step 5 – Protect remaining Site (Site C; former async target)	Site C protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	V6.2 CT1: symstar –cg flexcg protect –site asynctgt (1m 31.6s) V6.3 CT1: symstar –cg flexcg connect –site asynctgt (2m 23s)
Step 6 – Bring Workload Symm available again	RAs on workload symm are back on line.	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	Script: up_all_ras SP2: up_all_ras
Step 7 – Connect original workload site (now Adaptive Copy Mode target)	Site A connected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	V6.3 CT1: symstar –cg flexcg connect –site workload –nop (6m 54s)
Step 8 - Protect original workload site	Original workload site protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	V6.3 CT1: symstar –cg flexcg protect –site workload –nop (3m 22s) Note that this is possible as we are at sync target and hence sync replication back to workload site can be done!
Step 9 – Enable Star Protection	Star session star protected	V6.2.0.0 CRITICAL FAIL	Enable – FAILED (TIMED OUT)

		(13th April) PASS awarded after stress testing of SE 6.2.0.3 (see Appendix K) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	Got stuck in "Wait until R2 recoverable is achieved" Symstat SRDF/A session for RDF group 16 (B → C) was not switching. RDF daemon was running. Starting and stopping the RDF daemon still did not fix the problem. Note that this test (Configuration 2) only includes a single triangle, so no SRDF/A MSC running as such. Cycle switching only recommenced after a Disable –force Was executed. Various attempts were made to enable Star in this configuration, but all failed as everytime the switching of the SRDF/A leg ceased! V6.3 CT1: symstar –cg flexcg enable –nop
Test 5h – Switching workload back from original Sync target to original workload Site			
Step 1 – Halt Star	Star session halted	V6.2 PASS (13th April) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	Must be run from current workload site (Sync Site) All RDF groups suspended 1st Target: Halted 2nd Target: Halted V6.3 CT1: symstar –cg flexcg halt -nop (6m 55s)
Step 2 – Switch to Original workload site	Switch to original workload site successful	V6.2 PASS (13th April) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	Script on SP2: flexcg_planned_switch_from_sync_to_workload V6.2 SP2: symstar –cg flexcg [] switch –site workload (2m 40s) connect –site synctgt (36.5s) connect –site asynctgt (36.3s) protect –site synctgt (1m 19.6s) protect –site asynctgt (3m19.0s) enable (4m 17.4s) TOTAL: 12m 49s
Step 3 – Connect other two sites	Remaining two sites connected	V6.2 PASS (13th April) V6.3 PASS (5th Oct) V6.4 Not tested as not supported in Citi	V6.3 switch –site workload (1m 6s) connect –site synctgt (25.5s) connect –site asynctgt (24.7s) protect –site synctgt (1m 08s) protect –site asynctgt (3m 10s) enable (2m 13s)

Step 4 – Protect other two sites	Remaining two sites protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct)	TOTAL: 8m 30s
Step 5 – Enable Star Protection	Star session star protected	V6.2 PASS (13 th April) V6.3 PASS (5 th Oct) V6.4 Not tested as not supported in Citi	

Test 6 – Conducting Planned Switching Operations

Test 6a – Planned switch to Sync target

Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	Must be run from current workload site (workload Site) All RDF groups suspended 1 st Target: Halted 2 nd Target: Halted V6.2 Halt (2m 46s) V6.3 Halt (2m 14s)
Step 2 – Switch to Sync target	Switch completed successfully	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	Script: (run on synctgt) planned_flexcg_switch_to_sync V6.2 switch –site synctgt (1m 37s) connect –site workload (38s) connect –site asynctgt (38s) protect –site workload (22s) protect –site asynctgt (2m21s) enable (4m 20s) TOTAL: 10m 17s
Step 3 – Connect other two sites	Sites both connected	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	V6.3 switch –site synctgt connect –site workload connect –site asynctgt protect –site workload protect –site asynctgt enable (4m 20s) TOTAL: 17m 13s
Step 4 – Protect other two sites	Sites both protected	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	
Step 5 – Enable Star Protection	Star session Star protected	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	

Test 6b – Planned switch back from synctgt to original workload site

Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	Must be run from current workload site (synctgt Site) All RDF groups suspended 1 st Target: Halted 2 nd Target: Halted V6.3 Halt (6m 35s)
Step 2 – Switch to Original workload site	Switch completed successfully	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	Script: (run on workload) flexcg_planned_switch_from_sync_to_workload V6.2 switch –site workload (2m 31s)

Step 3 – Connect other two sites	Sites both connected	V6.2 PASS (2 nd May) V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	connect –site synctgt (38s) connect –site asyncgt (37s) protect –site synctgt (20s) protect –site asyncgt (2m20.0s) enable (4m 52s) TOTAL: 11m 19s V6.3 switch –site workload (1m 6s) connect –site synctgt (25s) connect –site asyncgt (25s) protect –site synctgt (8s) protect –site asyncgt (1m 9s) enable (2m 13s) TOTAL: 5m 27s
Step 4 – Protect other two sites	Sites both protected	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	
Step 5 – Enable Star Protection	Star session Star protected	V6.2 PASS (2 nd May) V6.3 PASS (10 th Oct)	
Test 6c – Planned switch to Async target In this scenario, Site A is still up, so after the switch SRDF/A is enabled back to Site A, with adaptive copy to Site B to keep it up to date.			
Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (9 th May) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (4 th Jan 2008)	V6.2 Failed first time. Error was: The SRDF/A session could not be dropped May have timeout set too short, as the whole halt process exited after 3m 40s. Query showed that both legs were suspended, which indicates that SRDF/A was still in the process of suspending when the timeout took place. Both legs ended up in Invalid state (Star was in Tripped state). Invalid state was fixed by running a # symstar –cg newcg halt –reset –force This left targets in PathFail / Suspended state. Star then enabled again using erset, connect, protect and enable (using script rolling_reset_newcg) Also repeated test continuously in a loop and this failure occurred again on 6 th iteration. Halt (2m 50.5s) UPDATE: Issued fixed with SE 6.2.0.3. Stress testing conducted on 8th/9 th May showed 0 failures after 113 runs. Stress testing undertaken using script: overnight_stress_test V6.3

			SP2: symstar -cg newcg halt -nop (2m 4s) V6.4 Sangs6# symstar -cg flexcg halt (Not timed)
Step 2 – Switch to Async target	Switch completed successfully	V6.2 PASS (11 th April) V6.3 PARTIAL PASS (5 th Oct) Poor Performance V6.3 (17 th Oct) PASS Performance issue fixed 5772/V6.4 PASS (4 rd Jan 2008)	Script: newcg_planned_switch_to_async V6.2 CT1: symstar -cg newcg switch (2m 00s) CT1: symstar -cg newcg connect -site NewYork (36s) CT1: symstar -cg newcg protect -site NewYork (2m 26s) CT1: symstar -cg newcg connect -site NewJersey (37s)
Step 3 – Connect to Site A	Site A connected	V6.2 PASS (11 th April) V6.3 PARTIAL PASS (5 th Oct) Poor Performance V6.3 PASS (17 th Oct) Performance issue fixed 5772/V6.4 PASS (4 rd Jan 2008)	V6.3 CT1: symstar -cg newcg switch (7m 01s) CT1: symstar -cg newcg connect -site NewYork (1m 47s) CT1: symstar -cg newcg protect -site NewYork (5m 13s) CT1: symstar -cg newcg connect -site NewJersey (12.7s) V6.3 CT1: symstar -cg newcg switch (53s)
Step 4 – Protect Site A with SRDF/A	Site A protected	V6.2 PASS (11 th April) V6.3 PARTIAL PASS (5 th Oct) Poor Performance V6.3 PASS (17 th Oct) Performance issue fixed 5772/V6.4 PASS (4 rd Jan 2008)	CT1: symstar -cg newcg connect -site NewYork (16s) CT1: symstar -cg newcg protect -site NewYork (2m 24s) CT1: symstar -cg newcg connect -site NewJersey (16s) V6.4 Script planned_flexcg_switch_to_async Sangs7: symstar -cg flexcg switch -site fdc(2:09s)

Step 5 – Connect Site B to keep it up to date	Site B connected	V6.2 PASS (11th April) V6.3 PARTIAL PASS (5th Oct) Poor Performance 5772/V6.4 PASS (4rd Jan 2008)	Sangs7: symstar –cg flexcg connect –site rdc (47s) Sangs7: symstar –cg flexcg protect –site rdc (1m 54s) Sangs7: symstar –cg flexcg connect –site cgc (1m07ss) [Note: Low performance caused by other GDSE people loading the RDF links at the same time]
Test 6d – Planned switch back from asynctgt to original workload site			
Step 1 – Halt Star	Both remote sites in Halted state	V6.2 PASS (11th April) V6.3 PARTIAL PASS (5th Oct) Poor Performance V6.3 PASS (17th Oct) Performance issue fixed 5772/V6.4 PASS (4rd Jan 2008)	V6.2 CT1: symstar –cg newcg halt (2m 15s) V6.3 CT1: symstar –cg newcg halt (6m 39s) V6.3 CT1: symstar –cg newcg halt (2m 5s) V6.4 Sangs7: symstar –cg flexcg halt (2m 41s)
Step 2 – Switch to Original workload site	Switch completed successfully	V6.2 PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 PASS (4rd Jan 2008)	Script on SP2: ./newcg_planned_switch_from_async_to_workload V6.2 Total time for switch, connects, protects and enable is 13m 6s V6.3 Total time for switch, connects, protects and enable is 7m 13s
Step 3 – Connect other two sites	Sites both connected	V6.2 PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 PASS (4rd Jan 2008)	V6.4 Script on sangs6: Planned_flexcg_switch_from_async_to_workload Total time for switch, connects, protects and enable is 6m 53s
Step 4 – Protect other two sites	Sites both protected	V6.2 PASS (11th April) V6.3 PASS (5th Oct) 5772/V6.4 PASS (4rd Jan 2008)	[Note: Low performance caused by other GDSE people loading the RDF links at the same time]

Step 5 – Enable Star Protection	Star session Star protected	V6.2 PASS (11 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (4 rd Jan 2008)	
Test 6e – Restarting workload at original workload site after halt Script: Overnight_stress_test			
Step 1 – Halt Star	Both remote sites in Halted state	V6.2.0.0 FAIL (12 th April) V6.2.0.3 PASS awarded after stress testing of SE 6.2.0.3 (see Appendix K) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (4 rd & 7 th Jan 2008)	Also repeated test continuously in a loop and this failure occurred again on 6th iteration. States “SRDF/A session could not be dropped” and targets go into invalid state. Comparing failed and successful interaction indicates that Star is concluding that Star is not allowing enough time for SRDF/A to stop on the occasions when it fails. The failures occurred about 8% of the time during overnight stress testing (see Appendix K) The problem was fixed by upgrading to SE 6.2.0.3. V6.3 Test 6e tested with script overnight_stress_test
Step 2 – Reset with halt -reset	Both sites now is disconnected state	V6.3 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (4 rd & 7 th Jan 2008)	SP2: ./overnight_stress_test Runtime – 7m 54s; 7m 19s; 7m 59s V6.4 Sangs6: time ./overnight_stress_test Runtime: 5m 51s; 6m 00s; 5m 56s
Step 3 – Reconnect, protect and enable Star	Star session Star protected	V6.2 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (4 rd & 7 th Jan 2008)	

Test 6f – Stress testing of planned switching between Site A and Site C

V6.4

Use scripts running in parallel at Site A and Site C:

Site A (sangs6): harness_s6

Site C (sangs7): harness_s7

Planned switch A → C → A Run 1	Switch occurs without error	5772/V6.4 PASS (8 th Jan 2008)	Ran 15 times and then hung due to script delay timing issues
Planned switch A → C → A Run 2	Switch occurs without error	5772/V6.4 PASS (8 th & 9 th Jan 2008)	Ran 25 times and then failed due to a SYMAPI error on sangs6 (this was not star specific – all SE operation were broken on sangs6)

Test 7 – Disabling SRDF/Star for Device Reconfiguration

Step 1 – Disable Star	Star protection disabled	V6.2 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 th Jan 2008)	V6.3 SP2# symstar –cg newcg disable –nop V6.4 Sangs6# symstar –cg flexcg disable –nop
Step 2 – Unprotect both target sites	Both sites unprotected	V6.2 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 th Jan 2008)	V6.3 SP2# symstar –cg newcg unprotect –site NewJersey –nop (6s) SP2# symstar –cg newcg unprotect –site London – nop (1m 9s) V6.4 Sangs6# symstar –cg flexcg unprotect –site cgc – nop Sangs6# symstar –cg flexcg unprotect –site fdc – nop
Step 3 – Clear up metadata	Clean up runs successfully	V6.2 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 th Jan 2008)	V6.3 SP2# symstar –cg newcg setup –options newcg_opt –clear –nop Note that a query run before and after shows no difference to the configuration, except of course the last command that was run and the time. V6.4 Sangs6: symstar –cg flexcg setup –options flexopt –clear –nop

Step 4 – Set up Star again	Set up star again	V6.2 PASS (12 th April) V6.3 PASS (5 th Oct) 5772/V6.4 PASS (7 rd Jan 2008)	V6.3 SP2# symstar -cg newcg setup -options newcg_opt -nop SP2# If any changes, ftp def files to other sites SP2# ./connect_protect_enable_newcg (4m 38s) V6.4 Sangs6# symstar -cg flexcg setup -options flexopt -nop Sangs6# ./connect_protect_enable_flexcg
Test 8 – Point-in-Copy testing (Emulation mode)			
Step 1 – Halt Star	Star halts	5772/V6.4 PASS (10 rd Jan 2008)	V6.4 Sangs6# symstar -cg flexcg halt -nop
Step 2 – Split BCVs from Site A	BCVs split	5772/V6.4 PASS (10 rd Jan 2008)	Sangs6# SYMCLI_CLONE_EMULATION=ENABLED export SYMCLI_CLONE_EMULATION sangs6# symmir -cg flexcg split -star -rdf -nop *or* sangs6# symmir -cg flexcg split -star -rdf -rdfg name:fdc -nop Reset with: sangs6# symmir -cg flexcg establish -star -rdf -rdfg name:fdc -nop
Step 2 – Split BCVs from Site C	BCVs split	5772/V6.4 PASS (10 rd Jan 2008)	Sangs7# SYMCLI_CLONE_EMULATION=ENABLED export SYMCLI_CLONE_EMULATION sangs7# symmir -cg flexcg split -star -nop Reset with: Sangs7# symmir -cg flexcg establish -star -nop