



Global Distributed Storage Engineering

SRDF/A Best Practice Enhancements

GDSE-06045-PS

Project Scope (RFC)

0.2

1. Version Control

Version	Date	Author	Reviewed	Comments
0.1	23-Aug-06	Chris Clayton		First draft
0.2	29-Aug-06	Chris Clayton		Incorporating Engineering Peer Review Feedback from Gary Johnson

2. Legal Notice

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3. Contact

Please address any comments or questions regarding the information contained in this document via email to the “*GT Global Distributed Storage Engineering” distribution list or alternatively to gdse@citigroup.com.

4. Latest Versions

It is recommended that the latest version of the document be used from the GDSE website <http://gdse.ny.ssmb.com>. Newer versions may include certification on additional platforms, or comments on issues discovered after deployment.

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6. Introduction

6.1 Overview

SRDF/A is a Global Engineering certified, long-distance replication solution. However, the initial certification was targeted at a relatively modest set of existing SRDF/S applications that urgently needed SRDF/A protection due to regulatory requirements.

In the 12 months since SRDF/A was initially certified, there have been a number of significant changes to both requirements and technology, which now need to be reflected in the best practice documented in the SRDF/A Solutions Guides. For example:

1. Citigroup wishes to deploy an SRDF/A-enabled environment to accommodate net new applications, with I/O characteristics, which are unknown prior to the deployment of the application. This is a major undertaking, as at the time of writing, EMC are unable to build generic SRDF/A-enabled environments. See Appendix A for further details.
2. Citigroup is now intending to use SRDF/A for entire datacenters, and not just a select number of applications. This has some scaling implications for the solution.
3. EMC have updated various SRDF/A configuration recommendations to reflect experience of deployments across their entire customer base. Furthermore, there have been a number of technical improvements to the SRDF/A product by EMC, which impacts Best Practices.
4. Citigroup has also learned from 12 months of SRDF/A deployment experience and ongoing Global Engineering research. Furthermore, Citigroup has updated other technology components on which SRDF/A depends (e.g. McData IPS SAN Router) and hence it is now necessary to update the SRDF/A Solutions Guides to accommodate these changes.

This project addresses update to the Best Practices for all of the above points.

6.2 *The challenge of deploying SRDF/A-enabled infrastructure*

We have a fundamental problem today with the way that we need to deploy SRDF/A.

We have begun execution of a Global Datacentre Strategy that requires long distance (out of region) disaster recover. Hence, going forward most EMC storage-based replication will be based on SRDF/A and not SRDF/S anymore.

We are a service provider to internal customers. We offer multiple, generic storage tiers to our customers, and hence we need to add an asynchronously replicated tier to the current list of available tiers. However, we will need to build these tiers before we know what applications will be deployed on them, or what their I/O profiles will be. Many applications will be new, or currently on non-Symmetrix storage, and hence it will not be practical to determine their I/O profiles via the current EMC recommended practice.

We are in a Catch-22 situation: with the current Best Practices for SRDF/A from EMC, we cannot build an SRDF/A infrastructure without detailed knowledge of I/O profiles, but we cannot attract internal customers to use SRDF/A unless the infrastructure is available on demand i.e. pre-installed and ready for use at short notice.

Hence, we need to:

1. Rapidly deploy (multiple) SRDF/A-enabled DMX systems, (as we do with SRDF/S-enabled DMX today)
2. Install said SRDF/A-enabled DMX without knowledge of the application I/O profiles what will go onto them i.e. install SRDF/A-enabled DMX in such a way that they can accommodate a wide variety of I/O profiles loads.
3. Describe the network requirements for SRDF/A with minimal information i.e. at the start of the deployment project, without detailed application I/O profile information so that we can cost.

For comparison, this is how we meet the above requirements for SRDF/S today. Addressing each of the above points in turn:

1. We build to a standard template (bin file layout, hardware build, connection to metro replication fabrics), enabling rapid deployment into data centres.
2. SRDF/S does not require analysis of application I/O profiles by EMC before we are allowed to use it. SRDF/S has no additional cache requirements. Metropolitan area bandwidth is cheap so we initially over-provision and then monitor to ensure we have headroom on the network bandwidth. We are able to add bandwidth later if necessary with modest effort.
3. Not an issue due to use of existing over-provisioned bandwidth

6.3 Project Scope

This project does not include any testing of the SRDF/A product. It addresses significant development of the Best Practices for the product, which covers testing already completed as part of other engineering projects (e.g. the McData IPS V2.0 certification; DMX3 SRDF certification, etc), or by EMC.

The following activities will be addressed in the expanded Solutions Guide documentation.

Activity	Difficulty			Estimate effort (man days)	In scope?
	L	M	H		
Investigate the feasibility of developing Best Practices for deployment of SRDF/A-ready infrastructure for <u>new applications</u> , or applications currently on non-Symmetrix storage ¹ . If practical, develop said Best Practices (additional bracketed effort figure). Vendor timeframes may render the development activity out of scope of this project.			✓	15 (+30)	✓
Update Best Practices for deployment of new SRDF/A-enabled infrastructure for <u>existing Symmetrix-based applications</u>	✓			2	✓
Develop Best Practice for migrating existing source frames from SRDF/S to SRDF/A, using concurrent SRDF.		✓		8	✓
Develop Best Practices for WAN throughput optimization for SRDF/A.		✓		12	✓
Develop Best Practices on sharing Network					

¹ Success of this activity is very highly dependent on EMC providing template configuration information and SRDF/A monitoring tools. Only EMC have access to the relevant customer base I/O profiles, and the sizing tools necessary to do this work. If they do not contribute to this project in an appropriate manner, it will not be possible to develop these Best Practices.

Bandwidth and FC → IP infrastructure between Symmetrix		✓		5	✓
Best Practices on using RAID/5 and large disks for SRDF/A resync PIT copies		✓		5	✓
Update Citigroup Solutions Guide with latest Best Practices from EMC	✓			2	✓
Update Citigroup Solutions Guide based on Citigroup's experience with SRDF/A to date.	✓			2	✓
SRDF/A Trending and resource usage tools			✓	N/A	x
Improved monitoring using event daemon using Solutions Enabler 6.3		✓		N/A	x
Multi-session consistency (MSC) in concurrent SRDF configuration		✓		N/A	x

6.3.1 Out of scope items

The reason for excluding certain topics from the project scope are given below:

1) SRDF/A Trending and resource usage tools

Citigroup is dependent on the vendor to deliver. EMC have only just started working on these, and so there is little certainty of delivery from the vendor on the timeframe of this project.

2) Improved monitoring using event daemon using Solutions Enabler 6.3

Event Daemon is not available in the currently certified version of Solutions Enabler (6.0.3). Improved monitoring will not be possible until SE 6.3 is certified by Citigroup and that product will not be available from the vendor until Q4 2006.

3) Multi-session consistency (MSC) in concurrent SRDF configuration

This capability is not available in the currently certified version of Solutions Enabler (6.0.3). It will not be possible until SE 6.3 is certified by Citigroup and that product will not be available from the vendor until Q4 2006. Furthermore, we may decide that we only support MSC in SRDF/Star environments, in which case it would be part of a future SRDF/Star certification exercise.

7. Project Strategy

Different strategies will be adopted for the different activities.

Activity	Strategy
Investigate the feasibility of developing Best Practices for deployment of SRDF/A-enabled infrastructure for <u>new applications</u> , or applications currently on non-Symmetrix storage. If practical, develop said Best Practices.	Main challenge. Develop contacts within EMC whom are responsible for producing both design and deployment Best Practice. Work with them to develop a model for a generic template SRDF/A-enabled deployments.
Update Best Practices for deployment of SRDF/A-enabled infrastructure for existing Symmetrix-based applications	The existing methodology of using EMC PS to size SRDF/A deployments in this scenario will be reviewed.
Develop Best Practices for migrating existing source frames from SRDF/S to SRDF/A using concurrent SRDF.	A number of different scenarios will be considered, including total replacement with new infrastructure. Migration of application data is out of scope; the focus of this Best Practices will be the changes required to the storage infrastructure.
Develop Best Practices for WAN throughput optimization for SRDF/A.	Testing of SRDF/A throughput with McData IPS with varying configurations will be used to create a Solutions Guide.
Develop Best Practices on sharing Network Bandwidth and FC → IP infrastructure between Symmetrix arrays	Best Practice will be developed in conjunction with IPS Product Owner.
Best Practices on using RAID/5 and large disks for SRDF/A resync PIT copies	Best Practices will be developed taking into consideration DMX3 Best Practice and Operational constraints.
Update Citigroup Solutions Guide with latest Best Practice from EMC	Collated Best Practices from published EMC documentation, presentations and meetings with EMC SRDF engineering staff
Update Citigroup Solutions Guide based on Citigroup's experience with SRDF/A to date.	Review existing Solutions Guide and modify to include proposed changes to Best Practice

7.1 Summary of strategy for building SRDF/A environments

We need to define different approaches to building SRDF/A environments, to accommodate differing requirements:

- 1) Existing applications on Symmetrix. There are at least three distinct scenarios:
 1. **Add to the existing DMX installation, typically using Concurrent SRDF temporarily to swing from local SRDF/S to remote SRDF/A replication.** The requirements for SRDF/A to run between “balanced systems” may preclude this option if it is not possible to have hardware/configuration at the remote SRDF/A target site that is similar to the source DMX. This situation may occur if the source DMX is not a current model.
 2. **Migrate existing applications to an all-new SRDF/A-enabled environment.** This will be a common approach used where it is not possible to simply add to and upgrade the existing solution, as described above. For this option, there is a pre-requisite for each application for a well-defined mapping between current Symmetrix and destination Symmetrix in the new SRDF/A enabled environment.
 3. **Converting existing units from SRDF/S to SRDF/A.** This assumes that there is no change in location for Production and COB. This is not the case for Citigroup.

In all of the above cases, use EMC well-developed internal process and tools (symmerge) that allows them to accurately size SRDF/A implementations (bandwidth, cache) based on measured I/O performance data. Note, however, that EMC would need to be engaged for each migration/conversion.

- 2) “Net new” applications or applications currently on non-Symmetrix Storage. There are two main steps.
 1. **Build an all-new SRDF/A-enabled environment to a predefined template configuration**, with generous initial allocations of required SRDF/A resources such as network bandwidth and cache. The template design would have associated with it a nominal peak workload (write MB/sec with certain assumptions about I/O size) for a given effective link bandwidth (the effective link bandwidth may be less than the nominal bandwidth available due to the impact of link latency or packet loss). The design must allow SRDF/A resources to subsequently be scaled up or down, to accommodate differences between the actual workload and template configuration workload capacity.

ISSUE: Template configurations do not current exist and need to be defined.

ISSUE: The methodology for creating template configurations does not exist and needs to be developed.

1. **Deploy automated SRDF/A resource monitoring tools on a Symmetrix by Symmetrix basis.** This is critical, as it is essential to spot changes in resource consumption before it becomes an issue.

ISSUE: The necessary monitoring tools do not exist today. EMC are working on these, but there is no details are available yet.

8. Project Classification

This project is classified as “Maintain” under the WTS Project Management System. The project ID associated with this project is *WE #4356*

9. Project Deliverables

This project will result in the creation and/or modifications of the following documents as a minimum. Additional document may also be created, if deemed necessary.

- **GDSE-05002-SG** – SRDF/A for Long Distance Replication Solution Guide V2.0
- **GDSE-06034-SG** – WAN throughput optimization for SRDF/A V1.0

10. Project Prerequisites

Engagement with the EMC staff responsible for development of EMC’s SRDF/A Best Practices (both deployment and design) and SRDF/A monitoring tools

11. Project Risks

The main activity of this project is heavily dependent on EMC providing enhancements to their own Best Practices (both deployment and design) for SRDF/A. This currently has very significant holes in it and it is not clear that these will be filled with sufficient quality and detail in an appropriate timeframe. If EMC cannot provide the appropriate information, development of the Best Practices will not be possible.

The new Best Practices to be developed for deploying SRDF/A-ready environments also depends on EMC developing appropriate monitoring tools. There is no certainty that appropriate tools will be developed. EMC know of the need but cannot commit to what will be delivered or when.

Any Best Practices developed cannot be tested in a lab, as they require real-world workloads over an extended period. The first few production deployments would be needed to verify the Best Practices.