

**SRDF[®]/A Reserve Capacity
Enhancement: Transmit Idle
Open Systems and Mainframe**

Technical Notes

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Executive summary

SRDF®/Asynchronous (SRDF/A) mode is a high-performance, extended distance asynchronous replication feature that uses a delta set architecture resulting in reduced bandwidth requirements with typically no performance impact to hosts.

SRDF/A Reserve Capacity enhances SRDF/A's ability to maintain operational state when encountering network resource shortfalls that would have previously suspended SRDF/A operations. With SRDF/A Reserve Capacity functions enabled, additional resource allocation can be applied to address temporary workload peaks, periods of network congestion, or even temporary network outages. The two functions that implement SRDF/A Reserve Capacity are Transmit Idle and Delta Set Extension (DSE), and they work together to maximize availability of continuous remote replication operations while minimizing operational overhead.

SRDF/A Transmit Idle is a Reserve Capacity enhancement to EMC's SRDF/A feature that provides SRDF/A with the capability of dynamically and transparently extending the Capture, Transmit, and Receive phases of the SRDF/A cycle while masking the effects of an "all SRDF links lost" event.

Without the SRDF/A Transmit Idle enhancement, an "all SRDF links lost" event would normally result in the abnormal termination of SRDF/A with either a CACA.20 or CACA.40 error. The SRDF/A Transmit Idle enhancement has been specifically designed to prevent this event from occurring.

Introduction

This technical note describes the SRDF/A Transmit Idle Enginuity™ enhancement as introduced in Enginuity version 5x71.

The goals of this document are threefold:

- ♦ To provide a base overview of SRDF/A Transmit Idle.
- ♦ To describe issues that SRDF/A Transmit Idle is targeted to solve and those that it does not solve.
- ♦ To illustrate how to use and manage SRDF/A Transmit Idle in both mainframe and open systems environments.

Audience

This technical note is intended for anyone who needs to understand the SRDF/A Transmit Idle enhancement as introduced in Engenuity version 5x71 for open systems and mainframe environments.

It is specifically targeted at EMC field technical staff (that is, TSG and/or CS personnel) and EMC customers who are either running SRDF/A or are considering SRDF/A as a viable long-distance replication solution.

SRDF/A Transmit Idle overview

The main premise of SRDF/A asynchronous mode is to provide a dependent-write consistent point-in-time image on the target side, which is not too far behind the source side, and which results in minimal data loss in the event of a disaster at the primary site.

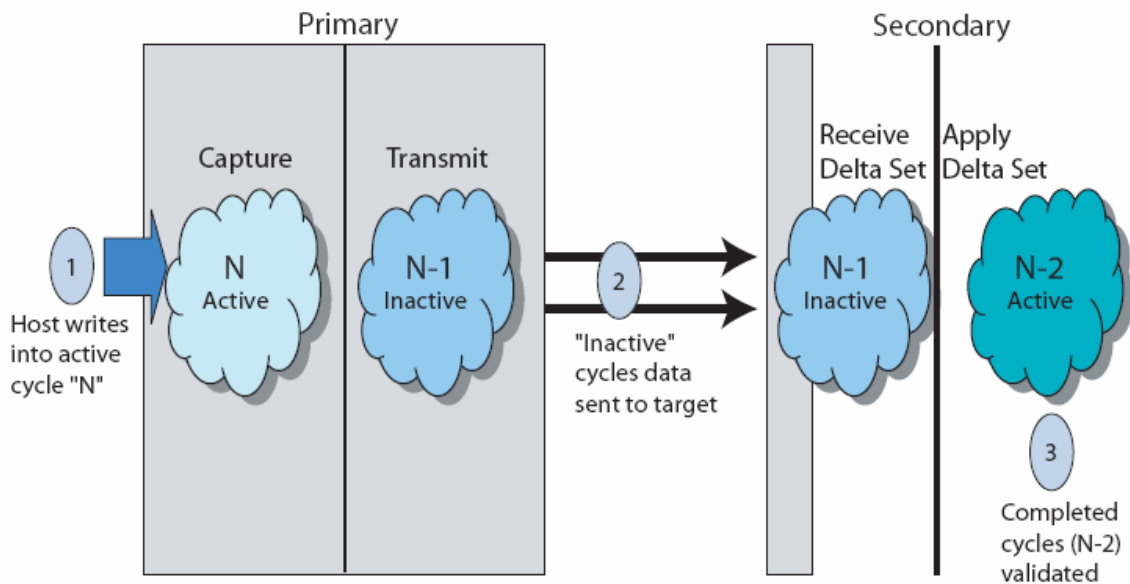


Figure 1 SRDF/A delta set architecture

Each representation of N (including N-x) in Figure 1 represents a set of Symmetrix® SRDF/A replication cycles. The following list describes the purpose of each of these cycles:

- N is the active cycle number on the primary or source side of the SRDF connection, accumulating the writes from the host. This cycle is also referred to as the Capture cycle.
- N-1 cycle on the source side is sending the accumulated I/Os to the target side. This cycle is also referred to as the Transmit cycle.
- N-1 cycle on the target side is receiving data from the primary or source side. This cycle is also referred to as the Receive cycle.
- N-2 cycle on the target side is performing the restore operation. This operation marks the I/Os as write-pending for the Disk Adaptor (DA) to be de-staged to physical disk. This cycle is also referred to as the Apply cycle.

The cycle transitions, within the same Symmetrix frame (Capture to Transmit or Receive to Apply), are cache-memory-only operations that modify bit settings without the overhead of copying actual data between cycles. The only data physically transferred or copied during this process takes place between the Transmit and Receive (N-1) cycles as data is transmitted over the SRDF link between sites.

In previous versions of Enginuity, when an SRDF link issue caused a transient loss of remote connectivity that exceeded the amount of time set by the SRDF Link Limbo timeout value (default 10 seconds), all active SRDF/A sessions utilizing the links that were lost would drop. This resulted in a loss of remote replication and the need to initiate a manual recovery process.

In Enginuity version 5772 (and also in version 5x71 with fix 31801), a new enhancement called SRDF/A Transmit Idle allows you to enable a function where loss of all links for an SRDF/A session will place the session into a state referred to as Transmit Idle. This causes the remote SRDF mirror to remain ready on the link, even though the actual link is physically down. This means that data will not be sent to the remote device during a brief link outage, but SRDF/A will not drop, allowing for recovery that does not require user intervention.

From a functional perspective, SRDF/A Transmit Idle is a resiliency enhancement to EMC's SRDF/A feature that provides SRDF/A with the capability of dynamically and transparently extending the Capture, Transmit, and Receive phases of the SRDF/A cycle while masking the effects of an "all SRDF links lost" event.

Without the SRDF/A Transmit Idle enhancement, an "all SRDF links lost" event would normally result in the abnormal termination of SRDF/A with

either a CACA.20 or CACA.40 error. The SRDF/A Transmit Idle enhancement has been specifically designed to prevent this event from occurring.

Enginuity functionality

This section provides additional details regarding the Symmetrix SRDF/A Transmit Idle enhancement Enginuity requirements and functionality.

Enginuity prerequisites

This section lists the Enginuity requirements necessary to support the SRDF/A Transmit Idle enhancement.

Note that the associated host software requirements are located in the applicable interface sections for open systems and mainframe environments. Refer to those sections for additional software requirements.

Enginuity requirements are detailed in Table 1:

Table 1 Enginuity Transmit Idle requirements

Enginuity level	Release level	EPack #	Fixes included in EPack
5772 and later	Initial	Not Required	N/A
5771	94.102	1079	31801, 31829, 31870, 32117, and 32342
5771	92.99	1016	31137, 31801, 31824, 31829, 31833, 31870, 32117, 32342
5671	60.65	1071	31801, 32117, 32342
5671	59.64	1017	30732, 31137, 31247, 31753, 31801, 31824, 31829, 31833, 31976, 32117, 32250, 32342

Other key Enginuity requirements and recommendations include:

- You need to have the appropriate SRDF and/or SRDF/A licenses.
- SRDF/A Transmit Idle is not supported on ESCON RAs.
- Do not use this enhancement unless it can be enabled at both sides.
- As this enhancement is rolled out to the field, additional fixes may be required.
- You should stay current with maintenance and process information.

- ♦ You should refer to Primus emc148716 for more information.

Functionality detail

The goal of this enhancement is to provide an additional level of resiliency during short SRDF/A “all links lost” events. When active, this enhancement presents an SRDF/A environment in the “Transmit Idle” state. This goal assumes that the source side SRDF/A cache limitation is not exceeded. In many cases the SRDF “all links lost” state lasts only one to two minutes. This is where the assistance provided by SRDF/A Transmit Idle can be most effective.

SRDF/A Transmit Idle is not a panacea for all causes of SRDF/A drops. It is targeted to address only short link outages when the Symmetrix cache is not constrained. It is important to note that SRDF/A Transmit Idle does not replace SRDF Link Limbo. SRDF/A Transmit Idle will only invoke after the SRDF Link Limbo timer expires. SRDF Link Limbo does not change when Transmit Idle is enabled.

SRDF/A Transmit Idle is of limited benefit if the Symmetrix system is cache constrained while running SRDF/A. While in the Transmit Idle state, SRDF/A continues to collect writes from the host and store them in cache. If the Symmetrix is running close to the system maximum write-pending cache limit (or the SRDF/A Max Cache Use value, if set) during normal operations under SRDF/A, it is probable that SRDF/A will drop. In this case, the drop would be caused by a “cache full” condition taking place shortly after all links are lost and SRDF/A Transmit Idle is invoked.

SRDF/A Transmit Idle should not be enabled until it can be fully supported on both sides of the SRDF link. It is important to note that EMC host-based management software (Solutions Enabler and SRDF Host Component) expect this to be true of both sides of the SRDF link. Accordingly, you must take care to enable Transmit Idle on both sides of the SRDF link. Enabling SRDF/A Transmit Idle on only one side of the link will not prevent SRDF/A from dropping with “all SRDF links lost” type errors.

Limitations

SRDF/A Transmit Idle cannot help you if the SRDF/A environment is not properly balanced between the frames and across the SRDF links. The following SRDF/A component configurations must be balanced:

- ♦ Types of DMX frames in use on each side of the link
- ♦ Cache sizes and allocation to SRDF/A
- ♦ SRDF link bandwidth sized appropriately to the requirements of the applications and data being replicated
- ♦ Drive counts and sizes, and data protection schemes in use

SRDF/A Transmit Idle does not take the place of ensuring that the SRDF network between the sites is of sufficient quality to meet an application's replication objectives.

Applicable settings

Activation/deactivation of the SRDF/A Transmit Idle enhancement is performed at the SRDF/A group level, via host software (see the applicable chapter within the SRDF Host Component and SYMCLI user guides). SRDF/A Transmit Idle can be set for a non-SRDF/A group in anticipation of SRDF/A being made active on the group at some time in the future.

As describe previously, to use SRDF/A Transmit Idle, it must be enabled on the Symmetrix units on both sides of the SRDF link. When enabled via Solutions Enabler or SRDF Host Component, commands to enable Transmit Idle must be issued to the Symmetrix arrays on both sides of the SRDF link.

The unit value for Transmit Idle within Enginuity is in seconds. The allowable values can be one of the following:

- NEVER SET (the default, disabled)
- OFF (disabled)
- ON (enabled)

NEVER SET or OFF (effectively the same) results in the feature being disabled. ON enables the Transmit Idle state to become set upon the loss of all SRDF links for the SRDF group. The Transmit Idle state remains in effect until at least one of the SRDF links for the group becomes usable again.

Invocation and upgrading

SRDF/A Transmit Idle is invoked dynamically. An Enginuity (code) upgrade or Enginuity level upgrade is allowed while SRDF/A Transmit Idle is active.

When SRDF/A Transmit Idle is invoked, several SymmWin scripts that require SRDF link connectivity may fail, just as they would without SRDF/A Transmit Idle being active. In this case, appropriate error messages are displayed as expected. For example, certain Parts Replacement scripts and scripts involving legacy features (for example, Replace last RA in an SRDF/A Group or Replace a non-protected R2 device in an SRDF/A group) may be affected.

Usage considerations

When an SRDF/A group is in the Transmit Idle state, all SRDF links for the group are not available, and consequently remote syscalls do not have any paths that they can use. As such, any host software operations that generate remote syscalls will fail with an appropriate error message while Transmit Idle is active.

Legacy API functions have been successfully tested with SRDF/A Transmit Idle invoked; however, once SRDF/A Transmit Idle is enabled, all hosts running SRDF/A control software must be upgraded to a level capable of providing support for the Transmit Idle enhancement.

When using SRDF/A Transmit Idle, there is no longer any reason to set SRDF Link Limbo above the 10-second default. Customers who currently have SRDF Link Limbo set to a value greater than 10 seconds need to change it back to 10 seconds when they enable SRDF/A Transmit Idle. Please ensure that all customer-specific SRDF/A usage documentation (Run Books, and so forth) are updated to reflect this SRDF Link Limbo timer setting as part of implementing SRDF/A Transmit Idle.

Testing considerations

This section provides additional best practices to support initial SRDF/A Transmit Idle customer testing. To test Transmit Idle (the ability to enter the Transmit Idle state), you may choose any one of the following options that cause the Transmit Idle state to be entered once it is enabled (for the SRDF group on both Symmetrix systems):

- ♦ Pull the cables connecting the RA directors to the network at either side of the SRDF group connection.
- ♦ Pull the cables connecting the RA directors at the switch or router at either side of the SRDF group connection.
- ♦ Disable the zone set to which the RA directors supporting the SRDF group are configured.
- ♦ Disable ports on network extension equipment for the RA directors supporting the SRDF group.
- ♦ Disable ports on the network extension equipment that will sever all connection for the SRDF group between the Symmetrix systems, such as ISL or DWDM network ports (specific to each network setup at each customer site).

If all RA directors supporting an SRDF group in either Symmetrix system are brought offline (via EMC service personnel or SRDF control software), the SRDF/A sessions supported by those RA directors will drop. This is by design. The SRDF/A Transmit Idle feature is designed to allow an SRDF/A session to continue to be active in the event of an unplanned network outage that causes an interruption for all SRDF group connections between Symmetrix systems.

If you intentionally put RA directors in a Symmetrix system in an offline state, it is assumed that you want the SRDF/A sessions supported by those RA directors to drop when the RA directors are taken offline.

Open systems software interface

This section provides additional details regarding the open systems interface to the SRDF/A Transmit Idle enhancement.

Open systems software prerequisites

This section lists the open system software requirements necessary to support the SRDF/A Transmit Idle enhancement. Current software requirements for an open system host environment are as follows:

- Solutions Enabler version 6.3.1.1 or later

Note that specific Enginuity requirements can be found in the associated Enginuity section. Refer to this section for additional software requirements.

Open systems interface details

SRDF/A Transmit Idle state is treated the same as the Partitioned state in most cases. When Transmit Idle is active (Transmit Idle state), only the following operations are allowed from the R1 (source) side:

- ♦ RW_ENABLE_R1_MIRROR
- ♦ WRITE_DISABLE_R1_MIRROR
- ♦ READY_R1_MIRROR
- ♦ NOT_READY_R1_MIRROR

Suspension of the SRDF/A environment when SRDF/A Transmit Idle is active can be accomplished with the following command:

```
symrdf suspend -immediate
```

Note: Additional restrictions that apply to SRDF/Star environments are described in the SRDF/Star section.

As noted previously, the SRDF/A Transmit Idle state is treated the same as the Partitioned state in most cases. For this reason, when Transmit Idle is active (Transmit Idle state), only the following operations are allowed from R2 (target) side:

- ♦ RW_ENABLE_R2_MIRROR
- ♦ WRITE_DISABLE_R2_MIRROR
- ♦ READY_R2_MIRROR
- ♦ NOT_READY_R2_MIRROR
- ♦ RW_DISABLE_R2_MIRROR

Suspension and failover of the SRDF/A environment when in SRDF/A Transmit Idle mode can be accomplished with the following commands:

```
symrdf suspend -immediate  
symrdf failover -immediate
```

The following figures provide examples of the more common SRDF/A Transmit Idle SYMCLI commands and their associated outputs.

```
symcfg list -rdfg <xxx | all> -rdfa
Symmetrix ID : 000190300016
  S Y M M E T R I X    R D F A    G R O U P S
-----
RA-Grp  Group          Flags  Cycle  Pri  Transmit
      Name          CSRM T time      Idle Time
-----
  2 ( 1) RFDVGROUP    XI-- X    30   33  000:06:45
  3 ( 2) RFDVGROUP    XI-- X    30   33  000:00:00

Legend:
      RDFA Flags      :
(C)onsistency        : X = Enabled, . = Disabled, - = N/A
(S)tatus              : A = Active, I = Inactive, - = N/A
(R)DFA Mode          : S = Single-session, M = MSC, - = N/A
(M)sc Cleanup        : C = MSC Cleanup required, - = N/A
(T)ransmit Idle      : X = Enabled, . = Disabled, - = N/A
```

Figure 2 Output from the `symcfg list` command

```
RDFA Information:
{
  Session Number          : 18
  Cycle Number            : 34
  Number of Devices in the Session : 2
  Session Status          : Active - MSC
  Session Consistency State : Enabled
  Minimum Cycle Time      : 00:00:30
  Average Cycle Time      : 00:00:30
  Duration of Last cycle  : 00:00:30
  Session Priority        : 33
  Tracks not Committed to the R2 Side : 1546
  Time that R2 is behind R1 : 01:50:00
  R1 Side Percent Cache In Use : 14
  R2 Side Percent Cache In Use : 3
  Transmit Idle Time      : 01:50:00
}
```

Figure 3 Output from the `symdev show` or `symdg show` commands

```

...
Device Group (DG) Name           : kevin
DG's Type                       : RDF1
DG's Symmetrix ID               : 000190300016
RDFA Session Number             : 15
RDFA Cycle Number               : 2576
RDFA Session Status             : Active
RDFA Minimum Cycle Time         : 00:00:30
RDFA Avg Cycle Time              : 00:00:30
Duration of Last cycle          : 00:00:30
RDFA Session Priority            : 33
Tracks not Committed to the R2 Side : 95
Time that R2 is behind R1       : 00:00:34
RDFA R1 Side Percent Cache In Use : 13
RDFA R2 Side Percent Cache In Use : 9
Transmit Idle Time             : 09:50:00
...

```

Figure 4 Output from the `symrdf query -rdfa` command

```

RDFA Info:
{
  Cycle Number           : 2584
  Session Status         : Active
  Minimum Cycle Time     : 00:00:30
  Avg Cycle Time         : 00:00:30
  Duration of Last cycle : 00:00:30
  Session Priority       : 33
  Tracks not Committed to the R2 Side : 234
  Time that R2 is behind R1 : 00:00:35
  R1 Side Percent Cache In Use : 7
  R2 Side Percent Cache In Use : 4
  Transmit Idle Time       : 00:10:00
}

```

Figure 5 Output from the `symrdf query -detail` command

When SRDF/A Transmit Idle is active, the new pair state of TransIdle is displayed appropriately with output from the `symrdf query` command.

Source (R1) View					Target (R2) View					MODES	
ST					LI					ST	
Standard					N					A	
Logical	Sym	T	R1 Inv	R2 Inv	K	T	R1 Inv	R2 Inv		RDF Pair	
Device	Dev	E	Tracks	Tracks	S Dev	E	Tracks	Tracks	MDAC	STATE	
DEV001					00AD RW					0	
					0 RW 0088 WD					0	
										0 A..X	
										TransIdle	

Figure 6 Output from the `symrdf query` command

The `set rdf group` command syntax has been extended to allow SRDF/A Transmit Idle to be enabled and disabled:

```
set [ra / rdf] group GroupNumber

[session_priority = SessionPriority] /
[minimum_cycle_time = CycleTime] /
[rdfa_transmit_idle = ENABLE / DISABLE];
```

For example, to enable this feature for rdf group 30, use the following command:

```
symconfigure set rdf group 30, rdfa_transmit_idle = enable
```

Note: This command must be entered at both the source and target sites so that Transmit Idle is set on both sides of the link.

New symevent report

There is one new symevent case to be aware of:

- ♦ Temporary link loss and recovery

Figure 7 provides an example that demonstrates this case.

Detection time	Dir	Src	Category	Severity	Error Num
< Link loss detected >					
Tue Nov 7 18:58:21 2006	RF-2D	Symm RDF	(40)	Informational	0x0071
SRDF/A Session entering transmit idle state					
Tue Nov 7 18:58:21 2006	RF-2D	Symm RDF	(40)	Warning	0x0010
No RDF links in an RDF group are operational					
<Link recovery detected>					
Tue Nov 7 18:58:27 2006	RF-2D	Symm RDF	(40)	Warning	0x0021
A single RDF link in an RDF group is now operational after a 'Single Link Down' event					
Tue Nov 7 18:58:27 2006	RF-2D	Symm RDF	(40)	Informational	0x0011
All RDF links in an RDF group are now operational after an 'All Links Down' event					
Tue Nov 7 18:58:27 2006	RF-2D	Symm RDF	(40)	Informational	0x0072
SRDF/A Session recovered from a transmit idle state					

Figure 7 Temporary link loss and recovery

Mainframe software interface

This section provides additional details regarding the mainframe interface to the SRDF/A Transmit Idle enhancement.

Mainframe software prerequisites

This section lists the mainframe software requirements necessary to support the SRDF/A Transmit Idle enhancement. Mainframe Host Component requirements are detailed in Table 2:

Table 2 Mainframe Host Component requirements

Host Component	Resource Pak Base	Required Host Component and Resource Pak Base maintenance levels
5.3	5.5	SR53057, SF55065
5.3	5.6	SR53057, SF56013
5.4	5.5	SR54004, SF55065
5.4	5.6	SR54004, SF56013
5.5	5.7	Included in base release

WARNING: As this enhancement continues to be rolled out to the field, additional fixes may be required. Please stay current with maintenance and process information.

Specific Enginuity requirements can be found in the Enginuity section.

Mainframe interface details

The key facts regarding the mainframe Transmit Idle interface are as follows:

- Transmit Idle can be set on or off via the SC SRDFA command.
- To determine if Transmit Idle feature is enabled, use the SQ SRDFA command.
- The SQ SRDFA command indicates when you are in the Transmit Idle status (that is, SRDF/A is active, SRDF/A devices are ready on the link, however the link is down).
- MSC prevents startup of an MSC group if one or more RDFGRPs are

in Transmit Idle status.

- ♦ MSC displays Transmit Idle status if there is a temporary link loss.
- ♦ MSC displays as normal when exiting Transmit Idle status after one of the links resume.
- ♦ The normal DROP command does not work when the status is Transmit Idle.
- ♦ A new SC SRDFA DROP_SIDE command is added to SRDF HC.

You can perform the following operations with the mainframe interface:

- ♦ Turn Transmit Idle on:
#SC SRDFA,LCL(cuu,ragroup#),TRANSMIT_IDLE,ONLINE
- ♦ Turn Transmit Idle off:
#SC SRDFA,LCL(cuu,ragroup#),TRANSMIT_IDLE,OFFLINE
- ♦ Drop SRDF/A if Transmit Idle is active:
#SC SRDFA,LCL(cuu,ragroup#),DROP_SIDE

```

08.38.19 S0041609 EMCMN00I SRDF-HC : (4) 4SQ SRDFA,LCL(07FC,16)
08.38.19 S0041609 EMCQR00I SRDF-HC DISPLAY FOR (4) 4SQ SRDFA,LCL(07FC,16) 491
491 MY SERIAL # MY MICROCODE
491 -----
491 000000006134 5671-59
491
491 MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
491 -----
491 LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
491 -----
491 16 Y F 36 000000006134 5671-59 G(R1>R2) SRDFA A MSC
491 KCH16AC DYNAMIC AUTO-LINKS-RECOVERY LINKS-DOMINO:NO (MSCKCH )
491
491 -----
491 PRIMARY SIDE: CYCLE NUMBER 15,451 MIN CYCLE TIME 30
491 SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
491 CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
491 AVERAGE CYCLE TIME 22 AVERAGE CYCLE SIZE 0
491 TIME SINCE LAST CYCLE SWITCH 12 DURATION OF LAST CYCLE 15
491 MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 94
491 HA WRITES 3,132,696 RPTD HA WRITES 4,930
491 HA DUP. SLOTS 397 SECONDARY DELAY 27
491 LAST CYCLE SIZE 0 DROP PRIORITY 33
491 CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
491 SRDFA TRANSMIT IDLE ( Y )
491 MSC ACTIVE ( Y ) ACTIVE SINCE 10/24/2006 08:34:11
491 CAPTURE TAG C0000000 00000011 TRANSMIT TAG C0000000 00000010
491 GLOBAL CONSISTENCY ( Y ) STAR RECOVERY AVAILABLE ( N )
491 -----
491 END OF DISPLAY

```

Figure 8 SQ SRDF/A display (primary side) showing Transmit Idle is ON

```

10.07.51 S0041609 EMCMN00I SRDF-HC : (6) ¢¢SQ SRDFA,LCL(07FC,16)
10.07.52 S0041609 EMCQR00I SRDF-HC DISPLAY FOR (6) ¢¢SQ SRDFA,LCL(07FC,16) 320
320 MY SERIAL # MY MICROCODE
320 -----
320 000000006134 5671-59
320
320 MY GRP ONL PC OS GRP OS SERIAL OS MICROCODE SYNCHDIR FEATURE
320 -----
320 LABEL TYPE AUTO-LINKS-RECOVERY LINKS_DOMINO MSC_GROUP
320 -----
320 16 N ? ? 000000006143 SRDFA T MSC
320
320 -----
320 PRIMARY SIDE: CYCLE NUMBER 15,804 MIN CYCLE TIME 30
320 SECONDARY CONSISTENT ( Y ) TOLERANCE ( N )
320 CAPTURE CYCLE SIZE 0 TRANSMIT CYCLE SIZE 0
320 AVERAGE CYCLE TIME 15 AVERAGE CYCLE SIZE 0
320 TIME SINCE LAST CYCLE SWITCH 14 DURATION OF LAST CYCLE 15
320 MAX THROTTLE TIME 0 MAX CACHE PERCENTAGE 94
320 HA WRITES 3,132,696 RPTD HA WRITES 4,930
320 HA DUP. SLOTS 397 SECONDARY DELAY 29
320 LAST CYCLE SIZE 0 DROP PRIORITY 33
320 CLEANUP RUNNING ( N ) MSC WINDOW IS OPEN ( N )
320 SRDFA TRANSMIT IDLE ( Y )
320 MSC ACTIVE ( Y ) ACTIVE SINCE 10/24/2006 08:34:11
320 CAPTURE TAG C0000000 00000172 TRANSMIT TAG C0000000 00000171
320 GLOBAL CONSISTENCY ( Y ) STAR RECOVERY AVAILABLE ( N )
320 -----
320 END OF DISPLAY

```

Figure 9 SQ SRDF/A display (primary side) showing Transmit Idle is ACTIVE

Possible values for the Transmit Idle indicator in the display are:

- ♦ SRDFA T IDLE (SRDF/A single session mode in Transmit Idle)
- ♦ SRDFA T MSC (SRDF/A MSC mode in Transmit Idle)
- ♦ SRDFA T STAR (SRDF/A STAR mode in Transmit Idle)

New error messages

SCF1586I	MSC - GROUP=ggggggggg (dddd,ra#) SER=ssssssssssss IN SRDFA TRANSMIT IDLE
Cause:	For MSC_GROUP = ggggggggg using MSC device dddd for RDFGRP ra# for the box with the serial number sssssssssss the RDFGRP is in the SRDF/A Transmit Idle status. This means that the link is down for this RDFGRP and the Transmit Idle feature is active, so the SRDF/A RDFGRP will stay active even though the link is down.
Action:	Determine the cause for the link being down and get that link active again. Being in SRDF/A Transmit Idle does not mean SRDF/A will run forever in this state, because no cycle switching is occurring and other resources will get exhausted.
SCF1587R	MSC - GROUP=ggggggggg WAIT FOR SRDFA TRANSMIT IDLE - RETRY OR CANCEL
Cause:	For MSC_GROUP = ggggggggg has one or more RDFGRPs identified in SCF1586I messages that are in SRDF/A Transmit Idle.
Action:	Reply "RETRY" to re-attempt the start of MSC after the Transmit Idle status has been resolved or reply "CANCEL" if you do not want to restart.
SCF1588I	MSC - GROUP=ggggggggg (dddd,ra#) SER=ssssssssssss NO LONGER IN SRDFA TRANSMIT IDLE
Cause:	For MSC_GROUP = ggggggggg using MSC device dddd for RDFGRP ra# for the box with the serial number sssssssssss the RDFGRP is no longer in the SRDF/A Transmit Idle status.
Action:	None.

Open systems SRDF/Star considerations

This section provides additional details specific to SRDF/A Transmit Idle Enhancement and SRDF/Star in an open systems environment. The following rules apply when the async leg of the SRDF/Star configuration is operating in the TransIdle state:

- ♦ The `symstar query` command will export the TransIdle pair state.
- ♦ If all three sites are reachable and the async leg on both sides is in the TransIdle state, `symstar query` behaves as if the links are still up.
 - For example, if a site was in the Protected state before going into the TransIdle state, it will still be shown as Protected.
- ♦ If one end of the async leg is in the TransIdle state and the other is in the Partitioned state, `symstar query` will behave the same as a Partitioned state.
 - For example, if a site was in the Protected state before the TransIdle, it will be shown as PathFail.
- ♦ All commands are allowed on the sync leg.

The following rules apply when the async leg is in the TransIdle state:

- ♦ The following controls are blocked on the async leg at the workload site when in the TransIdle state:

⇒ Protect,	⇒ Disconnect,	⇒ Unprotect,
⇒ Halt,	⇒ Reset,	⇒ Isolate,
⇒ Enable		

Note: The Protect control is a special case because it is possible to see devices as TransIdle in an SRDF/Star environment during the initial `symstar setup` if you are already running in SRDF/A mode.

- ♦ Switch control (to either of the target sites) is allowed.
- ♦ If at the beginning of the control all of the SRDF/A groups are not in the TransIdle state, the control can still fail if one of the RDF groups enters the TransIdle state during processing.
 - To recover, reissue the command with the `-force` option once the TransIdle state has cleared.

New Symmetrix event codes

The following new event codes are exported to the SymmEvent application:

- ♦ A5.8F3E.0D
SRDF/A (SNOW) dropped into limbo after all links for the group were lost.
- ♦ A5.8F3E.0E
SRDF/A (SNOW) recovered from SNOW limbo after a link came back.
- ♦ A5.CACA.71
SRDF/A (SNOW) was dropped because there were no online RAs.
- ♦ A5.90CA.00
SNOW error: Queue record added when in SNOW limbo.

The following event codes related to loss of the SRDF links and to SRDF Link Limbo being invoked are still posted within the Symmetrix system, prior to the event codes described previously:

- ♦ 7D3E
SRDF Link Limbo invoked because all links were lost.
- ♦ 7E3E
SRDF Link Limbo exited because link recovery occurred before the Link Limbo timer expired, if any link recovers.
- ♦ 047D
One link was lost.
- ♦ 046D
All links for a group were lost, if no link recovers.

Conclusion

SRDF/A Transmit Idle is a Reserve Capacity enhancement to EMC's SRDF/A feature that provides SRDF/A with the capability of dynamically and transparently extending the Capture, Transmit, and Receive phases of the SRDF/A cycle while masking the effects of an "all SRDF links lost" event.

Without the SRDF/A Transmit Idle enhancement, an "all SRDF links lost" event would normally result in the abnormal termination of SRDF/A with either a CACA.20 or CACA.40 error. The SRDF/A Transmit Idle enhancement has been specifically designed to prevent this event from occurring.

Key "take home" items from this technical note regarding SRDF/A Transmit Idle are as follows:

- ♦ The SRDF/A Transmit Idle enhancement is aimed at improving the resiliency of SRDF/A environments specifically with regard to temporary "loss of SRDF network" events.
- ♦ It is provided in the initial release of Enginuity version 5772 and later, and in Enginuity version 5x71 via appropriate Services Releases and/or EPacks.
- ♦ Both Solutions Enabler and SRDF Host Component software can set this value as either off or on for both sides of the SRDF/A group connection. The commands to turn Transmit Idle on or off must be issued to the Symmetrix arrays on both sides of the link.
- ♦ While SRDF/A Transmit Idle will allow SRDF/A to continue to stay active if all links for a group are lost for an extended period, SRDF/A may still drop for other reasons such as the system reaching the maximum amount cache available to SRDF/A.

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