

**IBM System Lab Services  
PowerHA Tools for IBM i**

**Full System Replication  
Manager  
Installation and Users Guide**

**June 27, 2019  
Version 4.3**

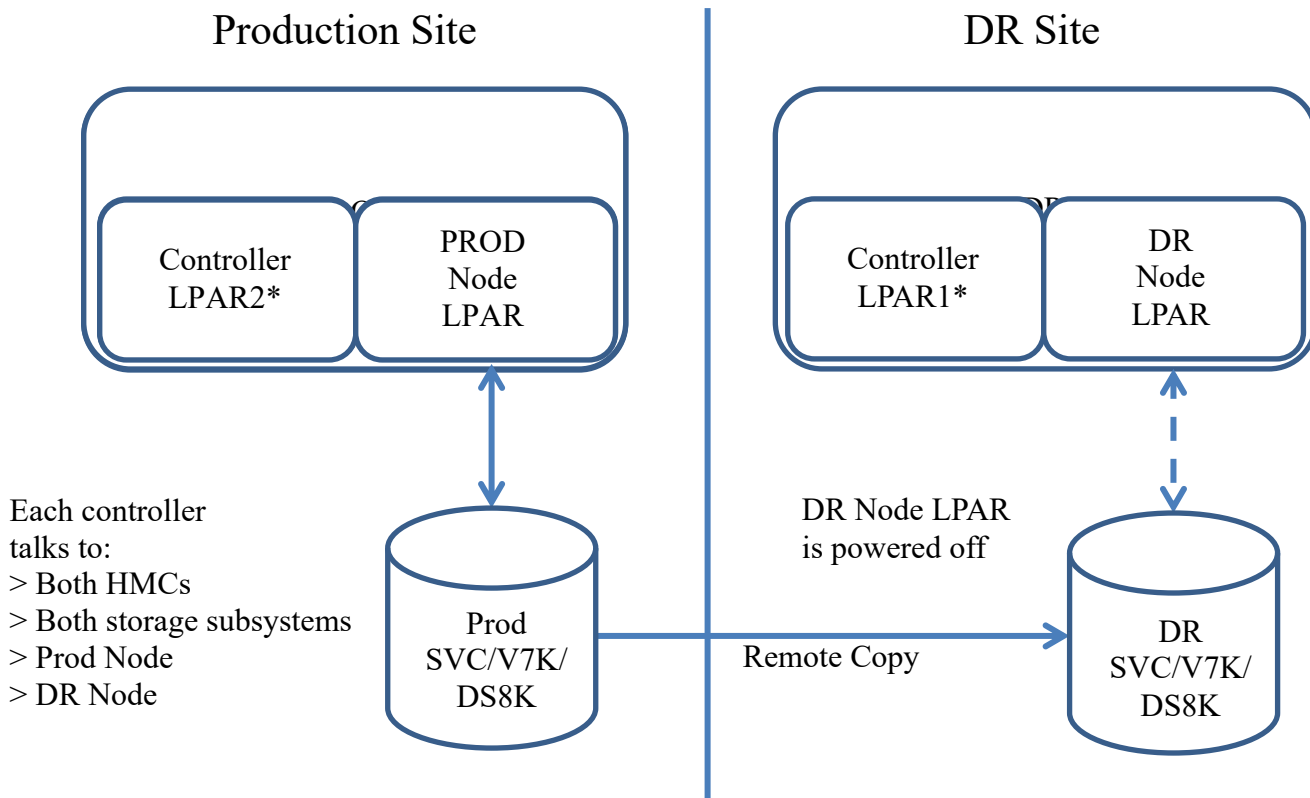
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# 1 Introduction

The following picture shows an overview of the PowerHA Tools for IBM i - FSR relationships between various entities involved in a HA and/or DR architecture for an IBM i environment.



\*It is recommended to have 2 control LPARs. If using only 1, then it should be at the DR site.

Note: Any reference to SVC in this document applies equally to V7000, V5000 and V3700.

## 1.1 What's new in 4.1

FSR 4.1 adds support for Full System Replication on the DS8000 storage subsystem using Metro or Global Mirror.

## 1.2 What's new in 4.2

FSR 4.2 primarily adds support for Full System FlashCopy, which is licensed separately. FSR benefits from several new features which were added for FSFC:

- All fixes to 4.1

- WRKCSEDTA - new command
- WRKCSECRDL enhancements:
  - Stores DSCLI credentials
    - No longer restricted to user QLPAR and password files
  - Option 2 displays the user profile
  - List is properly populated the first time
  - Password mismatch error message was incorrect
- WRKSTRPRSC enhancements:
  - Allow \*VIRTUAL IP interfaces
  - Allow entries with duplicate LOCCODE
  - Data area LASCONFIG removed when changes are made in WRKSTRPRSC
- FIXSTRPRSC enhancements:
  - Data area LASTCONFIG only created after successful completion of configuration
- CHKCSE / CHKPPRC enhancements:
  - Checks for QSYSOPR in \*DFT reply mode
  - Does not crash QZRDIAEXT2
- Changed the product access codes:
  - 80 - FSR for Storwize
  - 82 - FSR+FSFC version 1 for Storwize
  - 87 - FSR+FSFC version 2 for Storwize
  - 88 - FSR+FSFC version 2 for DS8K
  - 89 - FSR for DS8K
- Source and target LPAR's are always IPL'd in B-mode.
  - Detach will always be in manual mode
  - Switch will use what is defined by the HMC (i.e. \*PANEL)
- CHGASPACT(\*FRCWRT) performed prior to detach
- WRKCSE enhancements:
  - Opt 10 on GMCV can fail - now fixed
  - DS8K MMIR errors have better messages
  - DS8K detach occasionally tried to re-attach
  - Changing GMIR environment handles prompting better
- SWCSE \*UNSCHEDULED in batch will send inquiry message to QSYSOPR

### 1.3 What's new in 4.3

Version 4.3 was released with the intent of providing new enhancements for Full System Flash Copy. One of those enhancements was to remove the limit of how many CSE Data's were allowed, and that also benefits FSR. This was accomplished by re-structuring the PowerHA space where the FSR data was stored, therefore, all toolkit installations in the same PowerHA cluster must be at the same release level, and upgrading to version 4.3 requires recording, removing and recreating all the CSE Data's.

There are no other significant changes to 4.3 relevant for FSR. It is still recommended that customers upgrade to 4.3 as defects and new features will be delivered in version 4.3.

## 1.4 Planning

Planning for FSR installation is part of the services engagement associated with purchasing this product. This includes ensuring that all requirements/restrictions are followed. An overview of the Requirements and Restrictions is included below.

## 1.5 Requirements

Prior to the start of installation, the services representative must ensure the following tasks have been completed.

IBM i Release	IBM i Copy Services Manager for Power HA on i 4.3
i 7.1	Preferred
i 7.2	Preferred
i 7.3	Preferred
I 7.4	Preferred

- Each system/partition has its own Fiber Channel attachment card(s), or access to NPIV adapters
- Source and Target LPARs must have 100% of SYSBAS on supported storage devices
  - DS8K family
  - Storwize (SVC) family, including V3700, V5000, V7000 and V9000
  - Other storage is supported if managed by an SVC
- IBM i PowerHA has been set up on the control nodes
- Copy Services Metro or Global Mirror code enabled on the IBM System Storage
- Storwize units have a max of 32 simultaneous connections.
  - Each GUI browser and FSR process consumes at least one connection
  - If using FS910 with GMCV and the change volumes are in a data reduction pool (DRP), the SVC must be at firmware level 8.2.1.1 or higher

HMC Requirements:

- An HMC is required to manage the LPARs
  - FSM or ISV is not supported without an HMC
- At least one Controlling LPAR(s) is required

## 1.6 Controlling LPAR(s) Requirements

The Controlling LPAR(s)s must meet the following requirements:

- CPU:  $\geq 0.1$  or access to uncapped CPU
- Memory:  $\geq 6$  GB
- Disk: 200+GB. Can be internal or external disk.
- IBM i 7.1 or newer

- DS8K requires DSCLI installed on the IBM i
- IP connectivity to:
  - Source and Target LPARs
  - Storage (DS8K HMC or Storewize management interface)
  - LPAR HMC
- The following LPP and PTFs:

7.1	7.2	7.3	7.4
5733SC1 *Base, 1	5733SC1 *Base, 1	5733SC1 *Base, 1	5733SC1 *Base, 1
5770SS1 30, 33,41	5770SS1 30, 33, 41	5770SS1 30, 33, 41	5770SS1 30, 33, 41
5761JV1 *Base, 14	5770JV1 *Base, 14	5770JV1 *Base, 16	5770JV1 *Base, 16
5770HAS *Base, 1	5770HAS *Base, 1	5770HAS *Base, 1	5770HAS *Base, 1
Group PTFs SF99572	Group PTFs SF99716	Group PTFs SF99725	Group PTFs SF99665
5770HAS SI57181, SI65323	5770HAS SI57302, SI62180, SI65314		
	5770999 PTF MF62565	5770999 PTF MF62566	

For details installing Java 1.7 on IBM i 7.1 please visit this page:

<https://www-01.ibm.com/support/docview.wss?uid=nas8N1011217>



## 1.7 Source LPAR Requirements

The Source LPAR must meet the following requirements:

- IBM i 7.1 or newer
- SYSBAS 100% on external storage
- The following PTFs:

7.1	7.2	7.3	7.4
	5770999 PTF MF62565	5770999 PTF MF62566	

## 1.8 Installation Overview Checklist

The following checklist is provided to facilitate the installation process of FSR. Each installation task has been cross referenced with a page number, where instructions on completing the task can be found.

Task Name	Page
<b>Planning Considerations</b>	
FSR Subsystem Considerations	10
Clustering Security Requirements	10
Coordinate QTIME between all nodes	11
<b>Prerequisites Before Starting Toolkit Installation</b>	
Make LPARs available	14
Install PowerHA (57xxHAS and 57xxSS1 opt 41 )	14
Configure System i clustering on the control nodes	14
Restore the FSR library ( QZRDHASM)	15
Install software licenses	15
Change FSR Object Ownership	16
Download Java Secure Channel code	16
Create credentials to be used by the control nodes	18
<b>Configuration Steps</b>	
Create a Full System Replication environment	19
Describe resource differences between Production and DR nodes	27
Customize the IPL startup program	32
Perform first activation of the DR node	35

## 2 Planning Considerations

### 2.1 FSR Subsystem Considerations

FSR jobs are submitted by IBM i clustering to the \*JOBQ specified by the \*JOBID associated with the QLPAR user profile. The default \*JOBID is QDFTJOBID, and its default \*JOBQ is QBATCH. This \*JOBQ must be configured to allow multiple clustering jobs to run without any delay. Two jobs are submitted for each Copy Services Environment (CSE) CRG.

*Tip: Create a new \*JOBID for clustering that specifies Job Queue QSYSNOMAX. The JOBID parameter of the QLPAR User Profile must be changed to use this new Job Description. This will ensure that all clustering jobs can run as required in the QSYSWRK subsystem.*

#### 2.1.1 Running FSR in another subsystem

If running in QBATCH or QSYSNOMAX is not a valid option, then it is possible for the environment to be changed so that the jobs run in an independent subsystem. The standard work management objects must be created: subsystem description, job description, job queue and class. Change user profile qlpar to use these objects.

### 2.2 Clustering Security Requirements

*Note: Some of the TCP/IP servers used by clustering require that the QUSER user profile's STATUS = \*ENABLED and that it does NOT have \*SECADM or \*ALLOBJ special authority. It must also NOT be expired. If this is not possible, the file /QIBM/ProdData/OS400/INETD/inetd.conf must be changed to use a different profile that matches these requirements.*

```

Edit File: /QIBM/ProdData/OS400/INETD/inetd.conf
Record : 10 of 20 by 10 Column : 1 76 by 126
Control : _____

CMD .....1.....2.....3.....4.....5.....6.....7.....8..
# ##### DO NOT MODIFY THIS FILE #####
#
# Any changes made to this file will be lost during release upgrade.
# User-defined services may be defined in file:
# /QIBM/UserData/OS400/INETD/inetd.conf
#
#
# Clustering
as400-cluster stream tcp wait QUSER /QSYS.LIB/QCSTINETD.PGM QCSTINETD
#
*****End of Data*****
```

Figure 2-1

The ALWADDCLU (Allow Add to Cluster) network attribute must be appropriately set on the target node if trying to start a remote node. This should be set to \*ANY or \*RQSAUT depending on the

environment. If set to \*RQSAUT, then -- Digital Certificate Manager (57xxSS1 Option 34) on IBM i 6.1, or later release must be installed.

To change the ALWADDCLU (Allow Add to Cluster) network attribute, use the following green screen command:

**CHGNETA (Change Network Attributes)**  
Specify ALWADDCLU = \*ANY or \*RQSAUT

Note: This applies only to the control nodes.

## **2.3 Requirement to coordinate QTIME between managing partitions**

To prevent simultaneous operations on the same environment, a cluster wide lock per environment has been added, set at the start of SWPPRC, SWCSE, CHKPPRC, CHKCSE and STRFLASH operations and released at the end. The default time for automatic release of the lock is 15 minutes, and the time-of-day for the timeout is calculated and communicated to the other nodes in the cluster. Therefore, it is preferable to make sure that the QTIME system value on all systems contain the same time-of-day. You should consider use of the Simple Network Time Protocol (SNTP) TCP server to automate keeping the time synchronized.

**Note: If systems are in different time zones or the system times are significantly different, then this locking will work only on the local system.**

## 3 Setting up Full System Replication

### 3.1 Considerations

At setup time, the production system will be running, and all resources required for that partition will be known to the system. However some information about DR node resources may not be known until the DR node is activated for the first time. The IP addresses for both the source and target should be known prior to starting the setup.

The Controller partitions do not need to be dedicated to this purpose. They can be any other partition available, i.e., dev, QA, etc. They need to be able to communicate with the production partitions they will manage via TCP with the Full System Replication tools.

#### *3.1.1 System name vs. LPAR name*

The system name is stored in \*SYSBAS via the CHGNETA command. Thus when the DR node is active, it sees its system name as that of the Production node. The LPAR name is stored in the hosting HMC.

#### *3.1.2 System serial number and software licensing*

The serial number is stored in the hardware so it will be different between the Production and DR nodes. Licenses for 3<sup>rd</sup> party software that depend upon a specific serial number will need to be adjusted after a switch. The new RTVLPARINF command can be used to determine the current LPAR for the system. The new RUNLPARCMD command can also be used in the startup program to make changes. Licenses for FSR allow multiple serial numbers and will not require adjustment. You should check with the vendors of other licensed software to determine how to install serial-number-based licenses for their products.

#### *3.1.3 IP addresses*

The IP addresses and subnetwork of a node may need to change as part of a switchover. The IP addresses for when the partition is active at the production site and at the DR site must be configured on the node. The replication tool will modify the “online at IPL” attributes of these addresses as part of each switch.

#### *3.1.4 Clustering*

One or two control nodes are required in a cluster.

The cluster function allows the CSE data to be mirrored between the control nodes so that either control node can run functions at any time.

### ***3.1.5 Production LPAR Communication Agent***

The Controller(s) must be able to communicate with the Production LPARs. To do so, subsystem QZRDFSR must be started on the Production LPAR, with pre-start program QZRDIAEXT2 handling service requests from the Controllers. The subsystem can be started by using command STRSBS /QZRDHASM/QZRDFSR . Use of the WRKSTRPRSC or FIXSTRPRSC on the production node will also automatically start the subsystem

The Communication Agent listens on a specified port, and default port is 55920. On the Production LPAR, use the command SETUPFSR to change the port. This information is stored in file /QIBM/Qzrdhasm/FSRPort. On the Controlling LPAR, the port is configured using CRTCS EDTA or CHGCSED TA. The port specified must be the same on both the Controller and Production LPAR. Communications between the Production and Controller are encrypted.

### ***3.1.6 Credentials***

The Controller(s) must be able to communicate with all participants in the Full System Replication environment:

1. Production Power System HMC
2. DR Power System HMC
3. Production SVC/DS HMC
4. DR SVC/DS HMC
5. Production node
6. DR node

Configuring the user profiles and passwords for the SVCs, DS HMCs and Power Systems HMCs in the configuration is required as part of setup.

### ***3.1.7 LPAR date and time***

The date and time of an LPAR is stored in the HMC with offsets stored in IBM i \*SYSBAS. Since only \*SYSBAS, not the HMC data, is replicated to the DR site, the first time an LPAR is IPLed the date and time must be configured. Subsequent IPLs will retain the correct date/time.

### ***3.1.8 Communications ports***

The following communications ports are used by FSR Full System Replication and access must be allowed through the firewall:

- Managing partitions to SVC on port 22 ( if applicable )
- Managing partitions to DS HMC on ports 1751/1750 ( if applicable )
- Managing partition to Power System HMC on port 22
- DR and Production Controllers to Production and DR LPARs on port 55920 (or the port you specify)

### 3.1.9 Upgrading to version 4.3

FSR Version 4.3 uses a different PowerHA DDD structure. It is not compatible with prior versions. Therefore, the upgrade from pre-4.3 to 4.3 and beyond requires the following steps be observed:

- All nodes in the PowerHA cluster must be upgraded to version 4.3
  - This includes FSR, FSFC and IASP installations of the toolkit
- Production LPARs not in the cluster can be at one version older (i.e. a 4.3 controller and 4.2 production LPAR)
- Before the new library is restored, use WRKCSEDTA to record then delete the existing entries.
- After the new library is restored, use WRKCSEDTA to re-create the recorded entries.

After the upgrade, use CHKCSE and a test switch to validate the changes.

## 3.2 Installation

### 3.2.1 Make the LPARs available

- Controlling partitions -- create if necessary
- Production and DR nodes -- ensure there is a partition profile on the target site.

Both control node(s) and the Production node must be active; the DR node must be powered down but with resources identified.

### 3.2.2 Configure the Storage replication

- Create the user profile and password.
  - For SVC, the user must have administrator authority; copy operator authority is insufficient.
  - For DS8K the user should have admin authority
- Create the volumes, host connections, partnerships and remote copy consistency groups (RCCGs) as required by the storage type
- Start replication. Note that this can take a while, and switching cannot be performed until the relationships reach a synchronized state.

### 3.2.3 Install IBM PowerHA for i on the control nodes

A separate licensed program, **IBM PowerHA for i (5770HAS)**, is required. This provides the commands for configuring and starting clustering.

### 3.2.4 Set up and start clustering

There will be one or two control nodes in the cluster. Add the nodes to the device domain.

```
Display Cluster Information
Cluster . . . . . : <cluster name>
Consistent information in cluster : Yes
Number of cluster nodes . . . . . : 2
```

```

Number of device domains . . . . . : 1

Cluster Membership List

Node          Status          -----Interface Addresses-----
<PROD Ctl>   Active          nnn.nnn.nnn.nnn
<DR Ctl>     Active          nnn.nnn.nnn.nnn

```

**3.2.5 Install FSR on all three LPARs**

- Restore library QZRDHASM from the savefile provided by the Systems Lab Services consultant.

**3.2.6 Install software licenses**

On all the nodes, use the ADDPRDACS command to enter the license information for FSR. On the Production LPAR use the command twice to enter the keys for both the Production LPAR and the DR LPAR, assuming they have different system serial numbers. FSR can determine which node it is running on and check for the appropriate license.

- ADDLIBLE QZRDHASM
- ADDPRDACS and press F4=Prompt

```

Add Product Access Code (ADDPRDACS)

Type choices, press Enter.

Access code . . . . .
System serial number . . . . . *CURRENT       Seven characters, no dash

```

The key is unique for each of the following:

- The system (serial number) on which FSR is installed
- The FSR capabilities to be used (PPRC, Global Mirror, Full System Replication)

The license key enables use of the following FSR commands for Full System Replication:

- Add CSE Credential Entry (ADDCSECRDE)
- Change CSE Credential Entry (CHGCSECRDE)
- Change CSE Data (CHGCSEDTA)
- Check CSE Environment (CHKCSE)
- Create CSE CRG (CRTCSEDTA)
- Display CSE Data (DSPCSEDTA)
- Fix Startup Resources (FIXSTRPRSC)
- Remove CSE Credential Entry (RMVCSECRDE)
- Retrieve LPAR Information (RTVLPARINF)
- Run LPAR Command (RUNLPARCMD)

- Switch CSE Environment (SWCSE)
- Work with CSE Environments (WRKCSE)
- Work with CSE Credential List (WRKCSECRDL)
- Work with CSE Data (WRKCSEDTA)
- Work with Startup Resources (WRKSTRPRSC)
- Run the QZRDHASM/SETUPFSR command

```

                Setup IBM i Copy Services Mana (SETUPFSR)

Type choices, press Enter.

Node role . . . . . *CTL          *CTL, *PRD

```

If you select Node type = \*PRD, a second prompt requests entry of the port to be used for FSR communications from a control node.

You must verify the availability of the FSR communications port on the Production node. Use NETSTAT option 3 (Work with IPv4 connection status) and F14=Display port numbers. If the default, 55920, is already being used, choose another number. Then use the CHGCSEDTA command on the control nodes to specify the port to use.

After SETUPFSR is run, library QUSRSYS contains the following FSR objects:

- QIASP                    \*JRNRCV
- QIASP                    \*JRN

SETUPFSR will create user profile QLPAR, the required directories and set authorities.

**3.2.7 Change ownership of FSR objects**

All FSR objects are shipped as owned by QPGMR, and the \*PUBLIC has \*CHANGE authority to them. It is recommended to change the authorities to the objects in the QZRDHASM library based upon the security guidelines of your organization.

**3.2.8 Download Java Secure Channel code (JSch)**

Download JSch to /QIBM/qzrdhasm/ssh on all three nodes from <http://prdownloads.sourceforge.net/jsch/jsch-0.1.52.jar?download>

- Don't download a different version. It won't work.
- The Java Secure Channel is an open-source implementation of ssh which allows FSR to issue ssh calls programmatically and to review the results.
- Because it is open-source, you must download it yourself (i.e., we can't bundle it with our FSR code). It is recommended to read the End User License Agreement for JSch.
- Download to your desktop and then use FTP to copy it to your IBM i at /QIBM/qzrdhasm/ssh.





```

ftp> bin
200 Representation type is binary IMAGE
ftp> put jsch-0.1.52.jar /QIBM/qzrdhasm/ssh/jsch-
0.1.52.jar
227 Entering Passive Mode (9,5,168,177,167,46) .
150-NAMEFMT set to 1
150 Sending file to /QIBM/qzrdhasm/ssh/jsch-0.1.52.jar
226 File transfer completed successfully.
249282 bytes sent in 0.742 secs (336.12 Kbytes/sec)
ftp>

```

### 3.2.9 Create the credentials to be used by the control nodes

On either control node, use the Work with CSM Credentials List (WRKCSECRDL) command to enter the User IDs and passwords for:

- Production SVC
- DR SVC ( if applicable )
- Production HMC
- DR HMC ( if applicatble )
- Production DS8K
- DR DS8K ( if applicable )

The credentials information will be encrypted and replicated automatically to all nodes in the cluster.

```

                                Work with CSE Credentials List

Type options, press Enter.
  1=Add   2=Change   4=Remove

Opt      Host IP Address      User ID      Host description
  -      nnn.nnn.nnn.nnn

```

Press Enter after keying the IP address to enable entry of the credentials for the device.

```

                                Add CSE Credential Entry (ADDCSECRDE)

Type choices, press Enter.

Host IP address . . . . . > 'nnn.nnn.nnn.nnn'
User ID . . . . . _____
Password . . . . . _____
Confirm password . . . . . _____
Host description . . . . . _____

```

Repeat for the other three devices.

### 3.2.10 Create a Full System Replication environment for SVC

Enter the WRKCSE command on either control node in the cluster. The information will be replicated to the other control node.

```
Copy Services Environments

Type options, press Enter.
 1=Add   2=Change   4=Delete   5=Display   12=Work with
 14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt   Name      Type   Text
1   (name)
.
```

Key the desired name and press Enter. You must then specify MMIR or GMIR for Copy Service Type on the second display (GMIR if using Global Mirror with Change Volumes, GMCV).

```
Add an Environment

Enter Copy Service Type

Environment name . . . . : (name)
Copy Service Type . . . . : MMIR          FLASH, GMIR, LUN, MMIR
```

And SVC for Storage Type on the third display.

```
Add an Environment

Enter Copy Service Type

Environment name . . . . : (name)
Copy Service Type . . . . : MMIR
Storage Type . . . . . : SVC          DS8K, SVC
```

Specify \*NONE for Preferred Source and Preferred Target Copy Descriptions on the fourth display.

**Add an Environment**

Enter Copy Services and ASP information

Environment name . . . . . : (name)  
Copy Service Type . . . . . : MMIR  
Storage Type . . . . . : SVC

ASP/SVC Copy Descriptions:

Preferred Source . . . . .	<u>*NONE</u>	Name, *NONE
Preferred Target . . . . .	<u>*NONE</u>	Name, *NONE

Enter the details for the SVC environment on the fifth display: Production node name, Preferred Source SVC information, (and after Page Down) Preferred Target SVC information. Note: Even though the RCCG names may be the same between the two SVCs, they will have different RCCG IDs.

**Change a MMIR Environment.**

Type choices, press Enter.

Environment name . . . . . : (name)  
Storage type . . . . . : SVC

Metro Mirroring Power HA, ASP information:

Device name . . . . .	<u>*SYSTEM</u>	Name, *SYSTEM
Source Copy Description . . . . .	<u>*NONE</u>	Name, *NONE
Target Copy Description . . . . .	<u>*NONE</u>	Name, *NONE

Production node . . . . . : <prod name> Name

Preferred Source SVC Information:

IP Address . . . . .	<u>0.0.0.0</u>	IPv4
Remote copy consistency group Id	<u>0</u>	Id

More...

```

Change a MMIR Environment.
Type choices, press Enter.

Preferred Target SVC Information:
IP Address . . . . . 0.0.0.0 IPv4
Remote copy consistency group Id 0 Id

Comment:
Text . . . . . _____
_____
Bottom

```

### 3.2.11 Create a Full System Replication environment for DS8K

Enter the WRKCSE command on either control node in the cluster. The information will be replicated to the other control node.

```

Copy Services Environments

Type options, press Enter.
1=Add 2=Change 4=Delete 5=Display 12=Work with
14=List Stream files 16=Define host connections 18=Make PPRC Paths

Opt Name Type Text
1 (name) .

```

Key the desired name and press Enter. You must then specify MMIR or GMIR for Copy Service Type on the second display.

```

Add an Environment

Enter Copy Service Type

Environment name . . . . : (name)
Copy Service Type . . . . MMIR FLASH, GMIR, LUN, MMIR

```

And DS8K for Storage Type on the third display.

```

Add an Environment

Enter Copy Service Type

Environment name . . . . : (name)
Copy Service Type . . . . : MMIR
Storage Type . . . . . DS8K DS8K, SVC

```

Specify \*NONE for Preferred Source and Preferred Target Copy Descriptions on the fourth display.

```

                                Add an Environment
Enter Copy Services and ASP information

Environment name . . . . . : (name)
Copy Service Type . . . . . : MMIR
Storage Type . . . . . : DS8K

ASP/SVC Copy Descriptions:
  Preferred Source . . . . . *NONE           Name, *NONE
  Preferred Target . . . . . *NONE           Name, *NONE

```

Enter the details for the DS8K environment on the fifth display: Production node name, source and target DS unit information:

```

                                Change a MMIR Environment.
Type choices, press Enter.

Environment name . . . . . : (name)

Storage type . . . . . : DS8K

Metro Mirroring Power HA, ASP information:
  Device name . . . . . *SYSTEM           Name, *SYSTEM
  Source Copy Description . . . . . *NONE           Name, *NONE
  Target Copy Description . . . . . *NONE           Name, *NONE

CSM information:
  CSM Replication . . . . . *NO           *YES, *NO

Production node . . . . . <prod name>       Name

Metro Mirroring DS unit information:
  Source device . . . . . IBM.2107-75XXXXX Name
  Target device . . . . . IBM.2107-75YYYYY Name, *SAME
                                          More...

```

GMIR environments will have a slightly different panel, with more parameters.

```

Change a GMIR Environment
Type choices, press Enter.

Environment . . . . . : HA8FSR

Storage type . . . . . : DS8K

Global Mirroring Power HA, ASP information:
Device name . . . . . *SYSTEM      Name, *SYSTEM
Source Copy Description . . . . . *NONE      Name, *NONE
Target Copy Description . . . . . *NONE      Name, *NONE

CSM information:
CSM Replication . . . . . *NO          *YES, *NO

Production TCP/IP host name . . . . . HA8FSR      Name

More..

```

Page down for more parameters:

```

Change a GMIR Environment
Type choices, press Enter.

Global Mirroring ICSM options:
Symmetrical Mirroring . . . . . *NO          *YES, *NO
D-Copy Flash normal . . . . . *NO          *YES, *NO
D-Copy Flash reversed . . . . . *NO          *YES, *NO
Override Master LSS . . . . . *NO          *YES, *NO

Global Mirroring DS unit information:
Source device . . . . . IBM.2107-75XA511 Name
Target device . . . . . IBM.2107-75HH571 Name, *SAME
Session number . . . . . 01          Hexadecimal
                                number
Reverse session number . . . . . ---      Required if
                                Symmetrical
CG interval . . . . . 0          Seconds (0 -
                                65535)

More...

```

```

Change a GMIR Environment.
Type choices, press Enter.

Space Efficient FlashCopy options:
On Normal CG Flashes . . . . . *NO          *YES, *NO
On Reversed CG Flashes . . . . . *NO          *YES, *NO

DS unit SMC information:
Source hmc1 . . . . . 0.0.0.0          IPv4
Source hmc2 . . . . . _____          IPv4
Source QLPAR password . . . . . XXXXXXXXXX
Source port . . . . . 1751          1750, 1751
Target hmc1 . . . . . 0.0.0.0          IPv4, *SAME
Target hmc2 . . . . . _____          IPv4, *SAME
Target QLPAR password . . . . . XXXXXXXXXX
Target port . . . . . 1751          1750, 1751

Comment:
Text . . . . . DS8K FSR

```

Press enter, then key in the volumes for MMIR:

```

Add, Change or Delete Volumes

Environment . : DS8KMM          Source device :
IBM.2107-XXXXXX
Type . . . . . : MMIR          Target device :
IBM.2107-YYYYYY
Volume sets . : 6

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
Opt      Source      Target
         Volumes    Volumes
-        8810-8812    8810-8812
-        8910-8912    8910-8912
-

```



Or for GMIR:

```

                                Add, Change or Delete Volumes

Environment . . : HA8FSR      Source device : IBM.2107-XXXXXX
Type . . . . . : GMIR       Target device : IBM.2107-YYYYYY
Volume sets . . : 3

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
      Source          Target          Target          Source
Opt   PPRC Vols      PPRC Vols      CG Flash Vols   CG Flash Vols
  -   BA00-BA02      BA00-BA02      BA03-BA05      BA03-BA05
  -

```

### 3.2.12 Create a cluster resource group for the environment

Use the CRTCEDTA command on either control node in the cluster to enter the SVC and node information.

```

                                Create CSE CRG

Supply all required values, press Enter.

CRG Name . . . . . _____ Name
Use . . . . . _____ *IASP, *SYSTEM

```

Note: The CRG name must be the same as the environment name created in the previous step.

Specify \*SYSTEM for use. A second display requests Copy type which must be \*PPRC. A third display supports entry of the remaining information; the Preferred target details can be entered after pressing Page Down.

Create CSE CRG

Supply all required values, press Enter.

CRG Name . . . . . : (name)  
Use . . . . . : \*SYSTEM  
Copy type . . . . . : \*PPRC

Environment name . . . . . (name) \_\_\_\_\_  
Production node name . . . . . \_\_\_\_\_ .  
FSR communications port . . . . . 55920 \_\_\_\_\_ .  
Controlling node name . . . . . \_\_\_\_\_  
Secondary controlling node name \_\_\_\_\_

Preferred source details:

IP address . . . . . \_\_\_\_\_  
HMC LPAR name . . . . . \_\_\_\_\_  
HMC Profile name . . . . . \_\_\_\_\_  
HMC managed system . . . . . \_\_\_\_\_  
Primary HMC IP . . . . . \_\_\_\_\_  
Secondary HMC IP . . . . . \_\_\_\_\_

More...

- Environment name
- Production node name
- Controlling node name (DR Controller)
- Secondary controlling node name (Production Controller)
- IP address of Production node
- Production LPAR name as known to the Power System HMC (case sensitive)
- Production LPAR profile name as known to the HMC (case sensitive)
- Name of the Power System HMC server that manages the production node (case sensitive)
- Production Power System HMC IP addresses

Create CSE CRG

Supply all required values, press Enter.

Preferred target details:

IP address . . . . . \_\_\_\_\_  
HMC LPAR name . . . . . \_\_\_\_\_  
HMC Profile name . . . . . \_\_\_\_\_  
HMC managed system . . . . . \_\_\_\_\_  
Primary HMC IP . . . . . \_\_\_\_\_  
Secondary HMC IP . . . . . \_\_\_\_\_

Power down command . . . . . \_\_\_\_\_

- IP address of DR node
- DR LPAR name as known to the Power System HMC (case sensitive)
- DR LPAR profile name as known to the Power System HMC (case sensitive)
- Name of the Power System HMC server that manages the DR node (case sensitive)
- DR Power System HMC IP addresses
- Power down command or customer program to be called on the Production node when a scheduled switch is requested. An inquiry message is sent to QSYSOPR on the Production node requesting permission to proceed.

**3.2.13 Configure the IP interface(s) on the Production node**

- Create the Ethernet line description
- Using CFGTCP option 1 (Work with TCP/IP Interfaces), Add the IP interface for the Production node. Add a second for the DR node if different from the Production node
- CHGIPLA STRTCP(\*NO)

**3.2.14 Describe resource differences between Production and DR nodes**

Communications, tape storage, BRMS resources and TCP/IP routing entries may be different between the two nodes. Use the Work with Startup Resources (WRKSTRPRSC) command to describe the differences. The Fix Startup Resources (FIXSTRPRSC) command uses this information to make the necessary changes during IPL.

```

Work with Startup Resources (WRKSTRPRSC)

Type choices, press Enter.

Resource type . . . . . *CMN          *CMN, *STG, *BRM, RTE
  
```

3.2.14.1 Communication information

```

Work with Communications Startup Resources

Type options, press Enter.
 1=Add   2=Change  4=Remove

Opt  Usage  IP Interface      Line Desc  Hardware Resource Location  Port
-    -      -
  
```

Since the DR node has not yet been IPLed, its resource information cannot be seen. Select Option 1=Add and press Enter to enter the information for the Production node Ethernet adapter.

```

                                Add or Change Communication Resources
Enter details, press Enter.

Usage . . . . . *PS                               *PS, *PT
IP Interface . . . . . nnn.nnn.nnn.nnn           IPv4 address
Line Description . . . . *IPADDR                 Name, *IPADDR
Resource Location . . . . *LINE
-----
Port . . . . . 0                                 0-32

```

- Usage is either \*PS (Preferred Source – Production node) or \*PT (Preferred Target – DR node). Specify \*PS.
- IP interface is the address to be activated after the Ethernet line is started. If you have multiple IP addresses per line, add an entry for each one. FIXSTRPRSC will start the line after updating it.
- Line Description is the name of the line to be changed. If you specify \*IPADDR for the line description, the line description name will be retrieved from the interface information provided that the interface has been defined.
- Hardware Resource Location is used to identify the communications resource, for example U9406.MMA.105C880-V2-C9-T1. If you specify \*LINE for the resource description, the resource description will be retrieved from the information in the line description. After you press Enter you will see the values listed in the entry.
- Port is used to distinguish between multiple hardware resources
- To start virtual IP interfaces which are not associated with line descriptions, specify \*VIRTUALIP on the Line Description parameter
- Virtual IP addresses will be started after other IP addresses have been started.

Note: If your \*CMN resource does not have a location code, your HMC firmware may be downlevel.

FSR uses the location code to identify the resource name (CMNnn) to be associated with the line description.

### 3.2.14.2 Storage information

```

                                Work with Storage Startup Resources

Type options, press Enter.
  1=Add   2=Change   4=Remove

Opt      Usage      Storage Resource      Device      Device
-----  -----  Serial Number      Description  Type
-        -          -

```

Select Option 1=Add and press Enter.

```

                                Add or Change Storage Resources
Enter details, press Enter.

Usage . . . . . _____ *PS, *PT
Serial Number . . . . _____ Character value
Device Description _____ Name
Device Type . . . . _____ *MLB, *TAP

```

- Usage is either \*PS or \*PT
- Serial Number is used to find the resource name which will be assigned to the device description specified -- for either a tape or media library resource.
- Device Description is the name of the tape device to be changed
- Device Type is \*TAP or \*MLB

Note: You may have to wait until the DR node is activated for the first time to find the serial number for its device.

FSR uses the serial number to identify the resource name (TAPnn or TAPMLBnn) to be associated with the device description and varies on the device description.

### 3.2.14.3 BRMS information

Typically, the customer has a tape library at the DR site which is a different BRMS location. Changing the device's location based upon the node being IPLed allows BRMS to select volumes from the correct location without changing the device used in the control groups or commands.

```

                                Work with BRMS Startup Resources

Type options, press Enter.
  1=Add   2=Change   4=Remove

Opt  Usage  Object Name  Object Type  Attribute  New Value
_    _____

```

Select Option 1=Add and press Enter.

```

                                Add or Change BRMS Resources
Enter details, press Enter.

Usage . . . . . *PS          *PS, *PT
Object Name . . . . BRMSTAPE   Name
Object Type. . . . . *DEVICE   *DEVICE, *MEDPCY

```

<b>Attribute</b> . . . . .	<b>*LOC</b>	<b>*LOC, *MEDCLS, *MOVPCY, *MARKDUP</b>
<b>New Value</b> . . . . .	_____	<b>*MARKHST, *MINVOL, *TEXT, *VOLSEC</b>

- Usage is either \*PS or \*PT
- Object Name is the name of the device or media policy to change. Only devices listed in WRKDEVBRM are valid.
- Object Type is the type of BRMS object to change
  - \*DEVICE
  - \*MEDPCY
- Attribute is the attribute of the BRMS object to change
  - \*LOC
  - \*MEDCLS
  - \*MOVPCY
  - \*MARKDUP
  - \*MARKHIST
  - \*MINVOL
  - \*TEXT
  - \*VOLSEC

Each Attribute has a list of possible New Values:

Attribute	Possible New Values
*LOC	*ANY or <valid BRMS location name>
*MEDCLS	*NONE, *ADSM, or <media class name>
*MOVPCY	*NONE, *ADSM, or <move policy name>
*MARKDUP	*NO or *YES
*MARKHIST	*NO or *YES
*MINVOL	*NONE or <number of required volumes>
*TEXT	*NONE or <text description>
*VOLSEC	*NO, *YES, or *ADSM

### 3.2.14.4 TCP/IP routing entries

TCP/IP routing entries must be restored from information entered via WRKSTRPRSC. Up to eight \*DFTROUTEs may be specified along with an unlimited number of other routing entries.

**Work with Routing Entry Startup Resources**

Type options, press Enter.  
1=Add    2=Change    4=Remove

Opt	Usage	Destination	Subnet Mask	Next Hop	Preferred Interface
-	-	_____			

Select Option 1=Add and press Enter.

```

                Add or Change Routing Entry Resources
Enter details, press Enter.

Usage . . . . . _____ *PS, *PT
Destination . . . . . _____ IPv4 address, *DFTRROUTE
Subnet Mask . . . . . _____ nnn.nnn.nnn.nnn, *NONE
Next Hop . . . . . _____ IPv4 address
Preferred Interface _____ IPv4 address, *NONE

```

- Usage is either \*PS or \*PT
- Destination is \*DFTRROUTE or an IP address
- Subnet mask is \*NONE or an IP address
- Next Hop is the IP address of the next system in the route, usually a router
- Preferred Interface is \*NONE or an IP address

View the WRKSTRPRSC Help text for more information.

### 3.2.15 Customize the IPL startup program

When a switch occurs, the DR node is IPLed, and a customer startup program must make the necessary adjustments in the environment, considering that the Production node now has a different serial number and physical resources. The program to run is specified by System Value QSTRUPPGM. The program can determine where it is running by using the RTVLPARINF command and then performing the tasks specific to the location where running (for example, installing the correct license information for the new serial number). At minimum, the startup program must run command QZRDHASM/FIXSTRPRSC.

```

                Fix startup resources (FIXSTRPRSC)

Type choices, press Enter.

Preferred source serial number _____ Character value
Preferred source LPAR number . . _____ 0-128, *ANY
Preferred target serial number _____ Character value
Preferred target LPAR number . . _____ 0-128, *ANY

```

This program uses the information created with WRKSTRPRSC to set up the proper environment on the node being switched to. Processing steps are:

- Determine where running: \*PS, \*PT, or unknown
- If data area QZRDHASM/QDETACHED exists:
  - CHGIPLA STRTCP(\*NO)
  - Change all line descriptions to ONLINE(\*NO)
  - Change all IP interfaces [except loopback] to AUTOSTART(\*NO)
  - Exit



- Else:
  - Check data area QZRDHASM/LASTCONFIG for \*PS or \*PT. If it matches where we are currently running, exit. Else, delete QZRDHASM/LASTCONFIG and continue ...
- Configure storage
  - Find the resource serial number in \*STG hardware resources
  - Resolve the resource name depending upon whether it is \*TAP or \*MLB
  - Vary off the device, if necessary
  - Modify the device description resource name, if necessary
  - Vary on the device, if necessary
- Configure BRMS
  - Call QZRDHASM/CHGBRMSOBJ for each entry in WRKSTRPRSC \*BRM
- Configure routes
  - If a route is specified in WRKSTRPRSC \*RTE for this LPAR, clear all existing routes
  - Add the routes specified in WRKSTRPRSC \*RTE
- Configure communications
  - If a line description and IP address are specified in WRKSTRPRSC \*CMN for this LPAR
    - Change all line descriptions to ONLINE(\*NO)
    - Change all IP interfaces (except loopback) to AUTOSTART(\*NO)
  - Find each resource specified in WRKSTRPRSC \*CMN and for each resource:
    - Vary off the line, if necessary
    - Modify the line description resource name, if necessary
    - Change the line description to ONLINE(\*YES)
    - Vary on the line, ignoring any errors
    - Change the IP address to AUTOSTART(\*YES)
- If everything was successful, create data area QZRDHASM/LASTCONFIG with \*PT or \*PS.
- STRSBS QZRDHASM/QZRDFSR. The subsystem contains information that enables communications between the control nodes and the Production node.

Note: IP interfaces are not started by FIXSTRPRSC.

The following should be added to the customer's startup program (note that the STRTCP command should be called after the subsystems have been started):

```
QZRDHASM/LOGMSG MSG('Starting FIXSTRPRSC')
QZRDHASM/FIXSTRPRSC PSSRLN(serial number) PSLPAR(number) PTSRLN(serial number) +
  PTLPAR(number)
MONMSG MSGID(CPF0000)
STRTCP
MONMSG MSGID(CPF0000)
```

### ***3.2.16 Bypass the Multi-path Reset***

When the Production LPAR IPLs after a switch it will have different disk adapters and different paths to its disk. This will result in CPP7777 messages posted to QSYSOPR. When FIXSTRPRSC runs it will perform a multi-path reset and will prevent additional CPP7777 messages in QSYSOPR.

However, if there are missing paths, the multi-path reset will mask them. For this reason some customers choose to ignore the CPP7777 messages and would prefer to not have the multi-path resetter run. To disable the multi-path reset, create this data area on the production LPAR:

```
CRTDTAARA QZRDHASM/NOMULTPATH *CHAR 1
```

### ***3.2.17 Retrieve LPAR Information (RTVLPARINF)***

The Retrieve LPAR Information command can be used in the customer startup program to make changes based upon the serial number and LPAR number where it is running. This command returns a value that allows execution of larger sections of code. The variable returned is a three byte string and will contain either '\*PS', '\*PT', or '???'.

Here's an example of the additions to a customer startup program:

```
RTVLPARINF PSSRLN(<serial>) PSLPAR(nn) PTSRLN(<serial>)  
  PTLPAR(nn) LPARUSAGE(&NODE)  
IF COND(&PROD *EQ *PS) CMD(DO)  
  SNDMSG MSG('Running on <name of Prod LPAR>') TOUSR(*SYSOPR)  
  ( list of commands for the Production node )  
ENDDO  
ELSE CMD(DO)  
  SNDMSG MSG('Running on <name of DR LPAR>') TOUSR(*SYSOPR)  
  ( list of commands for the DR node )  
ENDDO
```

Note: It is recommended to use the QZRDHASM/LOGMSG function to make an entry in the Viewlog for each major function of the startup program to help with debugging.

### ***3.2.18 Run LPAR Command (RUNLPARCMD)***

The command Run LPAR Command can also be used in the customer startup program to make changes based upon the serial number and LPAR number where it is running.

Example:

```
QZRDHASM/RUNLPARCMD SRLN(<PROD node serial number>)  
  CMD(SNDMSG MSG('Running on <name of PROD node LPAR>') TOUSR(*SYSOPR))  
MONMSG MSGID(CPF0000)  
QZRDHASM/RUNLPARCMD SRLN(<DR node serial number>)  
  CMD(SNDMSG MSG('Running on <name of DR node LPAR>') TOUSR(*SYSOPR))  
MONMSG MSGID(CPF0000)
```

### 3.2.19 First activation of the DR node

It will probably be necessary to activate the DR node in order to determine the resource information necessary for WRKSTRPRSC TYPE(\*CMN) and TYPE(\*STG) for \*PT. For Metro Mirror and Global Mirror with Change Volumes (GMCV), a detach is the preferred method since this will automatically activate the DR node in restricted state without taking the production node offline. For Global Mirror (GMIR), a detach is not supported. Therefore a switch or manual detach is required.. Since communications cannot be started yet, the research must be done using the console for the DR node.

Perform the following steps on a Controller to do a detach:

- Enter WRKCSE and Select option 12=Work with for the Full System Replication environment
- On the Work with SVC PPRC Environment display, option 8=Detach

The following steps are performed on the Production node:

- The IPL attributes are set to Restricted=Yes if QLPAR has \*SECADM authority
- Data area QZRDHASM/QDETACHED is created
- Replication is stopped
- The target node is IPLed in Manual mode while the production node continues to run
- The IPL attributes are set back to Restricted=No, if necessary
- Data area QZRDHASM/QDETACHED is deleted

Alternatively, do a switch which will deactivate the Preferred Source LPAR and reverse the replication.:

- CHGIPLA STRTCP(\*NO) STRRSTD(\*YES) to IPL in the restricted state without TCP/IP communications
- On one of the Controllers, do a CHKCSE for the environment to assure readiness for a switch
- On one of the Controllers, do a SWCSE for the environment to activate the DR node

In either case:

- Sign on to the HMC for the DR node and establish a console session to the DR node
- Use WRKHDWRSC TYPE(\*CMN) and select option 7 (Display resource detail) for an operational Ethernet port to determine the Location information.

```

                                Display Resource Detail

Resource name . . . . . : CMNnn
Text . . . . . : Ethernet Port
Type-model . . . . . : 268C-002
Serial number . . . . . : 00-00000
Part number . . . . . :

Location : U9179.MHD.1016B4P-V3-C2-T1
  
```

- Use WRKSTRPRSC \*CMN on the Production node to enter the location for \*PT. As before, add an entry for each IP address.

Add or Change Communication Resources

```

Enter details, press Enter.

Usage . . . . . *PT
IP Interface . . . . . nnn.nnn.nnn.nnn
Line Description . . . . . *IPADDR .
Resource Location . . . . . *LINE .
-----
Port . . . . . —

```

Note: If you did a Detach, there may be no Ethernet line description on the DR node so you cannot use the defaults of \*IPADDR and \*LINE.

- Use WRKHDWRSC \*STG to locate the serial number for the DR node tape device, and then use WRKSTRPRSC \*STG to enter the information for \*PT
- Prepare to switch back to the Production node. CHGIPLA STRTCP(\*YES) STRRSTD(\*NO)
- On one of the Controllers, do a CHKCSE for the environment to assure readiness for a switch
- On one of the Controllers, do a SWCSE for the environment to reactivate the Production node

### 3.2.20 Work with Copy Services Environments (WRKCSE) Security

The functions of the Work with Copy Services Environments (WRKCSE) menu require the adoption of the QLPAR user profile which has \*ALLOBJ special authority. The WRKCSE command is shipped with \*PUBLIC authority \*CHANGE so it may be desirable to limit access to one or more of the WRKCSE functions.

**Note:** Command line access from within WRKCSE will be as the original user profile only. No command line access is available when switched to QLPAR.

For most WRKCSE options, the WRKCSE command processing program calls a program named QZRDSECURE in the QZRDHASM library -- a user-written security policy program. If QZRDSECURE is not available, no operations authority checking is done by WRKCSE, and QLPAR is used for all DSCLI function. QZRDSECURE is called when any option is selected for FLASH, MMIR and GMIR environments.

This program must issue an IAS0391 exception message when it detects a user who is not authorized to a specific operation. This message is located in the message file QZRDHASM/QZRDIAMSGF. Any exception message issued by this program will deny access to the operation.

The WRKCSE command processing program passes the following parameters to QZRDSECURE:

1. Environment (IASP CRG) name, char(10).

2. Environment type, char(5);
  - FLASH
  - LUN
  - MMIR
  - GMIR
3. Option, char(2);
  - 1 = Add ('51' is passed)
  - 2 = Change ('52' is passed)
  - 4 = Delete ('54' is passed)
  - 14 = List Stream files.
  - 16 = Define host connections
  - 18 = Make PPRC Paths

If option 12 = Work with is selected on the main menu, QZRDSECURE is not called; the appropriate submenu for the environment is displayed, and its options will call QZRDSECURE with the name and type of environment plus the following options:

**Note:** The option passed will be a two-digit character value based on the option number from the screen (i.e., '01' is passed for opt 1)

FLASH environment options:

- 1 = Start Flash
- 2 = Stop Flash
- 12 = Work with Volumes
- 14 = List Stream files

MMIR environment options:

- 2 = Pause
- 3 = Resume
- 4 = Failover
- 6 = Start Replication after failover
- 12 = Work with Volumes
- 13 = Display Out of Sync sectors
- 14 = List Stream files

GMIR environment options:

- 2 = Pause
- 3 = Resume
- 4 = Failover
- 5 = Symmetrical switchover
- 12 = Work with Volumes
- 13 = Display Out of Sync sectors
- 14 = List Stream files

Any or all of these parameters may be used to define the client's security policy in regards to the WRKCSE command.

The QCLSRC file in library QZRDHASM contains a skeleton QZRDSECURE program that may be used to get you started. This source code is supplied for example and testing purposes only. If modifications are to be made, this source member should be copied to a library other than QZRDHASM and the modifications made there. Otherwise revised source code may be overlaid by a restore of the QZRDHASM library.

## 4 Performing switches with Full System Replication

The process of switching between Production and DR nodes is performed on either the Production or DR Controller, and the first step is to verify that all is ready for a switch.

Enter command Check Copy Services Environ. (CHKCSE) and press F4=Prompt.

```

                Check Copy Services Environ. (CHKCSE)

Type choices, press Enter.

Environment name . . . . . _____ Name
  
```

Key the environment name and press Enter. The following conditions are checked to determine readiness for a switch:

- The control node can communicate to the Production node.
- The environment must be \*PPRC only (no FlashCopy)
- At least one of the HMCs for the Production LPAR must be available
- At least one of the HMCs for the DR LPAR must be available
- CSE data must show USE(\*SYSTEM)
- Both storage units are available
- The \*PPRC direction in the CRG exit data must match the replication direction
- QSYSOPR is in \*DFT reply mode

### 4.1 Scheduled switch

System maintenance on the Production node may require a planned switch to the DR node. Enter command Switch Copy Services Environ. (SWCSE) and press F4=Prompt.

```

                Switch Copy Services Environ. (SWCSE)

Type choices, press Enter.

Environment name . . . . . _____ Name
Switch type . . . . . *SCHEDULED *SCHEDULED, *UNSCHEDULED
Type . . . . . * *, *GMIR, *MMIR
Auto replicate . . . . . *DFT *DFT, *YES, *NO
  
```

Key the environment name and type and Press Enter. The following steps are performed:

- If the Production node is running, send an \*INQ message (IAS0029) to QSYSOPR requesting permission to proceed
- Call the customer-specified power down command
  - \*STATUS message “Current SRC for <Production node LPAR> is nnnnnnnn” indicates progress toward shutdown

- Wait until the Production node LPAR is deactivated
- Switch replication direction between the storage units
  - \*STATUS message “Starting switchover of node <Production node> from LPAR <Production node> to LPAR <DR node>”
- IPL the DR node
  - \*STATUS message “Current SRC for <DR node LPAR> is nnnnnnnn” indicates progress of the IPL. Message “The PPRC switch for the \*SYSTEM CRG <CRG name> is complete.” is sent to the joblog of the Controller where the SWCSE was entered
  - The LPAR is always IPLd to the B side
- Call the customer startup program
  - FIXSTRPRSC processes the information for \*CMN, STG, \*BRM, and \*RTE differences entered with WRKSTRPRSC
  - Change license keys for other programs dependent upon the system serial number
  - Other customer-specified processing
- Start clustering; when clustering was set up, IP addresses for both the Production and DR nodes were specified

## 4.2 Unscheduled switch

If the Production node becomes inoperative, an unscheduled switch is necessary to activate the DR node. The only differences in the process described above are:

- CHKCSE cannot be used
- If running in batch, \*INQ message is sent to QSYSOPR on the Controlling node requesting permission to proceed.
- No \*INQ message is sent to QSYSOPR on the Production node requesting permission to proceed.
- The default is not to start replication automatically

### 4.2.1 Starting replication after unscheduled switch

To start replication after an unscheduled switch, use WRKCSE Option 12=Work with.

**Note: screens show SVC but functionality is identical with DS8K however a Metro Mirror will not show Detach and Reattach options**



```

                                Work with SVC PPRC
Environment
Environment . . . . . : <name>
MMIR Status . . . . . : Idling
Direction . . . . . :

Select one of the following:
  2. Pause
  3. Resume

  5. Switch
  6. Start Replication after Switch

  8. Detach
  9. Reattach
 10. Display replication

```

Select Option 6 (Start replication after switch). A Warning window opens:

```

.....
:                               Confirm Start of Replication                               :
:                                                                                       :
: Warning; this option may be hazardous to the health                               :
: data of your production data. It is possible to start                             :
: replication in either direction. BEFORE CONTINUING,                               :
: CONFIRM THE NEW NODE ROLES BELOW.                                                 :
:                                                                                       :
:                                                                                       :
: Press F10 to continue, F8 to reverse, F12 to cancel.                             :
:                                                                                       :
: Source LPAR . : ctciha4e                                                           :
: Target LPAR . : ctciha9e                                                           :
:                                                                                       :
:                                                                                       :
:                                                                                       Bottom :
: F1=Help      F3=Exit   F8=Reverse the Direction                               :
: F10=Continue F12=Cancel                                         :
:                                                                                       :
:                                                                                       :
.....

```

Be very careful here. The Source and Target LPARs are determined by FSR from the CSE exit data status of \*NORMAL or \*REVERSED. Be sure to confirm that FSR determined correctly before proceeding. Press F8=Reverse the Direction if you decide otherwise. Press F10 when ready to start replication.

Next, select Option 10 if available (Display replication) and press F11=Show status to monitor progress. For DS8K Metro Mirror, use option 12 ( Work with Volumes) and Option 13 (Display out of sync sectors ) instead.

```

Display Replication

Environment . . . : <name>                               Type . . . . . : MMIR
Consistency group : <name>
Cycle period . . : *NONE
Primary . . . . . : Master (or Aux)
State . . . . . : Inconsistent_copying

Relationship      State / in sync?      Freeze time      Progress
<name>           inconsistent_copying                        96
<name>           inconsistent_copying                        97
<name>           inconsistent_copying                        96
<name>           inconsistent_copying                        97

```

Eventually you will see that replication is running (Consistent synchronized).

```

Display Replication

Environment . . . : <name>                               Type . . . . . : MMIR
Consistency group : <name>
Cycle period . . : *NONE
Primary . . . . . : Master (or Aux)
State . . . . . : Consistent_synchronized

Relationship      State / in sync?      Freeze time      Progress
<name>           consistent_synchronized
<name>           consistent_synchronized
<name>           consistent_synchronized
<name>           consistent_synchronized

```

### 4.3 Detach

The detach function stops replication and IPLs the target node in manual mode and restricted state. The source node continues to run. On one of the Controllers, use the WRKCSE command and option 12 (Work with) to access this function.

- This function is not supported for GMIR replication without change volumes for SVC.
- This function is not supported for MMIR replication with DS8K

**Work with SVC PPRC Environment**

```
Environment . . . . . : <name>
MMIR Status . . . . . : Consistent synchronized
Direction . . . . . : Normal (or Reversed)
```

Select one of the following:

- 2. Pause
- 3. Resume
  
- 5. Switch
- 6. Start Replication after Switch
  
- 8. Detach
- 9. Reattach
- 10. Display replication

Select option 8 (Detach). The following steps are performed:

- The IPL attributes are set to Restricted=Yes if QLPAR has \*SECADM authority
- Data area QZRDHASM/QDETACHED is created
- LPAR memory is flushed
- Replication is stopped
- The target node is IPLed in Manual mode while the production node continues to run
- The IPL attributes are set back to Restricted=No, if necessary
- Data area QZRDHASM/QDETACHED is deleted

Wait for \*STATUS message IAS00E4 (Current SRC for <LPAR name of target node> is C600 4301) indicating the console is available for signon. Sign on the console and provide responses to complete the IPL. Any data changes on the target node will be lost when reattach restarts replication from the Production node.

## 4.4 Reattach

When you are ready to resume normal operations, select option 9 (Reattach). The following steps are performed:

- The target node is powered down, if not already Inactive
- Replication is resumed in the same direction as before the detach. You can monitor progress toward “Consistent\_synchronized” by selecting option 10 (Display replication) and pressing F11>Show status.



## 5 Displaying Full System Replication information

### 5.1 WRKCSE Option 5=Display

```

                                     Display a PPRC Environment
Press Enter to continue.

Environment . . . . . : <name>
Type . . . . . : MMIR (or GMIR)
Storage Type . . . . . : SVC
ASP Device name . . . . . : *SYSTEM
Source Copy Description . . . . . : *NONE
Target Copy Description . . . . . : *NONE
Production node . . . . . : <PROD node name>
Preferred source SVC Information:
  IP Address . . . . . : nnn.nnn.nnn.nnn
  Remote copy consistency group Id n
Preferred target SVC Information:
  IP Address . . . . . : nnn.nnn.nnn.nnn
  Remote copy consistency group Id n
```

### 5.2 WRKCSE Option 12=Work with

```

                                     Work with SVC PPRC Environment

Environment . . . . . : <name>
MMIR Status . . . . . : Consistent synchronized
Direction . . . . . : Normal (or Reversed)

Select one of the following:

  2. Pause
  3. Resume

  5. Switch
  6. Start Replication after Switch

  8. Detach
  9. Reattach
 10. Display replication
```

Note: Direction shows what is actually occurring between the storage units, not what is in the CSE data.

### 5.2.1 WRKCSE Work with Option 10=Display replication

```

                                Display Replication

Environment . . . . : <name>                Type : MMIR (or GMIR)
Consistency group : <RCCG ID and name>
Cycle period . . . : *NONE
Primary . . . . . : Master (or Aux)
State . . . . . : Consistent_synchronized

Relationship      Master volume      Auxiliary volume
<name>           <volume name>      <volume name>
<name>           <volume name>      <volume name>
<name>           <volume name>      <volume name>
<name>           <volume name>      <volume name>

```

Primary = Master if replicating in the normal direction or Aux if replicating in the reversed direction.

### 5.3 WRKCSEDTA Option 5 = Display

```

                                Work with CSE Data

Type options, press Enter.
  1=Create   2=Change   3=Copy   4=Delete   5=Display

Opt      CSE Data      CRG      Text
          BRMS9M9P1    FSFC
          CTCHAFS      FSR
          EXIT9M9P1    FSFC
          FSFCDS8K     FSFC
          FSFC9F9G     FSFC
          FSFC9J9K     FSFC
          FSFC9M9N     FSFC      GMCV Flash
          FSFC9M9P1    FSFC
          FSFC9M9P1Q   FSFC
          FSFC9M9P2    FSFC
          FSR9J2       FSR

```

### 5.4 DSPCSEDTA

```

                                Display CSE CRG Data

Press Enter to continue.

```

```
CRG Name . . . . . : <name>
Use . . . . . : *SYSTEM
Copy type . . . . . : *PPRC

Environment name . . . . . : <name>
Preferred production node name : <PROD node>
FSR communications port . . . : 55920
PPRC status . . . . . : *READY
PPRC direction . . . . . : *REVERSED
Controlling node name . . . . : <DR Ctl>
Secondary controlling node name: <PROD Ctl>
```

More...

Note: Direction is what is recorded in the CSE exit data based upon FSR processing and may not match the replication direction that is actually occurring between the SVCs.

```

                                Display CSE CRG Data

Press Enter to continue.

Preferred production details:
HMC LPAR name . . . . . : <name>
HMC Profile name . . . . . : <name>
HMC managed system . . . . . : <name>
Primary HMC IP . . . . . : nnn.nnn.nnn.nnn
Secondary HMC IP . . . . . :

Preferred target details:
HMC LPAR name . . . . . : <name>
HMC Profile name . . . . . : <name>
HMC managed system . . . . . : <name>
Primary HMC IP . . . . . : nnn.nnn.nnn.nnn
Secondary HMC IP . . . . . :

                                                                More...

```

```

                                Display CSE CRG Data

Press Enter to continue.

Power down command . . . . . : PWRDWSYS OPTION(*IMMED)

                                                                Bottom

```

## 6 Commands

### 6.1 ADDCSECRDE - Add CSE Credential Entry

ADDCSECRDE allows the user to add credential entries. This information is used by the toolkit whenever it needs to communicate with the device specified on the Host IP address parameter, and is used when communicating with the DS8K, HMC and SVC's. This information is encrypted and stored in the PowerHA device data domain, and is available to all the nodes in the cluster.

```

                                Add CSE Credential Entry (ADDCSECRDE)

Type choices, press Enter.

Host IP address . . . . . _____
User ID . . . . . _____
Password . . . . . _____
Confirm password . . . . . _____
Host description . . . . . _____

```



**Host IP address:** Enter the IP address of the host which the credentials are for. A valid IP address is required; name resolution is not performed by the toolkit.

**User ID:** Enter the user ID which exists on the device specified by the Host IP address.

**Password:** Enter the password for the user ID which exists on the device specified by the Host IP address.

**Confirm password:** Re-enter the password to ensure that it is correct.

**Host description:** Enter a description to make it easy for humans to see which host the IP address is for.

## 6.2 CHGBLDFLG – Change Build Flags

This command alters flags held in the BUILD data area that are used for debugging and other purposes within PowerHA Toolkit for IBM i. The command should only be used when so recommended by an IBM consultant or support personnel.

```
Change ICSM Build Flag (CHGBLDFLG)

Type choices, press Enter.

Specific build flag . . . . . *DEBUGEXIT  *DEBUGEXIT, *DEBUGFLASH...
Setting . . . . . *OFF                *ON, *OFF
```

**Specific build flag:** Determines which flag to toggle. The possible values are:

- **\*DEBUGCRG:** Change the DEBUGCRG flag used with the toolkit. Setting it on will result in more detailed messages related to the CRG DDD space.
- **\*DEBUGEXIT:** Change the DEBUGEXIT flag used with the toolkit for debugging the CRG exit program.
- **\*DEBUGFLASH:** Change the DEBUGFLASH flag used with the toolkit. Setting it on will result in more detailed messages related to flash operations.
- **\*DEBUGTPC:** Change the DEBUGTPC flag used within the toolkit for debugging CSM (formerly TPC-R).
- **\*DEBUGDDD:** Change the DEBUGDDD flag used within the toolkit. Setting it on will result in more detailed messages related to the DDD space.

- **\*TEST:** Change the TEST flag used within the toolkit. This should only be used for toolkit development testing.
- **\*XTRALOGS:** Change the XTRALOGS flag used within the toolkit. This will result in additional logging messages generated and retained.

**Setting:** Used to toggle the specified build flag. The possible values are:

- **\*OFF:** Change the above flag to off.
- **\*ON:** Change the above flag to on.

### 6.3 CHGBRMSOBJ - Change BRMS Object Attributes

This command allows you to change an attribute of a BRMS object. It is particularly useful for programmatically changing values which do not have a BRMS command line interface.

Change BRMS Object Attributes (CHGBRMSOBJ)	
Type choices, press Enter.	
BRMS Object type to change . . . _____	*DEVICE, *MEDPCY, *CTLGATTR
Name of BRMS object to change . _____	Object name
BRMS Attribute to change . . . . . _____	*LOC, *MEDCLS, *MOVPCY...
New attribute value . . . . . _____	

**Object type to change:** Specify the type of object to change. The objects which can be changed are:

- **\*CTLGATTR:** The following control group attributes (WRKCTLGBRM opt 8) can be changed:
  - \*DEVICE
- **\*DEVICE:** The following device attributes (WRKDEVBRM) can be changed:
  - \*LOC
  - \*TEXT
- **\*MEDPCY:** The following media policy attributes (WRKPCYBRM) can be changed:
  - \*LOC
  - \*MEDCLS
  - \*MOVPCY
  - \*MARKDUP
  - \*MARKHST
  - \*MINVOL
  - \*TEXT

- \*VOLSEC

**Name of BRMS object to change:** Specify the name of the BRMS object to change.

**BRMS Attribute to change:** Specify the attribute of the object to change. The valid combination of object to change and the attribute to change varies.

- **\*DEVICE:** Specifies the device(s) to be associated with the object. Only one device is currently supported. The possible values are:
  - **\*BKUPCY:** The value for the backup device field in this control group uses the default value for this field from the backup policy.
  - **\*SYSPCY:** The value for the backup device field in this control group uses the default value for this field from the system policy.
  - **device-name:** Specify the names of the devices that are used in processing this backup control group. Only one device is currently supported.
  - **\*NONE:** There is no device for this save operation. Save files are used to store the saved data.
  - **\*MEDCLS:** Devices for this policy or control group are selected based on device types that support the density for the media class specified in the media policy. The **\*MEDCLS** special value is used for devices that are part of a device pool, such as several systems that share a single or set of devices.
- **\*LOC:** Specifies the storage location to be associated with the object. The possible values are:
  - **\*ANY:** Any device in any location capable of saving to the specified media class can be utilized for the save operation.
  - **location-name:** Specifies the location name of the device that is to be used with this policy. Only devices assigned this location name can be used for the save operation.
- **\*MEDCLS:** Specifies the name of the media class to be used for any volume created using this media policy. The possible values are:
  - **\*NONE:** No media class is assigned for this media policy.
  - **\*ADSM:** No media class is assigned for this media policy. The media is managed by the TSM server.
  - **media-class-name:** Specify the name of the media class that is to be used with this media policy.
- **\*MOVPCY:** Specifies the name of the move policy to be associated with this object. The possible values are:
  - **\*NONE:** Specifies that no move policy is associated with this media policy.
  - **\*ADSM:** Specifies no move policy is associated with this media policy. A TSM server is responsible for movement and storage of the media.
  - **move-policy-name:** Specifies the name of the move policy that is to be assigned to volumes used by this media policy.

- **\*MARKDUP:** Specifies whether history items created by the save will be marked for duplication. You can use DUPMEDBRM VOL(\*SRCHHST) command to duplicate the marked saved items. The possible values are:
  - **\*NO:** History items created during a save operation that use this media policy will not be marked for duplication.
  - **\*YES:** History items created during a save operation that use this media policy will be marked for duplication.
  
- **\*MARKHST:** Specifies whether media volumes will be marked for duplication. If a volume is a member of a media set and it is marked for duplication, all members of the media set will be marked for duplication. When the DUPMEDBRM VOL(\*SEARCH) command is used, active volumes that have been marked will be selected and duplicated. The possible values are:
  - **\*NO:** Volumes written to during a save operation that use this media policy will not be marked for duplication.
  - **\*YES:** Volumes written to during a save operation that use this media policy will be marked for duplication.
  
- **\*MINVOL:** Specifies the minimum number of expired volumes that must be present before any save can begin. The possible values are:
  - **\*NONE:** There is no check done to determine the minimum number of required volumes before a save operation begins.
  - **number-of-required-volumes:** Specify the number of expired media volumes that must be available before any BRMS save operation will begin. The number of volumes can range from 1 to 9,999.
  
- **\*TEXT:** Specifies text that describes the object. The possible values are:
  - **\*NONE:** No text will be used to describe the object.
  - **text-description:** Specifies the text description to be used.
  
- **\*VOLSEC:** The secure volume attribute will be changed. Value values are:
  - **\*NO:** Volume security will not be applied to this media class. Volumes that do not have volume security can be read by anyone.
  - **\*YES:** Volume security will not be applied to this media class. Only users with special authorities \*ALLOBJ or \*SECADM can read media volumes in this media class. \*
  - **\*ADSM:** Volume security will not be applied. Volume security is managed by the TSM server.

**New attribute value:** Specify the new value value.

## 6.4 CHGCSECRDE - Change CSE Credential Entry

This command can be used to change a user credential entry in the Device Domain Data associated with IBM i Copy Services Manager. The information is encrypted using a 128 bit AES key before it is retained.

For a description of the parameters, see the command ADDCSECRDE.

## 6.5 CHGCSEDTA – Change CSE Data

CHGCSEDTA is used to change the CSE Data as it relates to the operational characteristics of the toolkit. The parameters of CRTCS EDTA and DSPCS EDTA are similar and these descriptions apply to those commands as well. Please refer to CRTCS EDTA for parameter details.

## 6.6 CHKFSFLASH - Check Full System Flash

The Check Full System FlashCopy Readiness (CHKFSFLASH) command performs checks to determine if the prerequisite conditions have been met for the identified CSE Data configuration to be able to perform a Full System FlashCopy via STRFSFLASH. Depending on whether the CSE Data refers to a Full System Flashcopy (FSFC) or Recovery Point Flash (RPF) the command will perform different steps. In both situation the purpose is to check whether the conditions are correct for a flashcopy. This command is not able to detect all conditions that could cause a STRFSFLASH command to fail, however, it will check the following:

- For DS8K environments, a flash relationship exists.
- For SVC environments, the consistency group and flashcopy mappings exist.
  - For RPF, the target LUNs must not have host connections
- The smc or svc is available
- The source partition is available
- The HMC for the source partition is available.
- The HMC for the target partition is available.
  - For RPF, there is no target partition.
- For SVC, that all host connections are valid.
- That no other instance of STRFSFLASH for this configuration is active.
- That the shutdown command is valid on the source partition.
- The cluster on the required nodes are operational.
- That all nodes are in the correct cluster domain.

The following checks are only made for FSFC operations:

- That device and line descriptions in the configuration exist on the source partition.
- That the BRMS port is available.
- That the backup commands are valid on the source partition.
- That the BRMS media classes are valid.

This command should be run in an attempt to pro-actively identify any conditions that must be corrected before STRFSFLASH can be completed successfully for the specified CSE Data configuration.

**CSE Data name:** This is a required parameter. Specifies the name of the CSE Data that contains the flashcopy configuration.

**Controller IP address:** Specifies the IP address on the controlling node where the processing for the CHKFSFLASH command will be performed. The possible values are:

- **\*LOCAL:** The local system is the controller.
- **IP address:** IPv4 formatted address

**Controller port:** The port on which the controller is listening for remote commands. This parameter is ignored for CTLR(\*LOCAL).

## 6.7 CHKRCYPNT – Check Recovery Point Flash

The Check Recovery Point Copy Readiness (CHKRCYPNT) command performs checks to determine if the prerequisite conditions have been met for the identified CSE Data configuration to be able to switch the partition LUNs to a recovery point copy via SWRCYPNT. This command is not able to detect all conditions that could cause a SWRCYPNT command to fail, however, it will check the following:

- That the environment is an SVC environments.
- That the consistency group and flashcopy mappings exist.
- The smc or svc is available.
- The source partition is available
- The HMC for the source partition is available.
- That all host connections are valid.
- That no other instance of STRFSFLASH for this configuration is active.
- That the shutdown command is valid on the source partition.
- The cluster on the required nodes are operational.
- That all nodes are in the correct cluster domain.

This command should be run in an attempt to pro-actively identify any conditions that must be corrected before SWRCYPNT can be completed successfully for the specified CSE Data configuration

**CSE Data name (CSEDTA)** This is a required parameter. Specifies the name of the CSE Data that contains the flashcopy configuration.

## 6.8 CLNICSMLLOG – Clean ICSM Log

This command will clean the logs related to the IASP Copy Services Manager, Full System Replication Manager, or Full System FlashCopy Manager. CLNICSMLLOG removes specified entries from the /QIBM/Qzrdhasm/Qzrdhasm.log, removes any temporary directories created by DMPINF, dmpinf zip files and toolkit joblogs in /QIBM/Qzrdhasm/joblogs/ which are older than the number of days

specified on this command. This command should be run periodically to prevent log files from consuming excessive space.

**Days of information to retain:** How many days of information to retain.

**FSFC environment:** The name of the FSFC environment to be cleaned.

- **\*NONE:** Do not clean up the logs for any environment.
- **\*ALL:** Clean up the logs for all environments.
- **environment-name:** Clean up the logs for the named environment.

## 6.9 CLRDDD – Clear Device Data Domain

CLRDDD is a utility command used to clear data out of PowerHA device data domains. It should only be used when instructed by IBM personnel and may remove toolkit configuration data.

## 6.10 CNLFSFLASH – Cancel Full System FlashCopy

Cancel a FlashCopy previously paused with STRFSFLASH. This is necessary if the intent is to issue another STRFSFLASH instead of RSMFSFLASH.

## 6.11 CPYCEDTA – Copy CSE Data

This interactive command will create a new Cluster Resource Group and write configuration data to the CSE Data device domain based on information from an existing CRG and existing CSE Data. The configuration data may be modified before the CSE Data is created.

Please refer to the command CRTCEDTA for a detailed description of the parameters.

**CSE Data name:** The name that identifies both the CRG and the CSE Data.

**To CRG:** Specifies the name of the CRG device which is to be prepared for backup. This name identifies a CRG device description on the owning cluster node. This is also the Environment name referenced elsewhere within ICSM. The environment is configured using WRKCSE.

## 6.12 CRTCEDTA - Create Copy Services Environment Data

CRTCEDTA is used to enter the CSE Data as it relates to the operational characteristics of the toolkit. The parameters of CHGCSEDTA and DSPCEDTA are similar and these descriptions apply to those commands as well.

```

                                Create CSE CRG

Supply all required values, press Enter.

CRG Name . . . . . : TEST

Use . . . . . : *SYSTEM

Copy type . . . . . *FLASH          *PPRC, *FLASH

```

The CRG Name can be different from the environment name. Entering use \*SYSTEM and type \*FLASH indicate this is going to be a CSE Data for Full System FlashCopy. Press Enter and the remaining FSFC-specific parameters are displayed.

```

                                Create Full System FlashCopy CSE Data

Supply all required values, press Enter.

CSE Data Name . . . . . : TEST
Use . . . . . : *SYSTEM
Copy type . . . . . : *FLASH

Environment . . . . . _____ Name
Primary controlling node . . _____ Name
Secondary controlling node _____ Name
Communications port . . . . 55920

Source LPAR IP address . . . _____ IPv4 address
Source host alias . . . . . _____ Name
Target host alias . . . . . _____ Name

```

**Environment:** Refers to the environment previously created in WRKCSE. This must be an FSFC environment, and determines the external storage details. It is common for multiple CSE Data’s to reference the same environment to facilitate daily vs. weekly backups. Note that only one FlashCopy using a specific environment can be executed at a time.

**Primary and Secondary controlling nodes:** Enter the cluster node names of the controllers. There is no practical distinction between primary and secondary nodes. If there is only one node, do not enter a secondary node.

**Communications port:** The port on the source LPAR the controllers will use to communicate with the source and target LPARs. Program QZRDIAEXT2 in subsystem QZRDFSR is expected to be listening to this port when the FlashCopy operations are performed.

**Source LPAR IP address:** The IP address the controlling and target LPARs will use to contact the source LPAR.

**Source and Target Host alias:** These labels are used in the messages to identify which LPAR the message is referring to.



Method to flush memory . . .	<u>*FRCWRT</u>	*QUIESCE, *FRCWRT, *IPL
------------------------------	----------------	-------------------------

**Method to flush memory:** The FlashCopy will only copy the data which is on disk, not that which is in the host's memory. Therefore, it is important that we flush as much data as possible from memory to disk prior to the FlashCopy. There are three methods we can use to achieve this:

- **\*FRCWRT:** *\*FRCWRT has minimal impact to users, and is typically a good option to use when testing the FlashCopy process, or when creating a FlashCopy for non-backup purposes.* This option will flush memory but will not hold any database transactions. Users will not be impacted beyond additional disk I/O created to perform the flush. Neither TCP nor jobs, processes or subsystems are ended. Once the flush operation has finished, the toolkit will perform a FlashCopy in the storage, capturing whatever is on disk. There is an increased possibility that some objects may be damaged on the FlashCopy. The IPL of the FlashCopy LPAR may take a long time as database and journal recovery may need to roll back many transactions. Furthermore, it is not recommended to use \*FRCWRT unless the items being backed up are journaled, as files may have partially written records (applications may not tolerate improperly formatted data, such as NULL values in zoned integer fields, etc).

Method to flush memory . . .	*QUIESCE	*QUIESCE, *FRCWRT, *IPL
Quiesce details:		
Maximum time quiesced . . .	59	0-240 seconds
Force flash copy . . . . .	*YES	*YES, *NO

- **\*QUIESCE:** *Use this option for minimal impact to users and to get a good FlashCopy for backups.* The \*QUIESCE option will first perform a \*FRCWRT, then it will perform a \*SUSPEND operation, followed by another \*FRCWRT before the FlashCopy is executed. The purpose of the first \*FRCWRT is to flush as much memory as possible before suspending database transactions (it could take 10-20 minutes to flush terabytes of memory on a busy system). Before suspending transactions the toolkit will spawn a second job which will automatically resume the system after a certain time period, to ensure that a failure or pause in the main toolkit process will not prevent access to the system longer than desired. During the \*QUIESCE process, new database transactions will be suspended while allowing existing transactions to reach a commit boundary. The “**Maximum time quiesced**” parameter determines how long to wait for the transactions to reach a commit boundary. When all the transactions are held, the FlashCopy will occur. If there remains outstanding transactions, the toolkit will perform a flash anyway if the “**Force flash copy**” option is selected, as it is likely that many transactions were held. Otherwise the process will fail.

Method to flush memory . . .	*IPL	*QUIESCE, *FRCWRT, *IPL
IPL details:		
Power down command . . . . .	pwrdownsys delay(30)	
Confirmation message . . . . .	*NO	*YES, *NO
Source LPAR Information:		
HMC LPAR name . . . . .	ctciha9m	

HMC Profile name . . . . .	ctciha9m	
HMC managed system . . . . .	CTCHA9	
Primary HMC IP . . . . .	9.5.168.29	IPv4 address
Secondary HMC IP . . . . .		IPv4 address

- **\*IPL:** By powering down the source LPAR we are ending all transactions and processes and moving all data from memory to disk. *This will create the best possible FlashCopy to perform backups from, but also has the greatest impact to the users of the source LPAR.*

The \*IPL option will (by default) issue and wait for a response to an inquiry message on the source LPAR, in QSYSOPR’s message queue. This confirmation can be removed by selecting \*NO on the “**Confirmation message**” parameter. The benefit of having a confirmation message is 1) validates the correct LPAR is being shut down and 2) provides the option to prevent the shutdown.

If \*IPL is used, a “**Power down command**” must be supplied. This command can be PWRDWN SYS RESTART(\*NO) (we recommend a 30-second [or longer] delay) or a command or program call which will terminate processes and applications then do a PWRDWN SYS RESTART(\*NO).

**Source LPAR Information** is only displayed if the method to flush memory is set to \*IPL. The **HMC LPAR name**, **HMC profile name**, and **HMC managed system** parameters are case sensitive. The **Primary HMC IP** is required and **Secondary HMC IP** is optional. If the toolkit receives an unexpected response from the currently used HMC it will automatically retry the response on the other HMC, if it is configured.

Target LPAR Information:		
HMC LPAR name . . . . .	ctciha9n	
HMC Profile name . . . . .	ctciha9n	
HMC managed system . . . . .	CTCHA9	
Primary HMC IP . . . . .	9.5.168.29	IPv4 address
Secondary HMC IP . . . . .		IPv4 address
Shutdown target before		
FlashCopy . . . . .	*YES	*YES, *NO
Restart target after		
FlashCopy . . . . .	*YES	*YES, *NO, *INQ

**Target LPAR Information:** Specify the details for the target LPAR. The **HMC LPAR name**, **HMC profile name**, and **HMC managed system** parameters are case sensitive. The **Primary HMC IP** is required and **Secondary HMC IP** is optional. If the toolkit receives an unexpected response from the currently used HMC it will automatically retry the response on the other HMC, if it is configured.

**Shutdown target before FlashCopy:** It is necessary to deactivate the target LPAR prior to performing a FlashCopy if the target LPAR is attached to the FlashCopy disks. For example, if two source LPARs with dedicated target disks share a common target LPAR, it is not necessary to shut down the target LPAR if it is not attached to the FlashCopy target disks.

**Restart target after FlashCopy:** The toolkit has several options for restarting the target LPAR. Note that if host connection changes are specified, they will be processed immediately prior to activating the target LPAR.

- **\*YES:** Restart the target LPAR immediately after the FlashCopy. This is the most common option. If there are multiple STRFSFLASH operations vying for the use of the target LPAR, one will randomly get a lock on it and the rest will continue to wait until they can also get a lock on it.
- **\*NO:** Do not restart the target LPAR after the FlashCopy. Some customers use this to create a FlashCopy immediately before a critical operation on the source LPAR, such as batch processing, for the purposes of performing a reverse FlashCopy. Backups are not usually performed in this scenario.
- **\*INQ:** Issue an inquiry message to QSYSOPR on the controller prior to restarting the target LPAR to allow an operator to control whether and when to start the target LPAR. This can also be used with multiple concurrent STRFSFLASH operations to control the order of target LPAR IPL's.
- **\*PAUSE:** The Full System FlashCopy process will be paused at the point immediately after the flashcopy has completed and prior to the start of the IPL of the target partition. Use the Resume Full System FlashCopy (RSMFSFLASH) CL command to resume the process.

Use BRMS integration . . . .	*YES	*YES, *NO
BRMS information:		
Lock BRMS . . . . .	*SRCONLY	*BOTH, *NO, *SRCONLY, *TGTONLY
Lock type . . . . .	*FCNUSG	*ALL, *FCNUSG, *HOLD
Base media class . . . . .	*NONE	class, *NONE
Base media class suffix	*NONE	suffix, *NONE
BRMS transfer method . . .	*ALL	*ALL, *CHGONLY
BRMS transfer port . . . .	*DFT	*DFT, 1024-65535
BRMS save compression . .	*DEV	*DEV, *YES, *NO, *HIGH, *MEDIUM, *LOW
Restricted media class(es)	*NONE	*NONE, class
+ for more values . .		

**Use BRMS integration:** Controls whether the toolkit will integrate with BRMS. If set to **\*NO**, the toolkit will not change the BRMS FlashCopy mode, manage journaling of files, lock users out of BRMS on the source, or transfer BRMS back, etc. **\*YES** will enable the **BRMS information** parameters.

**Lock BRMS:** Determines whether BRMS operations should be prevented and on which LPARs.

- **\*SRCONLY** is the recommended value, which will only lock BRMS on the source LPAR during the backups on the target LPAR. The purpose of locking BRMS on the source LPAR is to prevent activities that will change the BRMS database that will later be overwritten when QUSRBRM is copied from the target LPAR. This is the recommended value when the **BRMS Transfer method** is **\*ALL**.

- **\*TGTONLY** will only lock BRMS on the target LPAR after the BRMS database has been transferred to the source LPAR. The purpose of locking the database on the target LPAR after the backups is to prevent performing changes to the BRMS database there after it has been copied back to the source LPAR. These changes will be lost. If there is limited access to the target LPAR after the FlashCopy has finished (i.e. it is deactivated, 5250 is not started etc) there may be no reason to lock the target LPAR.
- **\*BOTH** will perform both **\*SRCONLY** and **\*TGTONLY** locks.
- **\*NO** will not perform any BRMS locking. This is the recommended value when the **BRMS transfer method** is **\*CHGONLY**.

**Lock type:** If locking of BRMS is desired, how it is locked can be decided.

- **\*FCNUSG** will use the functional usage model to prevent backups from occurring. Recoveries and viewing logs, media and history is allowed. Attempts to change the BRMS database (i.e. backups, editing control groups etc) will be denied with a message indicating the user is not authorized to that function. Use WRKFCNUSG to view/change individual functional areas. To temporarily override the lock, use the command SETUSRBRM to give **\*ADMIN** to a user to perform a locked function. This authority will be reset to the pre-FlashCopy state after the BRMS database has been transferred back to the source LPAR.
- **\*HOLD** will use the BRMS ‘halt’ method to hold any jobs accessing BRMS. This method’s purpose is to allow BRMS to force an exclusive single-threaded environment for critical functions such as STRMNTBRM. To remove this lock, perform this program call:

```
QSYS/CALL PGM(QBRM/Q1AOLD) PARM('STOPJOBS ' '*RELEASE ')
```

Or delete data area QUSRBRM/Q1AMNTHALT.

- **\*ALL** will implement both **\*HOLD** and **\*FCNUSG**
- **\*NONE** will not implement any locking mechanism and is appropriate when using **BRMS Transfer method \*CHGONLY**.

**Base media class:** Only use this option with **BRMS transfer method \*CHGONLY**. When using dynamic media classes, the toolkit will create a new media class from an existing base media class. The new media class will be named using the base media class and the **Base media class suffix**. The combined length of these two must be less than ten characters. The dynamic media class is created immediately prior to the FlashCopy, and is added to the **Restricted media class** list. Media previously used in a dynamic media class will be moved to the dynamic media class, and scratch volumes will also be moved to it. The toolkit will find all the media policies which use the base media class and specify the same media location as the device location of the devices specified on the CRTCEDTA command, and use the “Required Volumes” parameter to determine how many scratch media are required at each location. The toolkit will move that number of expired media to the dynamic media class. After the backups are finished the toolkit will write the text ‘#FSFC#’ to the media used during the backup to

identify for future use in a dynamic media class. Then the media will be moved back to the base media class and the dynamic media class will be removed.

**BRMS transfer method:** This parameter determines how to transfer the BRMS database from the target to the source LPAR. This process is triggered when ENDFSFLASH \*NORMAL is called on the target LPAR.

- **\*ALL** will transfer the entire BRMS data library (QUSRBRM). This is the BRMS-supported method of managing the FlashCopy data, and will also perform the BRMS operations to set the proper BRMS FlashCopy mode. The entire library is placed into a savefile and transferred to the source LPAR using a proprietary file transfer protocol. Since the entire QUSRBRM is moved, overwriting what is on the source LPAR, any updates to the source LPAR QUSRBRM after the FlashCopy will be overwritten. This is why it is important to lock QUSRBRM on the source LPAR to prevent backups until QUSRBRM has been restored from the target LPAR. \*ALL is by far the most common and least complicated option used to transfer the BRMS data.
- **\*CHGONLY** will only move the updates to the media and object detail created during the backup on the target. While this will result in significantly less data to transfer, more time is spent extracting the data from the target QUSRBRM and inserting it into the source QUSRBRM that there is little, if any, improvement in the overall data transfer time. \*CHGONLY was created to allow customers to perform backups on the source LPAR simultaneously with the backups on the target LPAR, or when using the toolkit to run multiple concurrent FlashCopy operations from a single source LPAR. When the BRMS data is transferred back to the source LPAR, it only only update media either expired or owned by the source LPAR so it is important to not override or reuse media classes assigned to the target LPAR. When the data is transferred back to the source LPAR, it is done in two steps; the media inventory and save history will quickly be transferred (as it has less data) which releases the media classes used. Then the second stage will transfer the object detail, which can potentially take hours. It is also important to note that each target LPAR must have its own media class, specified either as a restricted media class or dynamic media class. \*CHGONLY was developed with the help of the BRMS developers, but is not the BRMS-supported method to manage the BRMS database during FlashCopy (it is supported by the toolkit). It introduces significant complexity and possibility for error, and is usually discouraged unless the customer has a specific need for the benefits.

**BRMS transfer port:** This is the port the toolkit will open on the source LPAR to receive the BRMS database. \*DFT will attempt to select port 55066; if it is not available it will search subsequent ports until one is available.

**BRMS save compression:** Specify the compression used when saving BRMS to the savefile. \*DEV is the default, but \*MEDIUM is recommended.

**Restricted media classes:** When a BRMS media class is placed in this list, the toolkit will remove the functional authority to it on the source LPAR, and remove the functional authority to all others on the target LPAR. After the backups the functional authority will be restored on the source LPAR. Dynamic media classes are automatically added to the restricted media class list.

Target Comm Interfaces:

```
IO card location code . . . U8233.E8B.10001AP-V4-C2-T1
                                     *NONE, identifier
Line Description . . . . . FSFCLINE line name, *VIRTUALIP
IP interface . . . . . 9.5.167.93 IPv4 address

+ for more values . .
```

Target LPAR default route:

```
Binding interface . . . . *NOCHANGE IPv4 address
Next hop . . . . . IPv4 address
```

**Target Comm Interfaces:** The target LPAR should come online with a different IP address than the source LPAR. Use these parameters to indicate which IP addresses and line descriptions to bring online.

- **IO card location:** Specify the target IO card location which should be associated with the specified line description.
- **Line description:** The line descriptions specified will be modified with the resource name associated with the IO card location, and it will be varied on. All other line descriptions will be set to ONLINE(\*NO). This line description must exist on the source LPAR, with an invalid resource name and ONLINE(\*NO).
- **IP interface:** The IP interface which will be started. STRTCP will be called but no interfaces will be auto-started. This interface must exist on the source LPAR with AUTOSTART(NO). The toolkit will set this IP interface to be the BRMS restricted state IP interface.

**Target LPAR Default Route:** If the target LPAR IP address is in a different subnet and/or requires changes to the routing tables, use these parameters. If a new default route is specified, the existing one will be removed.

- **Binding interface:** Specify the interface to use for routing.
- **Next hop:** Specify the next for the default route.

Target LPAR Device Setup:

```
Backup device description TS3400PROD *NONE, device name
Device serial number . . . 78-78F1101

+ for more values . .
```

Target LPAR backup command \*NONE

+ for more values . .

**Target LPAR Device Setup:** This is used to work with devices to ensure that they are in the correct state for BRMS or other backup to use. When the target LPAR IPL's, it will find the devices and auto-configure them to use the next available resource name.

- **Backup device description:** Specify the device description the backups are configured to use. This must exist on the source LPAR prior to the FlashCopy. This can be a tape drive or media library device description.
- **Device serial number:** Enter the device serial number from WRKHDWRSC \*STG option 7. The toolkit will look for the specific serial number in WRKHDWRSC and determine the resource name which will be used on the specified device description. The serial number can be for a tape drive or a media library.

If there are multiple logical libraries in the media library then specify a media library device description with the serial number of a tape drive assigned to the logical library. The toolkit will then use the tape drive resource's parent library description to ensure the correct logical library is used.

All device descriptions will be varied off prior to varying any on.

**Target LPAR backup command:** Specify the backup commands to be issued by the toolkit. Prior to calling any of these commands, the toolkit will have started the specified IP interface. To prevent accidentally starting applications, the startup program has been changed to \*NONE, line descriptions set to not vary on at \*IPL, and TCP is set to not start on IPL. These are considerations to be taken when restoring from the backups.

These commands are issued in sequence. Processing will halt if any issue an escape message. The commands are executed as QLPAR in QSTRUPJD.

Wait for ENDFSFLASH . . . . .	*YES	*YES, *NO
FlashCopy Exit program . . .	*NONE	
Library . . . . .	*LIBL	*LIBL, library
Hold scheduled jobs . . . . .	*YES	*YES, *NO
Target keylock position . . .	*AUTO	*PANEL, *AUTO, *MANUAL
Stop target after backups	*NO	*YES, *NO, *RMV
Request type . . . . .	0	Number
Auto start cluster . . . . .	*YES	*YES, *NO
Wait time . . . . .	0	Number of seconds
Message Queue . . . . .	*SYSOPR	name, *SYSOPR
Library . . . . .		library name
Text . . . . .		

**Wait for ENDFSFLASH:** ENDFSFLASH is the command that will notify the toolkit that the backups have finished.

- **\*NO:** The toolkit will not wait for ENDFSFLASH to be called. It will be processed implicitly when the backup commands have all completed without issuing an escape message. Note that the toolkit is not able to monitor submitted backups.
- **\*YES:** The toolkit will wait for ENDFSFLASH to be called. This is expected to be submitted from the last \*EXIT in a control group, in SAVSYSBCH, a command line, etc. If any backups are submitted (for example to the controlling subsystem) \*YES is the correct option.

**Flash Copy Exit Program:** The FlashCopy Exit Program is described elsewhere in this guide. It's purpose is to allow for additional custom automation steps.

**Hold scheduled jobs:** This applies only to the basic job scheduler. The job entries are held immediately at the beginning of the startup program.

**Target keylock position:** Indicate how to start the target LPAR.

- **\*AUTO:** Start the LPAR in automatic / unattended mode. This is the recommended option.
- **\*MANUAL:** Start the LPAR in manual / attended mode. The recommendation is to use this option the first FlashCopy to bring the LPAR up in restricted state and verify the startup program is properly set. This will validate that the correct LUNs are being FlashCopied.
- **\*PANEL:** Use the default setting as defined in the HMC.

**Stop target after backups:** After the backups (and QUSRB RM transfer) the toolkit can deactivate and remove/stop the FlashCopy relationship.

- **\*NO:** Do not deactivate the target LPAR after backups. The LPAR will remain running, using CPU and memory resources.
- **\*YES:** Deactivate the LPAR from the HMC. The FlashCopy will remain active so the LPAR can be IPL'd later. This will free up CPU and memory resources and prevent users from accidentally signing on to the LPAR.
- **\*RMV:** The LPAR will be deactivated and the FlashCopy relationship will be stopped / removed. The LPAR cannot be IPL'd until another FlashCopy is performed. This is the best option if using thin provisioned or space efficient FlashCopy.

**Request type:** Internal code used by the toolkit to record it's state. In the case of a restart, this should be manually changed to 0.

## 6.13DLTCSEDTA - Delete CSE Data

This command will delete the specific CSE Data from the CRG device domain data. It also deletes the CRG.



**CSE Data name:** The name that identifies the CSE Data.

## 6.14 DSPCEDTA - Display Copy Services Data

This interactive command displays the specific CSE Data configuration information in the CRG device domain data space. It also displays CRG exit data.

**CSE Data name:** Specifies the name of the CSE Data and the exit data that is to be displayed.

## 6.15 DSPDDLCK - Display DDD lock holder

This is a utility command for display the job and user who holds a cluster-wide lock on the specified artifact. This command should be used if a log message indicates a lock is preventing an operation.

**Name:** Enter the name of the object to display a lock for.

**Type:** Enter the type of object to display a lock for.

## 6.16 ENDFSFLASH - End Full System Flash

Notifies the controlling partition that backups are finished.

**Action:** Indicates whether the backups finished successfully or failed.

- **\*NORMAL:** The backups finished with success. Will trigger moving QUSRBRM to the source partition if configured. The source partition will become the active BRMS instance. This is valid to run on the target partition.
- **\*FAILBKU:** The backups did not finish with success. Will not move QUSRBRM to the source partition. The source partition will become the active BRMS instance. This is valid to run on the target partition.
- **\*RSTFCNUSG:** Restore the Functional Usage values which were saved prior to the FlashCopy. Use this option if the backups or transfer of BRMS from the target partition failed and you will discard the BRMS backup history changes on the target partition. This is valid to run on the source partition.
- **\*CLNDYNMED:** Clean up the dynamic media class. This will mark and move any media in the specified media class to the base media class.

**Config:** Specifies a configuration. If used with ACTION(\*RSTFCNUSG) this will restore the restricted media classes provided in the specified configuration. This may be further limited with the MEDCLS parameter.

- **\*DFT:** The toolkit will use the standard configuration, typically only used with LOCKBRMS(\*BOTH).
- **\*MEDCLS:** Restore the function usage for the specified restricted media classes specified on the MEDCLS parameter, regardless which configuration they may be associated with.
- **Config-name:** The toolkit will use the configuration specified. You must specify the configuration if you have multiple flashcopies sending BRMS back to the source LPAR, or if using restricted media classes.

**Media class:** Specifies which media classes to restore function authority for or to clean up the dynamic media in. If a configuration is specified on the CONFIG parameter, only the function authorities for the media classes associated with the specified configuration will be restored.

- **\*ALL:** All of the outstanding media class function authorities associated with the specified configuration will be restored.
- **Config-name:** Only the function authorities for the specified media class will be restored.

**Base media class:** If \*CLNDYNMED is specified on the ACTION parameter, the Base Media Class specifies the class to merge the dynamic media class into.

- **\*NONE:** This parameter is ignored.
- **Media-class-name:** Specifies the base media class.

**Dynamic media class:** If \*CLNDYNMED is specified on the ACTION parameter, the Dynamic Media Class specifies the class to merge into the base media class. The dynamic media class will then be removed.

- **\*NONE:** No media will be merged.
- **Dynamic-media-class-name:** The media class to merge from and remove.

## 6.17 IPL LPAR – IPL Partition

This command will activate the specified LPAR.

**HMC partition name:** Specify the name of the LPAR to activate. This parameter is case sensitive.

**Partition profile:** Specify the partition profile to use when activating the partition. This parameter is case sensitive.

- **\*LPARNAME:** The name of the profile is the same as the partition name.

**Managing system:** The managed system name must be specified. This parameter is case sensitive.

**Primary HMC IP address:** Enter the IP address of the primary HMC. This address must have credentials listed in WRKCSECRDL.

**Secondary HMC IP address:** Enter the IP address of the secondary HMC. This address must have credentials listed in WRKCSECRDL. This IP address is optional and will only be used if an unexpected response is received from the primary HMC.

**IPL Source:** Specifies whether an initial-program-load (IPL) is started from the A-source, B-source or D-source of the system. This parameter allows you to control which Licensed Internal Code (LIC) storage source of the system to IPL. Also, the source of the system determines where LIC program temporary fixes (PTFs) are applied. This parameter also allows the system to be upgraded to a new release from an install image on DASD.

LIC has three storage areas known as the A-source, the B-source and the D-source. The D-source is the install media. The A- and B-sources are part of the system memory. Initially, the A- and B-sources are identical, but when Licensed Internal Code fixes are performed temporarily (PTF), the temporary fixes are stored on the B-source. When the same fixes become permanent, they are copied from the B-source to the A-source; therefore, the fixes reside on both the A-source and the B-source.

When you want to send temporary fixes to the B-source, you must start the system from the A-source, which causes the fixes to be sent to the B-source.

When you start the system from the A-source, you are running the system from the permanent fixes. When you start the system from the B-source, you are running the system from a mixture of temporary and permanent fixes. When you start the system from the D-source, you are using the Licensed Internal Code loaded from the install media.

It is recommended that you specify RESTART(\*YES); otherwise, you cannot be assured which source of the system is actually started. This precaution can save you some time.

- **\*PANEL:** The partition is started from the source that is currently shown on the operator's panel, the A-source, the B-source, or the D-source.
- **A:** The partition is started from the A-source.
- **B:** The partition is started from the B-source.
- **D:** The system is started from the D-source, the install media.

**Keylock position:** Specifies whether the LPAR will be activated for attended (manual) or unattended (auto) mode.

- **\*PANEL:** The partition is started in the mode that is currently shown on the operator's panel.
- **\*AUTO:** The partition is started in unattended mode.
- **\*MANUAL:** The partition is started in attended mode.

**Block until LPAR is active:** This parameter determines whether IPLLPAR will return control to the caller immediately or after the LPAR has reached the “Running” state.

- **\*YES:** IPLLPAR will remain active until the LPAR has reached a “Running” state.
- **\*NO:** IPLLPAR will terminate immediately after activating the LPAR.

**Max minutes to block:** Specifies how long IPLLPAR will wait for the partition to reach a “Running” state. This is ignored if **Block until LPAR is active** is \*NO. If the partition does not enter the “Running” state before the specified number of minutes has elapsed, IPLLPAR will issue and escape message.

**Confirm activation:** Configures IPLLPAR to wait on an inquiry message before activating the partition.

- **\*YES:** IPLLPAR will issue an inquiry message and will wait for a positive response before activating the partition.
- **\*NO:** IPLLPAR will activate the partition immediately.

## 6.18 LOGMSG – Log Message

The default log is in /QIBM/Qzrdhasm/qzrdhasm.log but some toolkit processes will change to a different log. LOGMSG will insert the specified message to the current log in use by the job.

**Message:** Enter the message to be inserted, from 20-120 characters.

**Message format:** Determines how the message will look in the log.

- **\*STD:** Use the standard message format. An example:

2017-07-27 12:46:00      standard message (logmsg)

- **\*CMDSTR:** Use the ‘command start’ message format. An example:

682401 2017-07-27 12:51:10 Start command start message starting from job  
682401/AASLAND/QPADEV001Q

**Message type:** Indicates the message status tag. The possible values are:

- **\*INFO:** The message does not have a tag.
- **\*ERROR:** The message is tagged with ‘Error’
- **\*WARNING:** The message is tagged with ‘Warning’

## 6.19 PRTCSE – Print CSE Information

The PRTCSE command prints Copy Services Environment (CSE) information, that was entered by the WRKCSE command and stored in cluster Device Domain Data (DDD). The information is printed to a QPRINT spool file. Unlike the environment list generated within WRKCSE, this command can access defined environments from any node within the cluster. Any combination of ENV and TYPE parameter values may be used.

**Environment name:** Specifies the name of the environments for which all information is to be dumped. The possible values are:

- **\*ALL:** All types of environments with the Copy Service Type below or all environments may be dumped.
- **Environment name:** All types of environments with the supplied environment name may be dumped.

**Copy Service Type:** The type of Advanced Copy Service environment. This parameter is required. The possible values are:

- **\*ALL:** All types of environments with the environment name or all environments may be dumped.
- **\*FLASH:** The FlashCopy environment with the environment name or all FlashCopy environments may be dumped.
- **\*GMIR:** The PPRC Global Mirroring environment with this environment name or all GMIR environments may be dumped.

- **\*LUN:** The LUN Level connection switching environment with this environment name or all LUN environments may be dumped.
- **\*MMIR:** The PPRC Metro Mirroring environment with this environment name or all MMIR environments may be dumped.

## 6.20RLSCSELCK - Release Copy Services Lock

This command releases a cluster wide environment lock used within IASP Copy Services Manager.

**Environment name:** Specifies the name of the Environment (which may be an Independent ASP). A special value of \*ALL may be used with RLSTYPE(\*OVR) to override all ICSM locks for the cluster.

**Release type:** The possible values are:

- **\*JOB:** Release the lock that is held by this process.
- **\*OVR:** Release a cluster wide environment lock which may be held by another process or when used with ENV(\*ALL), release all ICSM locks for the cluster. Use this only to override locks held by processes which are no longer active.

## 6.21RMVCSECRDE - Remove CSE Credential Entry

This command can be used to remove a user credential entry from the Device Domain Data associated with IBM i Copy Services Manager.

**Host IP address:** The address of the host to be removed.

## 6.22RSMFSFLASH – Resume Full System FlashCopy

The Resume Full System FlashCopy (RSMFSFLASH) command resumes the processing of a previous invocation of Start Full System FlashCopy (STRFSFLASH) from the point immediately after the flashcopy and prior to the IPL of the target partition. The Restart Target parameter in the CSE Data must have been set to \*PAUSE.

## 6.23RSTDDD – Restore Toolkit Device Data Domains

The Toolkits uses Device Data Domains (DDD) to store WRKCSE, WRKCEDTA and WRKCSECRDL information. Use RSTDDD to restore the DDD from files created by SAVDDD.

The sole parameter is the path to the directory which contains the DDD backup files generated by SAVDDD.

## 6.24 RTVINF - Retrieve ICSM Information

The Retrieve Information (RTVINF) command retrieves specific information from IASP Copy Services Manager. This command is only valid when executed within a CL program.

**Environment name:** This is a required parameter. Specifies the name of the Environment (which may be an Independent ASP) for which information is to be retrieved.

**Information:** This is a required parameter and specified the type of information to be returned. The possible values are:

- **\*CLUNODENAME:** The node name of this system within the cluster. The length of the first CL return variable below must be at least eight characters.
- **\*FLASHNODES:** The backup Flash Copy node names for the Flash configurations. Up to six FlashCopy environments may be configured. All six CL return variables must be specified and each of their lengths must be at least eight characters.
- **\*FLASHSTATUS:** First Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process
  - blank = undetermined.
- **\*FLASH2STATUS:** Second Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process
  - blank = undetermined.
- **\*FLASH3STATUS:** Third Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process
  - blank = undetermined.
- **\*FLASH4STATUS:** Fourth Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process

- blank = undetermined.
- **\*FLASH5STATUS:** Fifth Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process
  - blank = undetermined.
- **\*FLASH6STATUS:** Sixth Flashcopy status. The length of the first CL return variable below must be at least three characters.
  - 0 = Ready
  - 100 = Flashed
  - other number = Flash in process
  - blank = undetermined.
- **\*GMIRDIRECTION:** The length of the first CL return variable below must be at least one character.
  - N = Normal
  - R = Reversed
  - Blank = undetermined.
- **\*GMIRNODEROLE:** This key value MUST replace any use of \*PPRCNODEROLE for GMIR type environments, else unpredictable results may occur. The length of the first CL return variable below must be at least one character.
  - S = Source
  - T = Target
  - blank = undetermined
- **\*GMIRSTATE:** The length of the first CL return variable below must be at least one character.
  - 0 = Stopped
  - 1 = Running
  - 2 = Failover
  - 3 = Suspended
  - 4 = Lagging
  - 5 = Extreme Lagging
  - 6 = Paused
  - 9 = Other
  - M = Multi-target Incremental Resync Pair
  - blank = undetermined. RTVLPARINF
- **\*GMIRSTATEDIRECT:** State is returned in RTNVALUE and the direction is returned in RTNVALUE2. The length of the first and second variables must be at least one character.
  - State (RTNVALUE):
    - 0 = Stopped
    - 1 = Running



- 2 = Failover
    - 3 = Suspended
    - 4 = Lagging
    - 5 = Extreme lagging
    - 6 = Paused
    - 9 = Other
  - Direction: (RTNVALUE2):
    - M = Multi-target Incremental Resync Pair
    - N = Normal
    - R = Reversed
    - blank = undetermined
- **\*GMIR2DIRECTION:** The length of the first CL return variable below must be at least one character:
  - N = Normal
  - R = Reversed
  - Blank = undetermined
- **\*GMIR2NODEROLE:** This key value MUST replace any use of \*PPRCNODEROLE for GMIR2 type environments, else unpredictable results may occur. The length of the first CL return variable below must be at least one character
  - S = Source
  - T = Target
  - blank = undetermined.
- **\*GMIR2STATE:** The length of the first CL return variable below must be at least one character
  - 0 = Stopped
  - 1 = Running
  - 2 = Failover
  - 3 = Suspended
  - 4 = Lagging
  - 5 = Extreme Lagging
  - 6 = Paused
  - 9 = Other
  - M = Multi-target Incremental Resync Pair
  - blank = undetermined.
- **\*GMIR2STATEDIRECT:** State is returned in RTNVALUE and direction is returned in RTNVALUE2. The length of first and second CL return variables below must be at least one character.
  - State (RTNVALUE):
    - 0 = Stopped
    - 1 = Running
    - 2 = Failover
    - 3 = Suspended

- 4 = Lagging
  - 5 = Extreme lagging
  - 6 = Paused
  - 9 = Other
- Direction: (RTNVALUE2):
  - M = Multi-target Incremental Resync Pair
  - N = Normal
  - R = Reversed
  - blank = undetermined
- **\*IASPNAME:** The name of the Independent ASP used for the VRYCFG commands. The length of the first CL return variable below must be at least ten characters.
- **\*LUNCONNECTION:** The length of the first CL return variable below must be at least one character.
  - P = Connected to the Production Node
  - H = Connected to the HA node
  - Blank = undetermined
- **\*LUNNODEROLE:** The values indicate the normal role of this node. The length of the first CL return variable below must be at least one character.
  - P = Production Node
  - H = HA node
  - Blank = undetermined
- **\*MMIRDIRECTION:** The length of the first CL return variable below must be at least one character.
  - N = Normal
  - R = Reversed
  - Blank = undetermined
- **\*MMIRNODEROLE:** This key value should replace any use of \*PPRCNODEROLE for MMIR type environments. The length of the first CL return variable below must be at least one character.
  - S = Source
  - T = Target
  - Blank = undetermined
- **\*MMIRSTATE:** The length of the first CL return variable below must be at least one character.
  - 0 = Failed
  - 1 = Running
  - 2 = Failover
  - 3 = Suspended
  - 4 = Resuming
  - 6 = Paused

- M = Multi-target Incremental Resync Pair
- blank = undetermined.
- **\*MMIRSTATEDIRECT:** State is returned in RTNVALUE and direction is returned in RTNVALUE2. The length of first and second CL return variables below must be at least one character.
  - States:
    - 0 = Failed
    - 1 = Running
    - 2 = Failover
    - 3 = Suspended
    - 6 = Paused
    - M = Multi-target Incremental Resync Pair
    - blank = undetermined.
  - Directions:
    - N = Normal
    - R = Reversed
    - blank = undetermined.
- **\*MMIR2DIRECTION:** The length of the first CL return variable below must be at least one character.
  - N = Normal
  - R = Reversed
  - blank = undetermined.
- **\*MMIR2NODEROLE:** This key value should replace any use of \*PPRCNODEROLE for MMIR2 type environments. The length of the first CL return variable below must be at least one character.
  - S = Source
  - T = Target
  - blank = undetermined.
- **\*MMIR2STATE:** The length of the first CL return variable below must be at least one character.
  - 0 = Failed
  - 1 = Running
  - 2 = Failover
  - 3 = Suspended
  - 4 = Resuming
  - 6 = Paused
  - M = Multi-target Incremental Resync Pair
  - blank = undetermined
- **\*MMIR2STATEDIRECT:** State is returned in RTNVALUE and direction is returned in RTNVALUE2. The length of first and second CL return variables below must be at least one character.

- States:
    - 0 = Failed
    - 1 = Running
    - 2 = Failover
    - 3 = Suspended
    - 6 = Paused
    - M = Multi-target Incremental Resync Pair
    - blank = undetermined.
  - Directions:
    - N = Normal
    - R = Reversed
    - blank = undetermined.
- **\*MMIR3DIRECTION:** The length of the first CL return variable below must be at least one character.
    - N = Normal
    - R = Reversed
    - blank = undetermined.
  - **\*MMIR3NODEROLE:** This key value should replace any use of \*PPRCNODEROLE for MMIR3 type environments. The length of the first CL return variable below must be at least one character.
    - S = Source
    - T = Target
    - blank = undetermined.
  - **\*MMIR3STATE:** The length of the first CL return variable below must be at least one character.
    - 0 = Failed
    - 1 = Running
    - 2 = Failover
    - 3 = Suspended
    - 4 = Resuming
    - 6 = Paused
    - M = Multi-target Incremental Resync Pair
    - blank = undetermined
  - **\*MMIR3STATEDIRECT:** State is returned in RTNVALUE and direction is returned in RTNVALUE2. The length of first and second CL return variables below must be at least one character.
    - States:
      - 0 = Failed
      - 1 = Running
      - 2 = Failover
      - 3 = Suspended
      - 6 = Paused

- M = Multi-target Incremental Resync Pair
    - blank = undetermined.
  - Directions:
    - N = Normal
    - R = Reversed
    - blank = undetermined.
- **\*MULTITARGET:** Multi-target configuration
  - N = None
  - M = Multi-target using two Metro Mirror environments
  - G = Multi-target using one Metro Mirror environment and one Global Mirror environment.
- **\*PPRCNODEROLE:** The length of the first CL return variable below must be at least one character.
  - S = Source
  - T = Target
  - blank = undetermined
- **\*PPRCNODES:** The backup PPRC node names for the up to three PPRC configurations. RTNVALUE will contain the MMIR configuration node name. RTNVALUE2 will contain the GMIR configuration node name. RTNVALUE3 will contain the LUN configuration node name. All three CL return variables must be specified and each of their lengths must be at least eight characters.
- **PPRCNODE:** The Production node name. RTNVALUE will contain the node name. The CL return variable must be specified with a length of at least eight characters.

**Return value:** This is a required parameter. Specifies a CL character variable name for returned value.

**Return value 2:** This is a required parameter for \*MMIRSTATEDIRECT, \*GMIRSTATEDIRECT, \*FLASHNODES and \*PPRCNODES. For \*MMIRSTATEDIRECT and \*GMIRSTATEDIRECT, the PPRC direction ('N' or 'R') is returned here. For \*FLASHNODES, the second FlashCopy node will be returned here. For \*PPRCNODES, the GMIR target node will be returned here. Specifies a CL character variable name for the second returned value.

**Return value 3:** This is a required parameter for \*FLASHNODES and \*PPRCNODES. Specifies a CL character variable name for the third returned value. For \*FLASHNODES, the third FlashCopy node will be returned here. For \*PPRCNODES, the LUN HA node will be returned here.

**Return value 4:** This is a required parameter for \*FLASHNODES if a fourth FlashCopy environment is configured. Specifies a CL character variable name for the fourth returned value. The fourth FlashCopy node will be returned here.

**Return value 5:** This is a required parameter for \*FLASHNODES if a fifth FlashCopy environment is configured. Specifies a CL character variable name for the fifth returned value. The fifth FlashCopy node will be returned here.

**Return value 6:** This is a required parameter for \*FLASHNODES if a sixth FlashCopy environment is configured. Specifies a CL character variable name for the sixth returned value. The sixth FlashCopy node will be returned here.

## 6.25 RUNDSCMD - Run DS Scripted Command

The RUNDSCMD command is used in a CL program to run a scripted command through DSCLI and validate the results from the expected result list provided in the command parameters. The command optionally returns the total of numeric values in a specified column of the results.

Three exception messages may be issued:

- IAS0301 - Parameter error detected.
- IAS0302 - Result file error detected.
- IAS0303 - Results not as expected.

**Script input file:** The complete path and name of the script stream file. A value of '\*' is allowed when no script is to be executed, and only prior results are to be validated.

**Profile input file:** The complete path and name of the profile stream file. A value of '\*' is allowed when that value is also used for the script parameter.

**Results output file:** The complete path and name of the results stream file. This parameter is always required.

**User:** Specify the user profile name to be used to run the DSCLI scripted command.

**Result validation list:** A list of from one to ten validation entries to be matched against the results returned by the scripted command. The columns in the result file must be comma separated (refer to the profile that is in use).

Each validation list entry contains two or three elements:

- **Column position:** The comma separated column position for this element. This required value must be from one through 20.
- **Expected value:** The case sensitive character string that is expected. This value is required, must be enclosed in apostrophes, and may contain alphanumeric characters, blanks and

punctuation marks except commas. Strings that are not to be found may be specified by placing a minus sign (-) as the first character of the string.

- **Logic to next in list:** The logical operator (\*AND or \*OR) to the next expected value in the list. This value is required on all list elements except the last. Note that the results of each file row are evaluated from the first to the last expected value. Careful consideration must be made when this value is mixed (both \*AND and \*OR used on a single RUNDSCMD command). If more complex result checking is required, the RUNDSCMD command may be run again specifying '\*' for the SCRIPT parameter and combined results may be evaluated within the user's CL program.

**Result file rows:** The rows that are to be validated. The possible values are:

- **\*ALL:** The results specified in the validation list are expected to be found in at all of the result file rows.
- **\*ONE:** The results specified in the validation list are expected to be found in at least one of the result file rows.

**Summation column:** The comma separated column positional value that is to be summed and returned in the TOTAL parameter. Numeric values from one through 20 are allowed. The default is \*NONE. If a numeric value is specified, the content of that column in the result file may only contain numeric data.

**CL variable for returned total:** Specifies the name of the CL program variable that receives the total value being returned. The type and length for the CL variable must be TYPE(\*DEC) LEN(9 0). This parameter is required when the value of SUMCOLUMN is other than \*NONE.

**Return column:** The comma separated column positional value that is to be returned in the RTNVALUE parameter. Numeric values from one through 20 are allowed. The default is \*NONE. Refer to the RTNKEY parameter below. This parameter is required that the RTNCOLUMN parameter is also specified.

**Return key value:** Specifies the key string used to locate the row in the result file where the return value (RTNVALUE) will be extracted. The default is \*NONE. If a numeric value is specified for RTNCOLUMN and this parameter is \*NONE, the value in the first row of the result file is returned in RTNVALUE. If a numeric value is specified for RTNCOLUMN and this parameter specifies a key value, the value in the first row of the result file that contains that key is returned in RTNVALUE. This parameter is required that the RTNCOLUMN and RTNVALUE parameters are also specified.

**CL variable for returned value:** Specifies the name of the CL program variable that receives the character value being returned. The type and length for the CL variable must be TYPE(\*CHAR) LEN(80). This parameter requires that the RTNCOLUMN parameter is also specified.

## 6.26 RUNLPARCMD - Run command based on LPAR/SRLN

This command will run a specific command based on the specified LPAR and serial numbers detected. This command is usually used in the startup program to perform different tasks based on the serial and LPAR numbers.

NOTE: It is possible to test the behavior of this command on different serial and LPAR numbers by creating the following data areas:

```
CRTDTAARA DTAARA(QZRDHASM/FAKELPAR) TYPE(*CHAR) LEN(3)
VALUE('123')
```

```
CRTDTAARA DTAARA(QZRDHASM/FAKESRLN) TYPE(*CHAR) LEN(8)
VALUE('1234567')
```

The command RUNLPARCMD will look for these data areas and use them instead of detecting the actual serial or LPAR numbers.

**Serial number:** Specify the serial number required to run this command. NOTE: Prompt (F4) to see the current serial number.

- **\*ANY:** Run this command on any LPAR, regardless of serial number.
- **Serial-number:** Run the command on the LPAR with the specified serial number.

**LPAR number:** Specify the LPAR number required to run this command. NOTE: Prompt (F4) to see the current LPAR number.

- **\*ANY:** Run this command on any LPAR regardless of the LPAR number.
- **lpar-number:** Run the command on the LPAR with the specified number.

**Command to execute:** Run this command if the LPAR and serial numbers match those of the current LPAR. NOTE: Prompt (F4) to assist with building the command.

## 6.27 RUNSVCCMD - Run SVC Command

This command establishes an ssh session to an SVC, runs the user entered command, and stores the results in a stream file. NOTE: This command can establish an ssh session with any type of host, not just SVCs.

**Command:** Specifies the command to be run.

**SVC IP address:** Specifies the IPv4 formatted IP address of the SVC to be used.



**Results output file:** Specifies the IFS path name of the output file containing the results of the SVC command.

**Display results:** Specifies whether the results of the SVC command should be displayed in addition to be written to the output file.

## 6.28SAVDDD – Save Toolkit Device Data Domains

The Device Data Domains (DDD) are where the Toolkit stores WRKCSE, WRKCSEDTA and WRKCSECRDL information. The command SAVDDD will extract that information and place it into IFS files. Any sensitive information including passwords will be encrypted.

Use the RSTDDD command to restore / recreate the DDD information.

The sole parameter specifies the path to the directory in which to place the files. The directory must exist.

## 6.29SETCSELCK - Set Copy Services Lock

This command sets a cluster wide environment lock used within IASP Copy Services Manager.

**Environment name:** This is a required parameter. Specifies the name of the Environment (which may be an Independent ASP).

**Timeout minutes:** The number of minutes before the environment lock will self time out. The default is fifteen minutes.

## 6.30SETDDDLCK - Set DDD lock holder

This is a utility command for setting the job and user who holds a cluster-wide lock on a specified artifact.

**Name:** Enter the name of the object to display a lock for.

**Type:** Enter the type of object to display a lock for.

## 6.31SETUPFSFC - Set up IBM Pwr HA tools – FSFC

This command prepares IBM Power HA toolkit for IBM i for Full System FlashCopy operation after its has operational library (QZRDHASM) has been restored. Caution should be taken before running this command.

**Node Role:** Special values indicating which role the system will be acting. The possible values are:

- **\*CTL:** The system is a controlling node in Full System FlashCopy.
- **\*SRC:** The system is the source LPAR in Full System FlashCopy.

**FSFC Communications Port:** The port to which the production node will be using for communications. This value must match the FSFC communications port value specified in either CRTCEDTA or CHGCSEDTA that is run on the controlling node. The possible values are:

- **\*SAME:** The value does not change. This is the only valid value for NODETYPE(\*CTL)
- **\*DFT:** The default port (55920) will be used.
- **1 – 65535:** Specify the port number that is to be used.

**Toolkit access code:** A hexadecimal character representation of a Product Access Code supplied by IBM. Specify the access code within single quotes. The access code must be provided in order to authorize any Full System FlashCopy operations. The access code may be entered on this command or entered on the ADDPRDACS CL command. If access code was previously entered, it does not need to be entered again.

**Target line description:** Line description to be created on the target LPAR for communicating with the controlling node. The possible values are:

- **\*NONE:** No line description will be created
- **Name:** The name of line description to be created.

**Target TCP/IP interface:** TCP/IP interface to be created on the target LPAR for communicating with the controlling node. The possible values are:

- **\*NONE:** No interface will be created
- **IPv4 address:** IPv4 formatted interface to be created.

**Target TCP/IP interface Mask:** The subnet mask of the TCP/IP interface to be created on the target LPAR. The possible values are:

- **\*NONE:** No subnet mask provided
- **IPv4 address:** IPv4 formatted subnet mask.

## 6.32 STRFSFLASH - Start Full System Flash

This interactive command starts a Full System Flash Copy (FSFC) or Recovery Point Flash (RPF), as determined by the CSE Data it is performed on. For RPF it will create the flashcopy. For FSFC it will also perform the backup commands specified for the CSE Data. Use WRKCSEDTA or CRTCSEDTA and CHGCSEDTA to configure the FSFC or RPF.

STRFSFLASH for FSFC will perform these steps:

- Power down the target partition, if not already down,
- Flush memory in the source partition using a method specified in the CSE Data.
- Perform the flash of the external storage.
- Activate the source partition if not already up.
- Activate the target partition.
- Perform the backups on the backup partition.

STRFSFLASH for RPF will perform these steps:

- Flush memory in the source partition using a method specified in the CSE Data.
- Perform the flash of the external storage.
- Activate the source partition if not already up.

**CSE Data name:** Specify the name of the CSE Data that contains configuration information for the FlashCopy to be performed.

**Controller IP address:** Specifies the IP address on the controlling node where the processing for the STRFSFLASH command will be performed. The possible values are:

- **\*LOCAL:** The local system is the controller.
- **IP address:** IPv4 formatted address

**Controller port:** The port on which the controller is listening for remote commands. This parameter is ignored for CTLR(\*LOCAL).

## 6.33 STRGMTGTFL - Start a GMIR Target Flash

This command starts Global Mirroring environment D-Copy Target FlashCopy Backup as defined by the WRKCSE GMIR environment.

**Environment name:** This is a required parameter. Specifies the name of the environment for which the backup is to be started.

**CSE Data name:** Specifies the name of the CSE Data used for the flash. The possible values are:

- **\*ENV:** Use the CSE data that is named the same as the environment
- **Name:** The name of a specific CSE data

## 6.34 SWRCYPNT – Switch Recovery Point Copy

The Switch Recovery Point Copy (SWRCYPNT) command causes the Production Node to be powered down, the host connections to be changed to another set of LUNs to which previously a recovery point copy had been written, and the production node powered back up.

**Switch option (SWITCHTYPE):** The possible values are:

- **\*SCHEDULED:** This CSE switch is planned. The Production system is available.
- **\*UNSCHEDULED:** This CSE switch is not planned. The Production system is not available.

## 6.35 VIEWLOG - View Log File

This interactive command allows editing of the Advanced Copy Services log file on the local system and displaying the same on another system. This utility can also view any stream file on the systems.

**System name:** The system where the file is located. The possible values are:

- **\*LOCAL:** View the main log file on the local system.
- **\*SNMP:** View the SNMP log file on the local system.
- **System name:** View the main log file on the named system.

**Stream file:** The specific file to be viewed. The possible values are:

- **\*SNMP:** View the SNMP log file. This option allows the SNMP log file on another system to be viewed.
- **Path and name of the stream file:** The default is /QIBM/Qzrdhasm/qzrdhasm.log

## 6.36WRKCSE - Work with Copy Services Environment

This interactive command allows creation and editing of Flash Copy, Metro-Mirroring, Global-Mirroring and LUN environments defined for use within IBM i Copy Services Manager. Menus are also provided for basic operations. The information is retained in cluster Device Domain Data associated with IBM i Copy Services Manager.

There are no command parameters.

## 6.37WRKCSECRDL - Work with CSE Credential List

This interactive command allows addition, editing, and removal of user credentials needed to establish SSH sessions with a host. Normally the host will be either a SAN Volume Controller (SVC) or a Hardware Management Console (HMC). The information is encrypted using a cryptographic derived 128 bit AES key and retained in cluster Device Domain Data associated with IBM i Copy Services Manager.

There are no command parameters.

## 6.38WRKCSEDTA -Work with IBM i CSE Data

This interactive command provides basic operation to manage CSE Data used for Metro-Mirroring, Global-Mirroring, and Flash environments defined for use within IBM i Copy Services Manager.

**Select:** Select which CSE Data entries are to be displayed. The possible values are:

- **\*CRG:** Display only the CSE Data entries that are complete.
- **\*ALL:** Display all CSE Data entries.

## 6.39ZAPDDDLCK - Zap DDD lock

This is a utility command for releasing the job and user who holds a cluster-wide lock on a specified artifact.

**Name:** Enter the name of the object to display a lock for.

**Type:** Enter the type of object to display a lock for.

