IBM Rochester Systems Lab Services
PowerHA Tools for IBM i

SafeGuarded Copy for IBM i Installation and Users Guide

January 10, 2023
PowerHA Tools version 4.6

6

Introduction

Safeguarded Copy is a function of both Spectrum Virtualize (FlashSystems) and the DS8000 Enterprise storage server. For details on Safeguarded copy, read the following documents

DS8000 - https://www.redbooks.ibm.com/redpapers/pdfs/redp5506.pdf
Spectrum Virtualize - https://www.redbooks.ibm.com/redpapers/pdfs/redp5654.pdf

This manual is for the additional information on setting up the Lab Services PowerHA tools for IBM i functionality to integrate SafeGuarded Copies with IBM i.

Information on setting up CSM and DS8K/Spectrum Virtualize will not be covered in this manual.
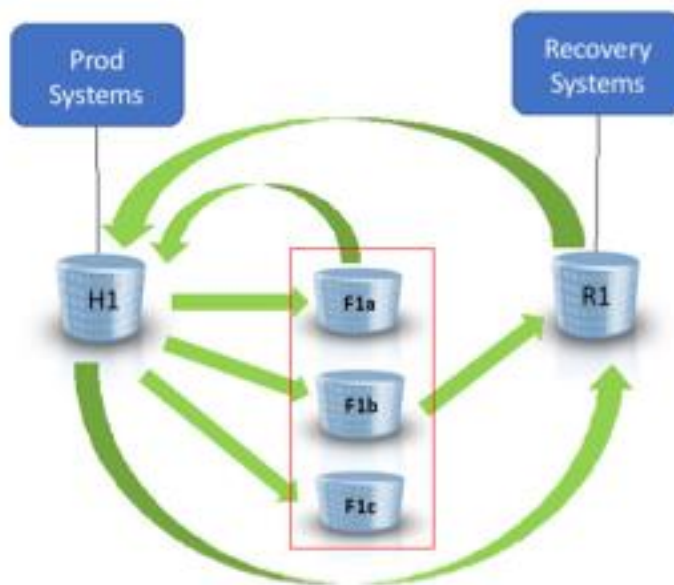
Planning

Planning for a SafeGuarded Copy installation is part of the services engagement associated with purchasing this lab services asset. This includes ensuring that all requirements/restrictions are followed.

A complex variation of SafeGuarded Copy for IBM i is the use of physical isolation along with backups using BRMS at the target site. This kind of implementation will also require PowerHA tools Full system FlashCopy which has been enhanced to support FlashCopies at a Safeguarded physical

isolation target. This manual will not cover the FSFC installation, only the changes required to implement the SafeGuarded function. Refer to the documentation available at http://ibm.biz/FSFC_V2 for details related to FSFC with Physical/Virtual Isolation.

Requirements

Prior to the start of installation, the services representative must ensure the following requirements have been met:

IBM i Release	IBM i Copy Services Manager for Power HA on i 4.6
i 7.2**	Preferred
i 7.3	Preferred
i 7.4	Preferred
I 7.5	Preferred

** New implementations will not be performed on this release as it is extended support only

IBM i Requirements

- Java 8 installed to communicate to CSM.
- PowerHA licenses are required on the partition that will manage the SafeGuarded copy functions. Note that the partition managing the safeguarded copy does not need to be part of any other clustered environment.
- A management node is required if using physical isolation with backups. Use the FSFC manual for requirements for that.
- For DS8K - DSCLI version compatible with DS8000 must be installed on the partitions managing the SafeGuarded copy.
- For Spectrum Virtualize, ssh is used to communicate to the storage.

External Storage Requirements:

- Minimum of DS8888X with code level 8.5. – Preferred DS89XX with 9.2 for enhanced recovery options
- CSM 6.3.1 or above
- If the CSM will use dual control (all actions require a requester and approver), then the CSM server(s) for SafeGuarded copy must be different that the CSM servers managing any replication or FlashCopy

SafeGuarded Copy options on IBM i

SafeGuarded Copy with virtual isolation (DS and Spectrum Virtualize)

SafeGuard Recovery

Prod LPAR

Attach recovery volumes to a partition to retrieve/analyze data or flash the recovery volumes back over production for full system restore

Any recovery point can be restored back to the production volume
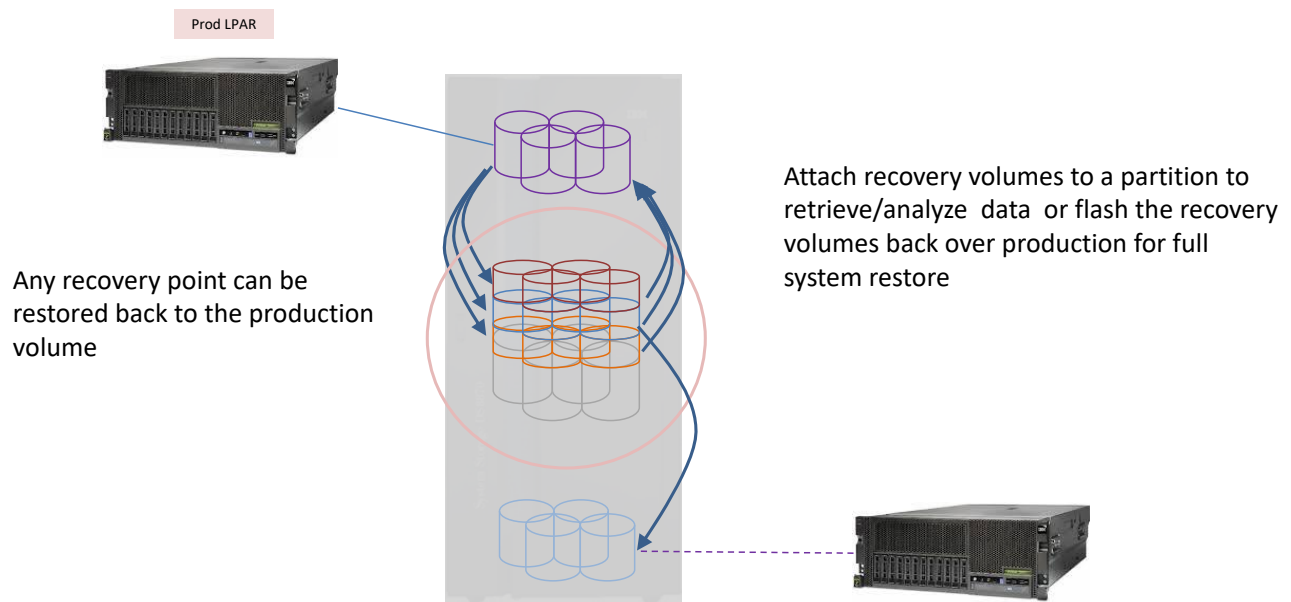
For this kind of SG protection, the PowerHA tools managing partition can on either the production node or a standalone node depending on how the user wants to do to control it.

If a user wants to combine this with a normal FlashCopy for backup, they can use either the FSFC or IASP Manager tools to FlashCopy with no modifications.

SafeGuarded Copy with physical isolation – DS8000 only
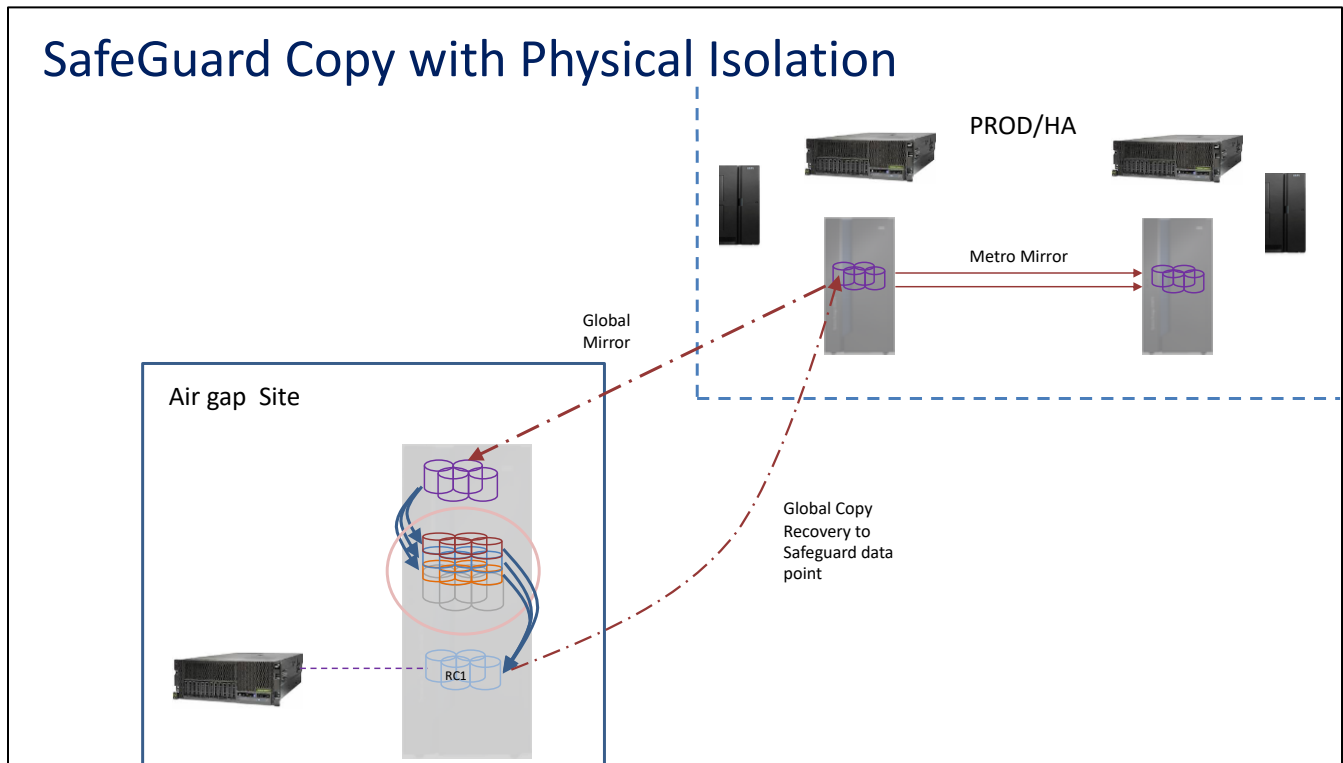
With Physical isolation, the PowerHA tools should run on a partition at the isolated air gap site. It will need to communicate to a CSM server that can connect to the primary DS8K.

Note: There is an RPQ for DS8880 that allows for a second user ethernet adapter to be configured in the DS. This allows for one IP on the regular network, and a second IP to be on a private network for Safeguarded copy management.

SafeGuarded Copy with physical isolation and backups with BRMS at the target site - DS8000 only

SafeGuard Copy with Physical Isolation and Recovery test

PROD/HA

Metro Mirror

CSM managed

Global Mirror

Air Gap Site

Global Copy Recovery to Safeguard data point

Tape library or VTL

- Controlling Partition
- RC2 Partitions for backup
- RC3 partitions for recovery test

RC1

RC2

Recovery 2 Volumes for Backup

RC3

Recovery 3 Volumes for Restore testing
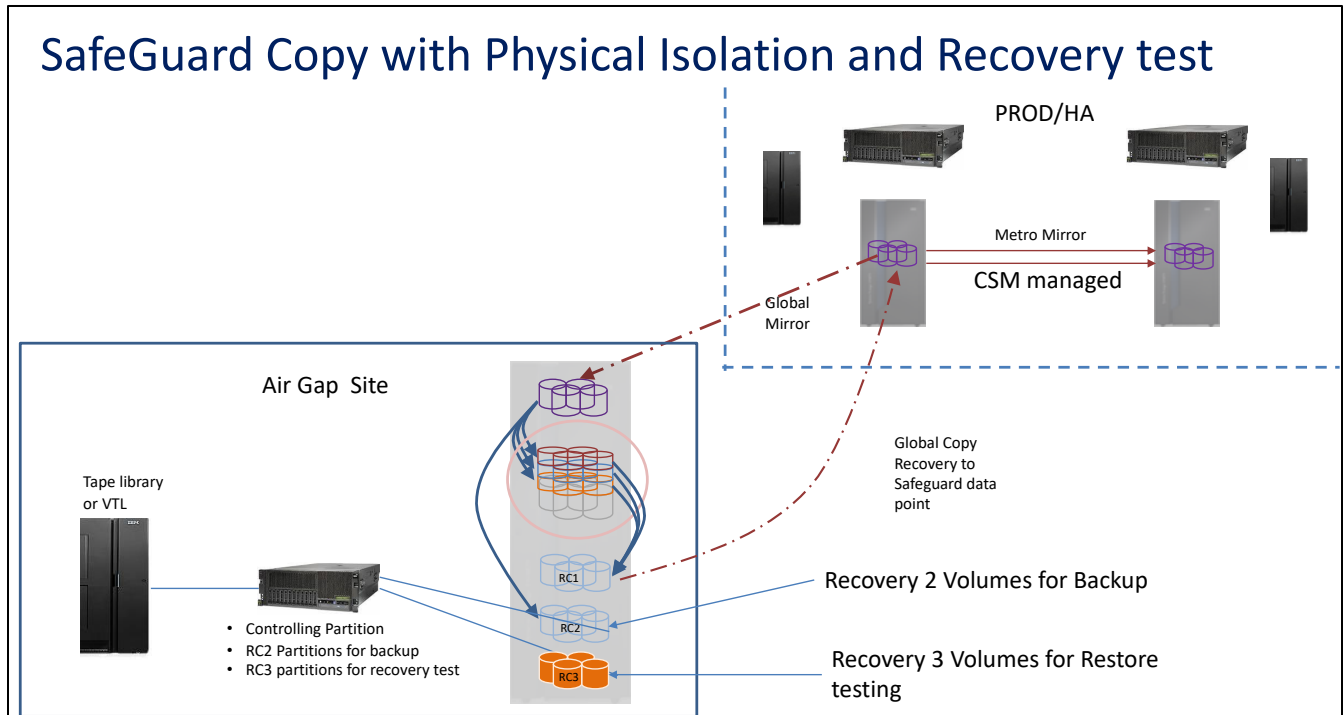
For physical isolation with backups at the target site, the FSFC toolkit is required. Since the airgap site cannot have a partition as part of a cluster, the SG copy must be for the full system to enable the remote system to IPL. FSFC has been updated with special code to manage BRMS as well as calling the STRSGCPY command.

SafeGuarded Copy Supported solutions

PowerHA SafeGuarded Copy can be combined with PowerHA tools replication or PowerHA solutions as well as non IBM solutions like logical replications.

Some solutions are fully contained within the PowerHA SafeGuarded Copy product - which means the tools will check the state of replication prior to performing the SG backup
- Virtual isolation at either source or target of a Metro Mirror or Global Mirror replication
- Physical isolation with a Global Mirror

- Physical Isolation with a Global Mirror off of a Metro Mirror

Other solutions will require custom coding to ensure the consistency of the SG data   i.e SG on a hyperswap target DS, customer code with logical replication etc.

IBM lab services will create the custom code for creating SafeGuarded copies as part of the implementation with the following rules
- The customer owns the code at the end of the engagement
- Any logical replication actions must be done by the customer/business partner

Installation

Quick steps

On the nodes where the SafeGuarded copy will be used:

- Ensure that a profile of QLPAR exists on the system with *JOBCTL, *ALLOBJ, *SPLCTL and *SERVICE   It is preferable this profile have no password so it cannot sign on
- Restore library QZRDHASM (obtained from Lab Services)
- Install the license key product option 91 (obtained from Lab services)
- Configure the CSM properties file on IBM i for the correct port.
- Add storage (DS/SVC) and CSM user ID's and passwords into WRKCSECRDL
- For DS:
  - Configure all the necessary recovery volumes and SafeGuarded space on the DS
  - Configure the necessary sessions in CSM for DS8K
- For Spectrum Virtualize:
  - Configure External Scheduling applications on Spectrum Virtualize
    - Settings->System->External Scheduling Applications must be set to the CSM URL

- Consider disabling or changing the timeout for Volume Protection. Ending recovery will fail to detach/delete recovery volumes if the recovery lpar was active within the volume protection timeframe (usually 15 minutes) of ending recovery.
  - On Spectrum Virtualize GUI see: Settings->System->Volume Protection
    - Create Safeguard copy enabled child pools on Spectrum Virtualize for all pools that contain volumes to be protected
    - Configure volumes groups in the Spectrum Virtualize and assign them a SafeGuard policy
    - Wait for the CSM server to detect and create the SG session
    - (Optional) Disable CSM scheduled tasks (CSM Server Setting->Scheduled Tasks)
- Configure the environments in WRKCSE for SG copies
- Add the DS, Spectrum Virtualize and CSM user ID's and passwords into WRKCSECRDL

Install the QZRDHASM library

Safeguarded copy requires PowerHA tools version 4.6 or above. If the partition where SafeGuarded copy will run already has a version of PowerHA tools installed, then a migration of every environment needs to be performed. This is documented in the IASP manager or Full System Replication/FlashCopy install guides.

Restore the QZRDHASM library with allow object differences *ALL. Then use command RUNSETUP to create the necessary directories etc. This program will fail if QLPAR does not exist.

If a previous version of SG copy was used, then after the install of the PowerHA tools 4.6 library, use an option 2 on each environment in WRKCSE to upgrade it.

Install the license key 91

Use ADDPRDACS to install the license key from lab services on the node where the Safeguarded copy will run

Configure the CSM properties file in IBM i

The file /QIBM/QZRDHASM/csmlib/csmServer.properties controls the ports to connect to for the CSM REST interface. The default is 9559 for all server except for CSM on an HMC. For an HMC, change the port to 443

With PowerHA tools 4.6, each environment can have its own CSM port properties by copying the csmServer.properties into the scripts directory.

Note, it is possible to run with 2 CSM servers on any combination of OS's, i.e. production may be on Windows and the secondary on a DS hmc. In that case the Primary is 9559 and the secondary is 443.

WRKCSECRDL

The CSE credential list is an encrypted file stored in cluster device domain data that can only be retrieved via API.   The data is encrypted so it is safe to pass around the cluster.

For normal CSM use, a *CSM user must be added. If the CSM is on a DS hmc, and dscli is also used, then there must be a *USER for DSCLI access and a *CSM at the same IP for CSM access.

If dual control is enabled, a second CSM authentication is required… then a *CSMAUT user required for the toolkit to use to approve non destructive tasks on the CSM (i.e create a SG copy, failover the CSM server etc)

```
                        Work with CSE Credentials List

 Type options, press Enter.
   1=Add   2=Change   4=Remove    6=Validate

 Opt     IP Address          Role        User ID            Description

         1.1.1.3             *USER       powerha            DSCLI
         1.1.1.3             *CSM        csmadmin           CSM
         1.1.1.3             *CSMAUT     csmauth            CSM Authentication
         1.1.1.5             *USER       svcuser            SVC user profile
```

Configuring SafeGuarded Copy sessions in WRKCSE for DS8000

To configure a SafeGuarded Copy environment in WRKCSE for DS8000, you will need to know the following information depending on what kind of environment is being configured

- For a logical isolation environment, you will need the production volumes, the recovery volumes and the CSM Safeguarded session name
- For Physical isolation, you will need the same information as logical isolation plus the Global Mirror Session name in CSM.
- The number of Safeguarded copies to keep active
- The DS8000 image ID, user and password
- The CSM user and password (2 if Dual control will be used… 2 different people should input these)

Other inputs like the frequency of copy, length of max time keeping a copy, source or target of replication are part of the custom programming around the environment.

When creating a Safeguarded Copy for IBM i, the Expire backup on auto roll should be checked. IBM i need all volumes to be consistent to so there is no benefit to leaving this unchecked. This will help create space for other SG copies if one volume runs out of space and auto removes the oldest SG copy by removing all volumes in that set.

Note that the default is unchecked.
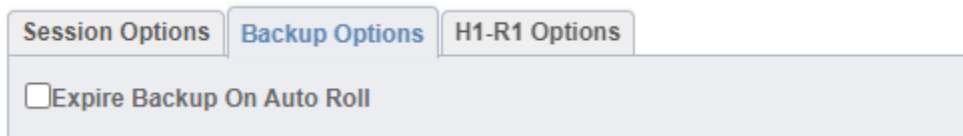
Session Options | Backup Options | H1-R1 Options

☐Expire Backup On Auto Roll

Create a Safeguarded Copy Environment

WRKCSE

Use option 1 to add a new environment.   The following screens show all the options on the first display panel. Each option needs Enter pressed after selecting it.

```
                          Add an Environment


Enter Copy Service Type
```

```
Environment name . . . . :    NEWSG
Copy Service Type  . . . .    FLASH          FLASH, GMIR, LUN, MMIR
Storage Type . . . . . . .    DS8K           DS8K, SVC
Primary ASP  . . . . . . .    *SYSTEM        33 - 255, *SYSTEM
```

On the next panel, change CSM Safeguarded copy to *YES then press enter to see more parameters

```
                          Create a FLASH environment
 Type choices, press Enter.

 Environment name . . . . . :   NEWSG
 Storage Type . . . . . . . :   DS8K

 Primary ASP  . . . . . . . .    *SYSTEM                  33 - 255, *SYSTEM

 CSM Safeguarded copy /
   FlashCopy  . . . . . . . .   *YES                      *YES, *NO

 FlashCopy DS unit information:
   Device . . . . . . . . . .                             Name

 DS unit SMC information:
   Flash hmc1 . . . . . . . .                             IPv4
   Flash hmc2 . . . . . . . .                             IPv4
   Port . . . . . . . . . . .   1751                      1750, 1751


                                                                      More...
 F1=Help   F3=Exit   F12=Cancel

```

Note: This screen is the same for both SafeGuarded Copy and or a FlashCopy which is controlled by CSM.

For a logical isolation environment, only fill in the CSM Safeguarded session name
For a physical isolation with a standalone Global Mirror, also fill in the CSM GMIR session name
For a physical isolation with a BRMS backup, also fill in the CSM FlashCopy session name

Enter the max number of Safeguarded copies to be kept for this environment
Chose the action to perform when a Safeguarded copy is requested and the max number of sessions already exists, the default is to expire the oldest Safeguarded copy.


```
                          Create a FLASH environment
 Type choices, press Enter.

 Environment name . . . . . :   NEWSG
 Storage Type . . . . . . . :   DS8K

 Primary ASP  . . . . . . . .    *SYSTEM                  33 - 255, *SYSTEM
```

```
CSM Safeguarded copy /
  FlashCopy  . . . . . . . .   *YES                        *YES, *NO
  CSM Primary server . . . .   1.1.1.1                     IPv4
  CSM Secondary server . . .   2.2.2.2                     IPv4
  CSM Safeguard session name
  MYSGCPY                                                  Name, *NONE
  CSM GMIR session name  . .   *NONE                       *NONE, Name
  CSM FlashCopy session name   *NONE                       *NONE, Name
  Max number of Safeguarded
    copies . . . . . . . . .   11                          2-500
  Action when max copies
    exceeded . . . . . . . .   *EXPIRE                     *EXPIRE, *FAIL

FlashCopy DS unit information:
  Device . . . . . . . . . .   IBM.2107-75xxxx             Name

 DS unit SMC information:
  Flash hmc1 . . . . . . . .   1.2.2.2                     IPv4
  Flash hmc2 . . . . . . . .   2.3.3.4                     IPv4

 Comment:
  Text . . . . . . . . . . .
```

* Multiple screens have been joined for clarity in the above figure

Notes.
1. The Session names for CSM sessions are case sensitive.
2. Session names in WRKCSE are limited to 40 char which is shorter than those allowed by CSM.

The DS information is required to communicate directly to the DS8000 to retrieve volume specific information like SafeGuarded copy space usage that is not available via REST API's only.

For information on setting up FSFC for physical isolation, use the FSFC version 4.6 manual which includes a section titled Physical-Virtual Isolation (PVI) for Production LPARs

Configuring SafeGuarded Copy sessions in WRKCSE for Spectrum Virtualize

With Spectrum Virtualize, Safeguarded Copy is typically Virtual Isolation as PowerHA for IBM i does not support any 3 site solution. Therefore, the replication is used for high availability/disaster recovery, and the Safeguarded Copy is performed on either the source, target or both storage units.

Safeguarded Copy can be performed at either a system level or an IASP level. It is usually recommended to protect the entire system if systems are using PowerHA and IASP's.   In this way the entire system can be recovered quickly.

To configure a SafeGuarded Copy environment in WRKCSE for Spectrum Virtualize, you will need to know the following information depending on what kind of environment is being configured

- For a logical isolation environment, you will need the CSM Safeguarded session name and SG Flashcopy IP
- The default duration for a SafeGuarded Copy
- The Spectrum Virtualize userid and password
- The CSM user and password (2 if Dual control will be used… 2 different people should input these)

CSM Scheduled Tasks

For SVC SG Copy environments, the CSM scheduler must be disabled to prevent CSM from making copies. On the CSM server go into Settings→Scheduled Tasks

Create a Safeguarded Copy Environment

WRKCSE

Use option 1 to add a new environment. The following screens show all the options on the first display panel. Each option needs <Enter> pressed after selecting it. A Storage Type of SVC has the same four parameters.

```
                         Add an Environment

Enter Copy Service Type

Environment name . . . . :   NEWSG
Copy Service Type  . . . .   FLASH          FLASH, GMIR, LUN, MMIR
Storage Type . . . . . . .   SVC            DS8K, SVC
Primary ASP  . . . . . . .   *SYSTEM        33 - 255, *SYSTEM
```

On the next panel, change CSM Safeguarded copy to *YES then press enter to see more parameters

```
                      Create a FLASH environment
Type choices, press Enter.

Environment name . . . . . :   NEWSGC
Storage Type . . . . . . . :   SVC

Primary ASP  . . . . . . . .   *SYSTEM                  33 - 255, *SYSTEM

CSM Safeguarded copy /
  FlashCopy  . . . . . . . .   *YES                     *YES, *NO
  CSM Primary server . . . .   1.1.1.1                  IPv4
  CSM Secondary server . . .   2.2.2.2                  IPv4
  CSM Safeguard session name
  MYSGCSSN_____         Name, *NONE
  CSM FlashCopy session name  *NONE                     Name, *NONE
  Default retention period    1                         1-365

Flash SVC IP Address . . . .   3.3.3.3                  IPv4
```

Note: This screen is the same for both Safeguarded Copy and regular FlashCopy using CSM

We do not support CSM FlashCopy for BRMS at this time with the SVC Safeguarded Copy as that is a physical isolation function.

Notes.
1. The Session names for CSM sessions are case sensitive.
2. Our session names are limited to 40 char which is shorter than those allowed by CSM.

If automated recovery is desired, then use opt 16 against the environment to add the hosts for the recovery partition. Volumes should be left blank – they will be assigned automatically as needed during recovery.

Configuring Recovery Partitions

Considerations

Recovery partitions are lpars dedicated to running a recovered copy of a Safeguarded backup for the purposes of data validation, etc. Best practice is to use recovery partitions to regularly validate backups to detect potential undetected problems with the data and to ensure that all necessary data is available and recoverable in the event of an incident.

Recovery partitions are typically used to IPL crash consistent exact byte for byte copies of the originally backed-up system disks. These are point in time backups with no pre-backup preparation, so unless special steps are taken *on the source system before the backups*, starting a recovery partition is like starting an identical copy of your production systems on the same network unless steps are taken in advance to prevent that.

Startup Programs

The inability to notify the Source LPAR of an impending SG copy also means that no preparation to the Start Up program (system value QSTRUPPGM) and IPL attributes (CHGIPLA) is possible. These values must be set such that every time the Source or recovery LPAR IPLs it must be able detect where it is running and take appropriate actions.

The Toolkit command CFGSTRPRSC must be added to the very start of the Source LPAR startup program. This command will determine where the LPAR IPLs using information from WRKSTRPRSC. If it detects that it is IPLing as a Production LPAR it will modify the resources for that role and continue with the remainder of the startup program. However, if it detects it is running on the recovery lpar, it will activate the correct IP address(es) and return a

Autostart Entries

Examine the controlling subsystem auto-start entries (WRKSBSD opt 3) to determine whether they will start unwanted applications on the recovery LPAR. There should always at least the startup program (QSTRUPJD) autostart entry, but if additional autostart entries are used, consider moving these to the startup program, after CFGSTRPRSC, so that they are only processed if this isn't a recovery LPAR IPL.

System name vs. LPAR name

The system name is stored in *SYSBAS via the CHGNETA command, thus when the Target LPAR is active, it sees its system name as that of the Source LPAR. The LPAR name is stored in the hosting HMC and is not modified during the recovery process. Users logging on to the recovery partition will see the original system name, and any code that is conditional on the system name will believe it is on the original system.

System serial number and software licensing

The serial number is stored in the hardware and if the Target LPAR is on a different system, the serial number will be different between the source and recovery LPARs. Licenses for 3rd party software that depend upon a specific serial number may need to be adjusted after a switch if that software is needed to perform any desired validation.

IP addresses

It is important not to start any TCP/IP interfaces with IP addresses that conflict with the source system, so the active IP addresses and subnet of a recovery LPAR may need to change as part of a switchover. The IP addresses and line descriptions for the recovery LPAR must be configured on the Source LPAR so that after a Flash Copy, they are available to the recovery LPAR. Changes to the startup program are required to control which line descriptions and IP addresses are activated on the source or recovery LPARs.

Please note that unlike the FSFC toolkit, it is not practical to change startup programs before a SG copy is made, so changing the source system startup program is mandatory. The WRKSTRPRSC and CFGSTRPRSC commands are provided to simplify this process.

Clustering

If the SG copy source system is part of a cluster, the recovery system should be removed from the cluster in the startup program to avoid problems with PowerHA.

Journaling

Safeguarded backups are point in time crash consistent backups that are typically taken without any force write or quiesce process on the source system. The SG copy will appear to the recovery LPAR as an immediate crash, with any data or transactions still cached in memory lost. To mitigate any damage to important files or partial database transactions, all important user data should be journaled, or the applications should have logic to detect and repair mid-transaction failures.

Startup program changes

The source LPAR's startup program should be modified to include code similar to:

```
        DCL         VAR(&IPLTYPE) TYPE(*CHAR) LEN(5) VALUE('?????')
        /* BEGIN POWERHA TOOLS FOR IBM I */
```

```
            QZRDHASM/CFGSTRPRSC RTNVAR(&IPLTYPE)

            IF          COND((%SST(&IPLTYPE 1 3) *EQ '*FC') *OR +
                           (%SST(&IPLTYPE 1 5) *EQ '*DTCH') *OR +
                           (%SST(&IPLTYPE 1 5) *EQ '??????')) +
                           THEN(RETURN)

            IF          COND(%SST(&IPLTYPE 1 3) *EQ '*SG') THEN(DO)
            /* Optional – specific to SG Copy */
            DLTCLU      CLUSTER(yourclustername)
            MONMSG      MSGID(CPF0000)
            VRYCFG      CFGOBJ(youriaspname) CFGTYPE(*DEV) STATUS(*ON)
            MONMSG      MSGID(CPF0000)
            STRTCP
            MONMSG      MSGID(CPF0000)
            RETURN
            ENDDO
        /* End POWERHA TOOLS FOR IBM I */
```

CFGSTRPRSC will configure the line descriptions for the current role (WRKSTRPRSC in the next section will determine which resources to change). It is therefore necessary to delay starting TCP until after CFGSTRPRSC, and only for source IPLs.

- CHGIPLA STRTCP(*NO)

Review the controlling subsystem for any autostart entries which should NOT be started on the target LPAR. Find alternative methods of starting those applications.

- DSPSBS QSYS/QCTL opt 3
  o Should only have QSTRUPJD

If CFGSTRPRSC determines that the prior IPL was on the same hardware and it was already configured, it will skip any additional processing and exit. This information is stored in data area QZRDHASM/LASTCONFIG. Removing this data area prior to calling CFGSTRPRSC will force the toolkit to re-configure the LPAR.

WRKSTRPRSC

WRKSTRPRSC is the command used by the Toolkit to indicate which resources need to be changed. The changes are affected by CFGSTRPRSC in the startup program.

System Information Entries
The System Information Entries uses the Serial and LPAR numbers to determine where the LPAR is IPLing, and link with the information in other panels of WRKSTRPRSC.

```
              Work with System Information Entries

Type options, press Enter.
```

```
  1=Add    2=Change    4=Remove

             Serial     LPAR     Default
Opt    Usage   number     number   CSEDTA       Comment

       *SG01   10F3DDR    19       *NONE        Safeguard Recovery
       *PS     10001AP    5                     Production LPAR
```

In the example above, if the LPAR is IPLing on serial number 10001AP and lpar number 5, when CFGSTRPRSC is called from the startup program, all WRKSTRPRSC usage linked to the preferred source (*PS) will be activated. CFGSTRPRSC will return *PS.

If the LPAR is IPLing on serial number 10F3DDR and LPAR number 19, when CFGSTRPRSC is called from the startup program, all WRKSTRPRSC usage lined to *SG01 (Safeguard 01) will be activated. It will lookup the communications, BRMS, and routing information for that usage (see the following screens and configure the lpar to match. CFGSTPRSC will return *SG01, causing the start up program to execute the code conditioned on *SG before continuing. Note that it may be desirable to bypass the rest of the startup program, or to perform specific actions such as starting TCP. If that is the case, additional instructions can be conditioned by the &IPLTYPE variable.

Additional entries such as IPLing at the preferred target (*PT) can be configured if Full System Replication is used, or *FCxx if there are multiple FlashCopy targets it might IPL on for other toolkit use cases. See the appropriate manual for those details.

Communications Startup Resources

Depending on where the LPAR is IPLing, it may be desirable to differentiate which communications interfaces to start. Use this panel for that.

```
             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

     *PS    9.5.167.148     ETHLINE     U8233.E8B.10001AP-V23-C3-T1     0
     *SG01  9.5.95.152      SGLINE      U8231.E1D.10F3DDR-V7-C2-T1      0
```

In our example above, if the System Information Resource Panel determines that the LPAR is IPLing as *SG01 (Safeguard recovery partition 1), it will:

- Disable all other IP interfaces and line descriptions
  - Only performed once if there is a match in the WRKSTRPRSC table
- Find the IOA at the location code specified
- Retrieve the communication resource (CMNxx) associated with that IOA
- Modify line description SGLINE to use that resource and change VARYON(*YES)
- Change IP interface 9.6.95.152 to AUTOSTART(*YES)

When CFGSTRPRSC returns control to the startup program, the subsequent call to STRTCP will activate the correct IP interfaces.

The *SGxx and *PS LPAR Usage behaves similarly. If multiple IP addresses are required, multiple entries with the same LPAR Usage can be specified. If there is no entry for the current LPAR Usage then there will be no changes to the line descriptions or IP interfaces.

Obtaining the Hardware Resource Location can be done using several methods:

- IPL the target LPAR into manual mode and restricted state and use WRKHDWRSC *CMN option 7 to view it
- Use the information in the HMC
- Extrapolate the information from source LPAR resources:
  - o U8233.E8B.10001AP-V4-C2-T1) consists of:
  - o U8233.E8B = CEC information
  - o 10001AP = serial number
  - o Vxx = LPAR number xx
  - o Cyy = slot number yy

For virtual IP's specify *VIRTUALIP instead of a line description.

Using SG Copy with IBM i

Note, some of these screens will vary between DS8000 and Spectrum Virtualize

WRKSGCPY

```
                        Safeguarded Backups

   Environment name . . . :   NEWSG
   CSM session name . . . :   MYSGCPY
   Backup recovery option :   No Copy
   Minimum time between copies:   1
   CSM Retention period . . . :   10080
   Background copy rate . . . :   50


 Type options, press Enter.
   4=Expire*   6=Recover   7=End recovery


 Opt     Backup ID     Backup Time                  Copy Sets     Recoverable
```

```
_       1553803517      2019-03-28 15:05:17 CDT            4          Yes
_       1553803749      2019-03-28 15:09:09 CDT            4          Yes
_       1553804035      2019-03-28 15:13:55 CDT            4          Active
_       1553804144      2019-03-28 15:15:44 CDT            4          Yes
_       1553885737      2019-03-29 13:55:37 CDT            4          No



                                                                  Bottom
 Command:
 ===>
 F1=Help    F3=Exit    F5=Refresh    F6=Create Backup    F9=Retrieve    F12=Cancel
 F13=End Recovery    F14=Display volume capacities
```

*Opt 4 is not available on Spectrum Virtualize
*Opt 7 is only shown if there is an Active recovery

The WRKSGCPY display is used to display and manage an SG copy from IBM i without need to sign onto CSM. All current SG copies are displayed on this panel. If an SG copy is Recoverable *NO, then it means there is a failure on that copy - possibly auto expire by the storage due to space constraints etc.

At the top of the screen, the "Backup Recovery option", "Minimum Time between backups", "CSM retention period", "CSM retention period" and "Background Copy rate" are all retrieved from the CSM server and displayed for informational purposes. The specific values displayed differ between DS and Spectrum Virtualize based setups. These cannot be changed from IBM i.   To alter these values, sign into the CSM and modify the parameters of the environment… this will force dual control to approve these changes if implemented.

Function key F6 from the WRKCSGCPY screen can be used to create a SG backup manually.   It will perform the same actions as the STRSGCPY command. The STRSGCPY command will typically be used on a job scheduler or embedded in a custom automation program that is scheduled. If an environment has custom coding around making a SafeGuarded Copy, this F6 option should not be used.

The Background Copy Rate is how the recovery volumes will be used. Typically, this should be set to 0. If not 0, then fully provisioned volumes need to be planned for.

Recovery is performed by either:

    1) Using an option 6 against a backup from the WRKSGCPY display.
    2) Using the STRSGRCY command interactively or in custom automation code.

Either recovery process will start a recover action from CSM which will make a set of recovery volumes available. The Recoverable column will show Active for the current recovered backup. Using a 6 or STRSGRCY for a different backup will fail if a recovery is already in progress.

For DS8000 - the recovery is performed onto the defined recovery volumes, which should be mapped to a recovery LPAR.

For Spectrum Virtualize – the recovery dynamically creates a new set of FlashCopy volumes in the primary pool. If recovery hosts are configured in WRKCSE Option 16, then the recovery volumes are evenly distributed to the defined hosts. The recovery cannot be started if any volumes are already mapped to the specified hosts. This can happen because of misconfiguration, or if the end recovery fails to remove the mappings due to enabled volume protection on Spectrum Virtualize.

Spectrum Virtualize allows for multiple recoveries at the same time for a Safeguarded copy environment, however each recovery is a new set of LUNs in the primary pool. The PowerHA tools will only allow for one recovery at a time to limit the possibility of running out of space in the primary pool.

Recovery volumes should not be left in a recoverable state as it will impact the ability to create new SG copies since an SG copy that is in recovery cannot be deleted

To end recovery, use F13 or the ENDSGRCY command.

Warning… Do not change the recovery volumes or end recovery if they are attached and in use by an IBM i partition

For DS8000 Option 4 can be used to expire an SG copy. Since only the latest SG backup can be expired, *selecting option 4 on any SG copies other than the last one will result in multiple SG copies being deleted*. An F16 is required to confirm expiring SG copies.

There is no command to expire copies, it must be performed from the WRKSGCPY screen or CSM directly.

Note: Opt 4 will fail if dual control is enabled on CSM!

```
                       Confirm Expire of Backup(s)

 Note: Selecting a backup to expire will automatically cause all backups older
 than the selected backup to also be selected to expire.  If only one backup
 is shown, no older backups exist.
 Press F16 to confirm your choices for 4=Expire.
 Press F12 to return to change your choices.

 Backup ID       Backup Time                   Copy Sets       Recoverable
 1553803517      2019-03-28 15:05:17 CDT           4            Yes
 1553803749      2019-03-28 15:09:09 CDT           4            Yes
 1553804035      2019-03-28 15:13:55 CDT           4            Yes
```

F14 will display the volumes usage. The results are different for DS and Spectrum Virtualize.

F14 for DS uses DSCLI to the DS to query the SG space used for each volume. This can be a long running command

```
                      Display % Volume(s) Capacity Used

   Environment name . . . . . . . . . . . :    SGGMTEST
   Total logical capacity (TB)  . . . . :    1.56
   Total percent logical used . . . . . :    .07
   Total physical cap available (TB)  . :    10.34


            Disk         Safeguarded        Safeguarded
   VolId    size        capacity (GB)      capacity used       % used
   D400      85             130                   .10             .07
   D401      85             130                   .10             .07
   D402      85             130                   .10             .07
   D410      85             130                   .10             .07
   D411      85             130                   .10             .07
   D412      85             130                   .10             .07
   D500      85             130                   .10             .07
   D501      85             130                   .10             .07
   D502      85             130                   .10             .07
   D510      85             130                   .10             .07
                                                                  more
```

Total logical capacity (TB) is the configured capacity (either by cap or multiplier) that was configured for the SafeGuarded Copy space
Total percent logical used is how much of the logical space used
Total physical cap available (TB) is the available space in the EXTPOOLs where the SG space is configured

- If the logical space fills up, then the DS will auto expire SafeGuarded copies to make room for new ones.
- If the physical space fills up, then the host may pause until space is available. This should be monitored and avoided!

For Spectrum Virtualize, option F14 will display the SG pools usage. This function queries the Spectrum Virtualize for the space used by each SG pool. This can be a long running command.

```
                        Display % Volume(s) Capacity Used

Safeguarded              Total percent      Total physical cap      Number
Disk Pool                    used            available (TB)       SG volumes
SGCPY                         .00                 2.14                0
SGTest                        .00                  .16                0
```

Total Percent used is the percentage of the physical capacity of the pool that is in use.
Total physical capacity available (TB) is the total capacity assigned to the SG child pool during creation.
Number of SG volumes is the number of SG copy volumes in the pool.

STRSGCPY

STRSGCPY will perform all the actions to create a SG copy for both logical and physical isolation as follows

- A new SG copy is taken
- **Retention Period (RETENTION) is a SVC only parameter.** For DS, use the CSM session properties to assign when copies should be automatically discarded.
- DS Only:
    - If a Global Mirror session is provided in the environment, the Global Mirror will be paused with consistency before the SG copy is taken.
    - If the max number of SG copies is exceeded by the new copy, the oldest will be expired (even with dual control so ensure the minimum frequency between copies is set appropriately)
    - If a Flash session is provided, a new flash will be taken
    - If a Global Mirror session is provided, the Global Mirror will be resumed.

STRSGRCY

```
                    Start Safeguard Recovery (STRSGRCY)

Type choices, press Enter.
```

```
Safeguard Environment  . . . . .                    Name
Backup ID  . . . . . . . . . . .    *LAST            Character value, *LAST
```

DS8000:
This command will first check to ensure there is no active recovery. If one is found the command will
fail.   If no active recovery is found, the selected backup will then be recovered to the configured
recovery volumes.

SVC
This command will first check to ensure there is no active recovery. If one is found the command will
fail.   If no active recovery is found, the selected backup will then be recovered to dynamically created
Flash copy volumes. If the host connection list is configured in WRKCSE, the dynamically created
volumes will be mapped to the specified hosts with an approximately equal number of volumes per
host.

Note: for Spectrum Virtualize, this command will fail if there are any volumes mapped to the specified
hosts before the recovery is started. This can be caused by misconfiguration, or by an end recovery that
failed to unmap and delete volumes because volume protection is enabled.

ENDSGRCY

```
                    End Safeguard Recovery (ENDSGRCY)

 Type choices, press Enter.

 Safeguard Environment  . . . . .                    Name
```

ENDSGRCY will end the active recovered SG copy

For SVC, ending the recovery will result in the volumes being unmapped from the hosts.

NOTE - it is important to consider Volume Protection (Spectrum Virtualize GUI -> Settings -> System
-> Volume Protection) in relationship to ending recovery on a SG copy. If Volume protection is active
(the default), any attempt to end recovery in less than the configured time period (15 minutes default)
after the LPAR is shutdown will result will require manual intervention to detach and delete the
recovery volumes. The options to prevent this situation are:

   1) Disable volume protection globally:

Volume Protection

Volume protection prevents active volumes from being deleted or unmapped from hosts if the system detects recent I/O activity within a certain interval. For example, if volume protection is set for 30 minutes, any volume cannot be unmapped or deleted for 30 minutes after the last I/O activity.

Enable volume protection on this system.

(●) Disabled

2) Automate the recovery lpar shutdown and ENDSGRCY to include a delay between lpar shutdown and ENDSGRCY command more than the defined volume protection duration. Please note that the volume protection duration can be configured in the Spectrum Virtualize GUI:

Volume Protection

Volume protection prevents active volumes from being deleted or unmapped from hosts if the system detects recent I/O activity within a certain interval. For example, if volume protection is set for 30 minutes, any volume cannot be unmapped or deleted for 30 minutes after the last I/O activity.

Enable volume protection on this system.

(●) On

Protection duration (minutes)

15   − | +

3) Disable volume protection only for the pools(s) that contain the recovery volumes.
   a. Please note that the default is to place the recovery volumes in the parent pool. It cannot be placed in the safeguard copy pool, but it can be placed in another pool if this is desired. This can be modified in the properties of the CSM session on the CSM server:

| Session Options | Recover Options |

Backup Recovery:

Background copy rate for B1-R1
`50`   (0-150)

Recovery Pool

-source pool- ∨
Pool0
-source pool-

   b. If you select Enabled for Volume protection, you can control the volume protection settings by pool:

Control the pools to which volume protection will apply.

Actions ▼	Default ⌄	Contains ⌄	Filter	
Pool		Volume Protection		
Pool0		⬤ Disabled		
SGCPY		🔵 Enabled		

Other Commands/APIs

CLEANLOGS

CLEANLOGS is used to trim the log files kept by PowerHA tools. It can remove the logs entirely with *NONE, or keep the entries from a number of days

It is recommended to clean the logs periodically to ensure they do not take up too much space on the system.

IPLLPAR – 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.

- ***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.

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'

RTVLPARSRC – Retrieve LPAR Reference Code

This command issues commands to an HMC to retrieve the current state, SRC, and keylock setting of a partition.

Partition: The name of the HMC partition.

Managed system: The name of the managed system containing the partition.

HMC IP address: The IP address of the HMC that manages the managed system and partition.

SRC: Specifies the name of a variable which will contain the SRC and state of the partition. In a CL program this should be a character variable with a length of 24 bytes. Upon successful completion the SRC will be returned in positions 1 - 8. Position 9 will contain keylock setting. It will be set to 'N' for normal, 'M' for manual, or '?' for undetermined. The state will be returned in positions 10- 24.

STOPLPAR – Shutdown LPAR from HMC

This command issues the command to an HMC to immediately shut down a partition.

Partition: The name of the HMC partition.

Managed system: The name of the managed system containing the partition.

HMC IP address: The IP address of the HMC that manages the managed system and Partition.

Asynchronous shut down: Specifies whether the partition is shut down synchronously or asynchronously. The possible values are:

*YES
 The shut down is asynchronous.

*NO
 The shut down is synchronous.

Confirm: Specifies whether the request should be confirmed before the partition is shut down.

 *YES
 A confirmation panel is displayed when the STOPLPAR command is issued in an interactive job. An inquiry message is sent to QSYSOPR when the STOPLPAR command is issued in a non-interactive

job.

*NO
    There is no confirmation when the STOPLPAR command is issued.

WRKSTRPRSC -Work with Startup Resources

This interactive command provides the information for the toolkit to use. It should be executed on the *source LPAR*. The information is used by the command CFGSTRPRSC, which must be in the QSTRUP startup program. Please note that this data is not replicated via a cluster, so it must be configured on each partition that is the source of a SG copy.

There are five main panels on WRKSTRPRSC which can be selected on the command or cycled through using F11. The common element that ties the records together is the LPAR Usage. Once the toolkit (CFGSTRPRSC) determines the current LPAR Usage, the rules on the remaining panels apply to when the LPAR is used in that role. Some LPAR Usage identifiers allow for multiple variations; for example, you can have two preferred source LPARs (*PT01, *PT02) depending on which serial number it is running on.

If the toolkit cannot determine the current role of the LPAR it will exit without performing any modifications.

The panels are:

- ***SYS:** Determine the LPAR Usage based on the serial and LPAR numbers.
  - ***PSxx:** Preferred Source – where your production LPAR is normally running.
  - ***PTxx:** Preferred Target – where the target LPAR can run after a roleswap
  - ***SGxx:** Safeguarded Copy – used when recovering from a Safeguarded Copy.
  - ***FCxx:** Flashcopy Target – where the backups will occur after a Safeguarded Copy.
  - **Default CSEDTA**: Used for PVI configurations to determine which configuration to use for flashcopy backups.
- ***CMN**: Determines which communications resources to bring online. All other lines and IP addresses are left offline.
  - **Usage**: Indicate the role in which these resources will be used
    - ***PSxx:** Activated when the serial and LPAR numbers match the system usage for the preferred source.
    - ***PTxx:** Activated when the serial and LPAR numbers match the system usage for the preferred target.
    - ***SGxx:** Activated when the serial and LPAR numbers match the system usage for the Safeguarded Copy for recovery.
    - ***FCxx:** Activated when the serial and LPAR numbers match the system usage for Safeguarded Copy for backups.
    - ***CTL1:** The IP for the primary controller. Used by CFGSTRPRSC in a PVI configuration to reach the controllers. STRFSFLASH CTLR(*AUTO) will use

> this entry first to find a working controller. Hardware Resource Location is not used.
>> ▪ ***CTL2:** The IP for the secondary controller. Used by CFGSTRPRSC in a PVI configuration to reach the controllers. STRFSFLASH CTLR(*AUTO) will use this entry to find a working controller if the primary is not reached. Hardware Resource Location is not used.

- o **IP Interface:** Specifies the IP interface to be activated and set to autostart when the LPAR is in the specified role. The IP address must exist on the source LPAR.
- o **Line Description:** Specifies the line description to be activated and set to autostart when the LPAR is in the specified role. The line description must exist on the source LPAR.
  - ▪ ***IPADDR:** Use the line description currently assigned to the specified IP address.
  - ▪ ***VIRTUALIP:** The specified IP address is virtual and does not have a line description associated with it. Start this IP address after all preceding IP addresses have been started. The Hardware Resource Location must be *NONE.
- o **Hardware Resource Location:** Indicates the hardware resource location that will be associated with the specified line description.
  - ▪ ***LINE:** Use the resource location currently associated with the specified line description.
  - ▪ ***NONE:** No hardware resource location is specified. This is only valid for *VIRTUALIP
- o **Port:** Specify the port of the resource if necessary.
  - ▪ ***DFT:** Use the location code to determine the port number.

- ***STG:** Determines the tape storage resources to configure based on the usage of the LPAR.
  - o **Usage:** Configure the resource for the specified LPAR usage.
  - o **Device Description:** What the toolkit will vary on and is expected to be used in the backups (WRKCTLGBRM etc).
  - o **Device Type:** Indicate whether the device is media library (*MLB) or tape drive (*TAP). If *DEV is specified, the toolkit will use the type which the device description refers to.
  - o **Serial Number:** Enter the serial number of the tape resource. The toolkit will find the resource name (TAPMLBxx) associated with this serial number (it must be operational) and change the specified device description to it.

- ***BRM:** Change the specified BRMS attributes. For example, you can change the location associated with a device, or the devices used by a control group, etc based on where the LPAR is IPL'ing. Note that only a handful of objects and attributes can be changed. See also the CHGBRMSOBJ command which has similar functionality.
  - o **Usage:** Apply this rule to if the LPAR usage matches.
  - o **Object Name:** The name of the BRMS object to change
  - o **Object Type:** The type of BRMS object to change
  - o **Attribute:** Which BRMS attribute to change
  - o **New Value:** The new value for the specified attribute

- ***RTE:** Routing entry changes based on LPAR usage. If there are any new routes for a specific LPAR usage, then *all the existing routes (CFGTCP opt 2) will be removed*. The new routes will be created.
  - o **Usage:** Apply the new route if the LPAR usage matches.

- o **Destination:** The route destination (IP or subnet)
- o **Subnet Mask:** The destination subnet mask.
- o **Next Hop:** The next hop in the network for the packet destined for the network
- o **Preferred Interface:** Which interface to use to send these packets

QZRDIARSGC – Retrieve SG Copies

QZRDIARSGC is an API to retrieve the information about SG copies. There is a CL sample for using this API in member RTVBKPCPYI in the QCLSRC file in QZRDHASM.

QZRDIARSGC requires 3 parameters
Environment name   INPUT   CHAR 10
Return space   OUTPUT CHAR [enough space to handle the proposed number of copies]
Length our return space   INPUT   INT 4

```
/* The first 80 bytes of the return space is a header that contains    */
/* information about the list.                                         */
/*                                                                     */
/* Format of data returned in output (buffer)                          +
*     Offset   Len   Description                                       +
*     -------  ---   ---------------                                   +
*        1      4    Bytes returned                                    +
*        5      4    Bytes available to be returned                    +
*        9     10    Environment name                                  +
*       19     40    Session name                                      +
*       59      2    Number of backups                                 +
*       61     10    Recovery option ( Full Copy | No Copy)            +
*       71      2    Retention period (days)                           +
*                       (SVC Only)                                     +
*       73      2    Min Frequency (DS) or Background Copy Rate (SVC)+
*       75      1    Active recovery ( Y | N )                         +
*       76      5    Reserved                                          +
*       80      *    First backup (repeating section)                 +
*/
```

The next 64 bytes repeating is the entries for each SG copy. Each entry is 64 bytes.

```
/*  Repeating section:                                                 +
*        [ repeats (number of backups) ]                              +
*        1     10    Backup Id                                         +
*       11     23    Backup date/time                                  +
*       34     23    Expire date/time                                  +
*                       (SVC Only)                                     +
*       57      2    Number of copysets                                +
*       59      1    Recoverable (N | Y | A)    no/yes/active          +
*       60      5    reserved                                          +
*/
```

It is advisable when using the API to plan for more SG copies than configured to ensure the return space is large enough to handle an unusual condition.

QZRDSGCAP – Retrieve SG Capacity

QZRDSGCAP is an API to retrieve the Safeguard copy space currently used by each volume or disk pool. There is a sample for using this API (RTVSGCAP) in CL in the QCLSRC file in QZRDHASM that shows how to use this API to monitor available space.

```
*   Parameters :  1) Environment name  - 10 characters
*              2) Safeguard disk pool - 20 characters   - Input
*              3) Format  - 8 characters - Output  SGCP0100 - DS8K
*                                 SGCP0200 - SVC
*              4) Buffer pointer
*              5) Buffer length     *INT 4
*
*   The returned format will be determined by the type of storage for the specified environment
*    name.
*
*   Format of data returned in output (buffer) when returned format is SGCP0100 (DS)
*
*    Offset   Len   Description
*    -------   ---   ---------------
*     0    4    Bytes returned     *INT 4
*     4    4    Bytes available to be returned  *INT 4
*     8    8    Total logical capacity (TB) (packed decimal 15 5)
*    16    8    Total percent logical used (packed decimal 15 5)
*    24    8    Total physical cap available (TB) (packed decimal 15 5)
*    32    4    Number of volumes   *INT 4
*    34    *    First volume
*    [ repeats (number of volumes) ]
*     0    4    Volume Id    *CHAR 4
*     4    8    Capacity (packed decimal 15 5)
*    13    8    Used capacity (packed decimal 15 5)
*
*
*   Format of data returned in output (buffer) when returned format is SGCP0200 (SVC)
*
*    Offset   Len   Description
*    -------   ---   ---------------
*     0    4    Bytes returned     *INT 4
*     4    4    Bytes available to be returned      *INT 4
*     8    4    Number of safeguarded disk pools     *INT4
*    [ repeats (number of disk pools) ]
*     0    20   disk pool name     *CHAR 20
```

```
*    20    8    Total percent used  (packed decimal 15 5)
*    28    8    Total physical cap available (TB)  (packed decimal 15 5)
*    36    4    Number of SG volumes in pool.  *INT 4
```

IPLLPAR

STOPLPAR

Restoring a SafeGuarded Copy

To restore a SafeGuarded copy, the CSM server must be used. Restoring mean overwriting the entire system with a previous version of data. Do not confuse *restoring* a copy with *recovering* a copy. Recovery is activating a SG copy on a separate recovery lpar to validate, etc.

Restoring a copy involves completely overwriting the original system with a copy.

The process for restoring is

- Decide on the correct version of the data to restore. This might mean recovering multiple versions to the recovery partition to check the data prior to deciding on the right one.
- Power off the lpar to be restored. Do not restore a copy to a running lpar.
- Use CSM and the appropriate options to restore back to production/HA/DR as required
    o For Spectrum Virtualize, the option is a direct FlashCopy back over production
    o For DS8000, use the restoration guide provided with the implementation to perform the correct restoration for the configuration

Important Note: For PowerHA customers, do not restore a previous version of SYSBAS without deleting the cluster it is part of and recreating it.

Dual Control Mode

Dual Control is a CSM function that forces every action performed on a Session to be validated by a second user. PowerHA tools supports dual control for most operations, but others will be disabled.

To configure Dual Control mode on CSM, use the Enable Dual Control in the administration section of CSM. Note that a second user will have to approve turning dual control on.

Once Dual Control is on, all PowerHA tools using CSM other than Safeguard Copy will break therefore the customer should have separate CSM servers for SG copy than from managing PPRC or FlashCopy.

Selecting Dual Control *YES on the WRKCSE environment will cause new parameters to show. The CSM server will now need 2 user profiles and those users must be registered in WRKCSECRDL.

Differences with Dual Control

- Dual Control will cause the option 4 expire to be disabled. Expiring SG copies will need to be performed from the CSM GUI with 2 people.
- Dual Control will not allow for the max number of SG copies to be set lower than the number of copies on the storage.   I.e if the max number is currently 5, and there are 5 copies on storage, changing the max number to 3 will cause all uses of STRSGCPY to fail. This is to prevent malicious changing of the number of copies to keep – including deleting and recreating the environment.
- To reduce the number of copies to keep, first use the CSM GUI with 2 people to reduce the number of copies to new required number, then change the max copies in the environment.
- If a STRSGCPY fails to expire the oldest copy (could be due to recovery being active), manual intervention by 2 people using the CSM GUI will be required to remove the extra copies

For customer who wishes to protect against malicious use of STRSGCPY to expire old SG copies, the minimum timeframe per backup (mins) option in the CSM session properties should be set to a number to meet the requirement. E.g. if the back is only to run every 24 hours, then set the minimum time to 1200 minutes (20 hours). This will prevent a user from deleting previous backups and give space for the job to change timing by some margin.

Trouble Shooting

IASP Manager Log Files and the VIEWLOG command

IASP Manager uses many parts of the operating system from clustering to LPAR. Some of the errors that the programs may encounter have the messages returned directly in the joblog. These errors typically occur at the start of a command where IASP Manager is starting and checking clustering. If this happens, use the messages in the joblog to find and correct the error.

Once clustering is started, all other messages go to the IASP Manager log file. All problem determination should start with this log file.

VIEWLOG (View Log File)

```
                       View Log File (VIEWLOG)

 Type choices, press Enter.

 System name   . . . . . . . . . .   *LOCAL      Character value, *LOCAL...
 Stream file   . . . . . . . . . .   '/QIBM/Qzrdhasm/qzrdhasm.log'
.
 -


_____
___

 _____
 Operation to perform . . . . . .   *DSP        *EDT, *DSP
 Job number . . . . . . . . . . .   *ALL        1-999999, *ALL
```

The viewlog command opens the **/qibm/qzrdhasm/qzrdhasm.log** file. This file is a running log of all IASP Manager activity on the system.

When the file is opened, use a "b" in the control field to go directly to the end of the log. Then page up until the start of the command is found (new commands insert a blank line in the log for easy identification).

The System name parameter can also name a remote system or *SNMP. The remote system option uses remote IFS which requires that the user ID and password be identical on the remote system that you wish to open the log on. The *SNMP option displays the SNMP log file on the local system.

Note: All logs are included in the information collected by the DMPINF command.

VIEWSCRIPT

```
Environment name . . . . . . . .                  Name
Copy type  . . . . . . . . . . .                  FLASH, MMIR, MMIR2, MMIR3
Which files  . . . . . . . . . .   *ALL           *ALL, *CSM
System name  . . . . . . . . . .   *LOCAL         Character value
```

CSM logs are found in the environment directory. The easiest way to find these logs is with the VIEWSCRIPT command using *CSM files.

DMPINF (Dump IASP Manager Information)

The DMPINF command creates a single stream file containing all the information for the environment and IASP Manager. The stream file is located at **/tmp/qzrdhasm_<host name>.txt** and can be sent to IBM for debugging an IASP Manager issue.

The file contains the following information
- IASP Manager exit data
- Log file and backup log file
- DSCLI scripts and results files
- DSCLI profiles

For TCP-R environments, additional information is included:
- Permanent user space (status etc.)
- Environment IFS directories (XML results)

Retrieving the DMPINF file to send to IBM:

1. Use the **DMPINF** command. This command is in the **QZRDHASM** library.

Once you have collected the above information, you can either FTP the file to your PC to e-mail the documentation to the support representative or use System i Navigator to drag and drop it.

Using FTP
1. From your PC, FTP to your IBM i system
2. Sign on with a valid user ID and password
3. Enter the following commands:
    quote site namefmt 1
    get \tmp\qzrdhasm_nodeName.txt

Using System i Navigator
1. Open System i Navigator
2. Expand the name of the system where the data was collected [click the + sign]
3. Expand 'File Systems'
4. Expand 'Integrated File System'
5. Expand 'Root'
6. Click 'tmp'
7. Drag and drop the 'qzrdhasm_<nodeName>.txt' file to your desktop or any folder on your PC.

The joblog can be moved to your PC via System i Navigator as well.

1. Open System i Navigator
2. Expand the name of the system where the data was collected
3. Expand 'Basic Operations'
4. Click 'Printer Output'
5. Drag and drop the joblog spool file to your desktop or any folder on your PC.

Placing a service call for support

Overview

IBM brand services offers multiple different types of support for PowerHA Tools - IASP Manager.

- Initial Defect Support.   IBM provides a 60-day defect support period of PowerHA Tools - IASP Manager upon delivery to the customer.   Following this period, all services and support are provided via contract only.
- Email support only. This option is available for FlashCopy where the data is not critical to the running of the business. This level of maintenance also entitles the customer to receive version updates to IASP Manager whenever they are available.
- 24 x 7 support through the IBM Rochester support center. This is the default level of support for all PowerHA Tools - IASP Manager customers using PPRC, but it is also available for FlashCopy customers if they decide the FlashCopy process is critical to their business.

Placing a service call

E-mail support

To request support using e-mail support, send an e-mail to **iessspt@us.ibm.com** stating the problem and include as much information as possible. Always include the file created by the DMPINF command (see Section 0) in the e-mail as this always contains the information needed to start the analysis process.

IBM support with 24 x 7 Maintenance

To place a call on PowerHA Tools - IASP Manager with IBM support, it is important to give the correct information on your PowerHA Tools - IASP Manager environment to ensure the call is directed to Rochester as quickly as possible.

a. Place the service call for software
b. The product is IBM i
c. **The problem description must include "Copy Services toolkit"**. The Copy Services toolkit keyword will direct the call to the correct support queue in Rochester.

It is also beneficial to have the DMPINF (see Section 0) available to send into IBM so the problem can be diagnosed as quickly as possible.

Note: The customer is required to have an iSeries Software Maintenance Agreement (MA) as a prerequisite to this Agreement. The iSeries Software MA allows access to IBM's support structure. To assist IBM personnel in correctly routing your problem, request support for IBM i Copy Services Manager, using component identifier 5722SS1CS.