Dell PowerMax: GDPS and Advanced Copy Services Compatibility

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White Paper

Abstract

This white paper introduces the Dell optional copy services features: Compatible Peer and Compatible Native Flash for Mainframe. It also outlines supported features and provides guidelines on implementation of those features with versions of IBM® GDPS®.

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Executive summary

Overview

In addition to the Dell native Symmetrix™ Remote Data Facility (SRDF™) remote copy technologies, Dell Technologies offers compatibility remote copy features that enable Dell PowerMax to perform many of the same remote copy technologies traditionally available on IBM® DASD subsystems. With these optional features, customers can use PowerMax transparently in common Geographically Dispersed Parallel Sysplex (IBM GDPS®) deployments Metro GDPS Metro HyperSwap® Manager, without any additional Dell software, without modifications to GDPS, and enabled for all planned and unplanned actions.

This white paper introduces Dell compatibility features: Compatible Peer, and Compatible Native Flash (IBM® FlashCopy®). It shows how those features are employed with PowerMax arrays in GDPS Metro deployments. These technologies constitute a significant portion of the foundational technologies of the business continuity solutions of IBM GDPS Metro and GDPS HM service offerings.

Audience

This white paper is intended for the following audience:

- Storage architects

- Storage administrators

- System administrators

- Operations staff

- Data-center personnel managing Dell PowerMax storage arrays within GDPS environments

- Dell Technologies staff and partners managing Dell PowerMax storage arrays within GDPS environments

Revisions

Date	Description
May 2018	Initial Release
September 2019	Content Update
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We value your feedback

Dell Technologies and the authors of this document welcome your feedback on this document. Contact the Dell Technologies team by email.

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Note: For links to other documentation for this topic, see the PowerMax Info Hub.

Introduction

IBM Remote copy services definition and operation do not require GDPS. However, these remote copy technologies are frequently deployed with GDPS, especially when constructed in a business-continuity solution. Depending on the particular version of GDPS and its deployment configuration, one or more compatible features are required on a PowerMax. The following table matches Dell Technologies compatibility features with IBM Remote Copy features and specific GDPS offerings.

Table 1.   Feature mapping

Common Name (Official IBM Product Name)	Dell Technologies Microcode Feature Name	GDPS Offering
PPRC - Metro Mirror PPRC-XD (Global Copy)	Compatible Peer	GDPS Metro/GDPS Metro HyperSwap Manage (HM)
FlashCopy V2	Compatible Native Flash	All Versions of GDPS

Compatible Peer (PPRC)

Compatible Peer (PPRC) provides synchronous replication and remote copy technology between two volumes in different PowerMax DASD subsystems. Compatible Peer supports all Metro Mirror (PPRC synchronous) and Global Copy (PPRC-XD) directives as employed by GDPS Metro and Metro HM. Compatible Peer also responds to all PPRC interfaces: TSO commands, Copy Services Manager, TCP-R, ANTRQST API, and ICKDSF. Compatible Peer is implemented using SRDF by enabling the PowerMax to conform to PPRC operations issued over a FICON channel for both planned operations and in response to unplanned events. Compatible Peer is managed entirely by PPRC directives and GDPS; PowerMax arrays with Compatible Peer require no additional Dell Technologies software support for planned or unplanned operations.

Operationally, Compatible Peer supports unplanned GDPS autonomic operations for both FREEZE and HyperSwap. PowerMax arrays with Compatible Peer reports primary DASD Subsystem failures and PPRC secondary write failures to the initiating z/OS, enables GDPS to initiate its autonomic operations to ensure continuous availability in the case of HyperSwap, or preserve data consistency at the secondary DASD in the case of FREEZE. PowerMax arrays also respond to the GDPS directives when unplanned events originate on non-Dell DASD.

To support the preservation of dependent write consistency by automation systems such as GDPS, Compatible Peer supports LCU-based CESTPATH's CGROUP(Y) definition. This provides a variable long busy timer setting, notification of a failure to write to secondary DASD to the system initiating the write and responds to the CGROUP FREEZE and CGROUP RUN directives.

Compatible Peer also supports PPRC synchronous and PPRC/XD operational modes for quick copy operations during initial copy operations or resynchronization following a FREEZE or HyperSwap. Compatible Peer responds to GDPS's CQUERY monitoring of percent copied, enabling GDPS to manage a low impact resynchronization operation.

PowerMax arrays with Compatible Peer support all planned GDPS SCRIPT directives and panel operations. This means no SCRIPT changes are required of existing scripts when replacing existing DASD subsystems with PowerMax arrays.

Compatible Peer's logical PPRC PATHs are defined using transparent path and volume definitions in the GDPS Metro GEOPARM. Dell Support can assist customers with the CESTPATH and GDPS Metro GEOPARM link definitions or provide documentation on the definition of the physical links.

Compatible Peer supports the FailOver/FailBack definition of PPRC volumes, an important enabling technology and performance enhancement to quickly enable resynchronization after a FREEZE or HyperSwap.

Compatible Peer supports Split Freeze Policy Definitions (PRIMARYFAILURE and PPRCFAILURE) and enables Enhanced Conditional Freeze Detection.

Support is also provided for PPRC Soft Fence which prevents users from accidentally accessing the original PPRC primary volumes after HyperSwap or PPRC Primary failure. Customers can use IBM Basic HyperSwap for continuous availability on PowerMax arrays with Compatible Peer IBM Copy Services Manager using the CSM z/OS Direct Connection type. TCP/IP connections are not supported for CSM management of Compatible Peer or Compatible Native Flash.

When Compatible Peer is used on a PowerMax array running PowerMaxOS, support is included for the new zHyperWrite function. The zHyperWrite function is exploited by DB2 and IMS in PPRC environments enabled for HyperSwap to write directly to the PPRC primary and secondary volumes that contain the active log datasets, bypassing PPRC replication for write I/Os and improving response time for this performance critical component of these DBMSs. The zHyperWrite with PPRC HyperSwap Environment must be controlled by GDPS or Copy Services Manager.

Compatible Native Flash (FlashCopy V2)

Compatible Native Flash (FlashCopy V2) provides "point in time" copy technology between two volumes in the same PowerMax array and is Dell implementation of FlashCopy. FlashCopy is typically deployed to provide point-in-time copies either to preserve disaster recovery readiness during resynchronization, as a capability for testing disaster recovery operations in parallel with production remote copy or as capacity for actual disaster recovery operations.

With Compatible Native Flash installed and configured on PowerMax DASD subsystems, FlashCopy relationships are simply defined in the GDPS GEOPARM. No Dell specific software is required for Compatible Flash's definition or operation.

Remote Pair FlashCopy is also supported in Compatible Native Flash with Compatible Peer. Remote Pair FlashCopy (Preserve Mirror) supports dual FlashCopy relationships between primary PPRC FlashCopy devices and secondary PPRC FlashCopy devices. This support allows mirroring to continue in full duplex state while performing FlashCopy operations. It also maintains HyperSwap availability in GDPS Metro environments, enabling customers to have greater choice in their storage purchases, and to implement a true two-vendor strategy.

Remote Pair FlashCopy helps to reduce bandwidth requirements and data movement across the links for improved performance and resiliency in addition to maintaining PPRC's duplex state during FlashCopy operations. Remote Pair FlashCopy is only supported between two PowerMax's. It is not available for a pair where one side runs Enginuity 5876 and the other HYPERMAX OS 5977 or later. Remote Pair FlashCopy on

PowerMax arrays are only available at HYPERMAX OS 5977.811.784 or later, or PowerMax OS 10.

Using compatible features with IBM GDPS business continuity solutions

GDPS is a suite of licensed software and implementation services offered by IBM to manage business continuity. It is built on top of and extends the functionality of native remote copy technology. There are several variants of GDPS that provide a framework and manage the different remote copy technologies (PPRC, XRC, FlashCopy, and Global Mirror) and their implementation over different topologies. VMAX All Flash arrays and PowerMax arrays can only be deployed in GDPS Metro and GDPS Metro Hyperswap Manager offerings.

GDPS implementations are solutions with many deliverables involving sysplex operations, sysplex definition, IBM zSystem processor definition, LPAR definition, BCPii configuration, z/OS automation, inter-site connectivity and DASD storage. They are multidisciplinary implementations undertaken by a team of subject matter experts, usually under the direction of an experienced solutions architect who has implemented GDPS previously. The implementation role of Dell Technologies is confined directly to the PowerMax DASD subsystem and those issues relevant to the implementation of operations related to storage and remote copy operations, such as:

- Configuration

- Connectivity

- Feature implementation

- Definition of VMAX arrays to GDPS

- Field support and problem determination related to VMAX DASD subsystems and the remote copy

GDPS and Hyperswap Manager

Deployment of PowerMax in GDPS Metro or GDPS Metro HyperSwap Manager requires:

- Activation of the Compatible Peer feature on paired PowerMax systems

- SRDF FCP linkage[1] between the PowerMax DASD subsystems for PPRC remote copy

- FICON connectivity between the production systems and PowerMax DASD subsystems

- Definition of GDPS Metro UTILITY devices in all LCUs with volumes remotely copied by PPRC.

GDPS and PPRC requires consistent deployment of the FREEZE GROUPs, non-FREEZE GROUPs, local DASD for GDPS-K systems (not remotely copied), limited sharing of DASD outside the sysplex and PowerMax device addressing for HyperSwap. In addition, GDPS Metro requires specific connectivity and IO GEN definition. PowerMax arrays with Compatible Peer satisfy all these requirements, including HyperSwap employment of alternate subchannel support.

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[1] RDF linkage in a HyperSwap can utilize direct connectivity.

PowerMax DASD subsystems are included in the GDPS Metro policy by defining the PPRC logical paths, PPRC volume pairing, any optional FlashCopy relationships and the unmirrored GDPS Metro Utility Devices in the GDPS Metro GEOPARM.

Compatible Peer supports only CKD DASD, and control is supported only from a FICON host-channel interface.

Non-Disruptive State Save (NDSS) requests are supported by the PowerMax arrays. NDSS is intended for capturing diagnostic information on demand within the PowerMax when certain problems occur in GDPS Metro environments.

PowerMax arrays also support PPRCSUM, for summary event notification on error conditions to reduce message traffic, and Storage Controller Health Messages for PPRC link status change notifications in a GDPS environment.

Unsupported GDPS architectures

Dell Technologies has not implemented a compatible Global Mirror feature. Therefore, PowerMax arrays do not support the Global Mirror based solution GDPS/GM nor its three-site implementation GDPS/MGM. Similarly, the PowerMax does not support z/OS Global Mirror (formerly XRC) and as a result cannot be deployed in a GDPS/XRC or GDPS/MzGM environment. While PowerMax does support Metro Mirror (PPRC), there is currently no support for Multi Target Metro Mirror, and hence no support for the GDPS/Metro (dual leg) service offering. Dell Technologies has not implemented a compatible Cascaded FlashCopy or SafeGuarded Copy feature.

The Dell commitment to compatibility features

In addition to the hardware development efforts, Dell Technologies has made significant investments to ensure successful implementation of the PowerMax family of arrays with compatibility features.

Implementation of new features: May 2017

Dell Technologies licenses from IBM the 2107 Attachment Specification which includes FICON features such as HyperPAV, zHPF, zHyperWrite, and Advanced Copy Services features. Dell Technologies provides full support for zHPF and is committed to full channel compatibility. Dell Technologies implements Advanced Copy Services features based on market acceptance and customer demand.

As an example, Query Host Access (QHA) CCW support was added with HYPERMAX OS 5977 and PowerMax and VMAX All Flash arrays. QHA is a used to determine if a device has active FICON path groups and is exploited by several host applications including GDPS and the ICKDSF utility parameter VERIFY OFFLINE to check for LPAR access before initializing a volume. zHyperwrite compatibility has been implemented to enable DB2 and IMS to bypass PPRC replication in a HyperSwap enabled environment.

Implementation of new features: 2018

Dell Technologies software continues to be enhanced to ensure FlashCopy and further channel compatibility. Dell now supports multiple incremental FlashCopy operations. Previously, IBM only allowed one incremental FlashCopy relationship per device and Dell software would honor that limitation. Now that FlashCopy supports multiple incremental relationships per source volume, Dell now supports this new functionality.

For channel compatibility, Dell now supports SuperPAV. SuperPAV extends HyperPAV to include the ability to share PAV aliases across logical subsystems. This logical progression is derived from previous PAV functionality (StaticPAV, Dynamic PAV, HyperPAV, and now SuperPAV). The benefit is that this feature should reduce total alias volumes addresses. With the reduction of alias volumes addresses, customers can now dedicate more addresses to their base volumes.

Conclusion

If your choice is the PPRC for remote replication, and FlashCopy for local replication, with or without GDPS, Dell Technologies can help with your implementation with the family of arrays and optional features.

PowerMax arrays with optional features provide a dependable solution supporting GDPS/PPRC and GDPS/HM implementations. When customers buy PowerMax with compatible features, they can expect not only compatible operations, but in addition they enjoy:

- Innovation with PowerMax arrays, particularly about the management of tiered solutions and Failover/Failback operations.

- The ability to use Dell Technologies TimeFinder SnapVX and zDP solutions with PPRC volumes

- Investment protection: PowerMax arrays with compatible features supports GDPS Metro operations without any changes to GDPS's SCRIPTs, policies, or panels.

- Choice: With the licensing of the compatible features, you also enjoy licensing for Dell's native replication technologies and the two technologies can run side by side within the same array.

For more information regarding compliant PowerMax models, configurations, and PowerMaxOS release-level prerequisites, see the Dell Support Matrix or contact your local Dell Technologies representative.

References

Dell Technologies documentation

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage and data protection technical white papers and videos provide expertise that helps to ensure customer success with Dell storage and data protection products.

See the PowerMax Info Hub for additional information.