

IBM Corporation
 2455 South Road
 Poughkeepsie, New York
 12601
 USA
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Report of Successful Completion of Qualification Testing

International Business Machines Corporation has successfully completed compatibility and interoperability testing of the IBM DS8886 at code level R8.1 Microcode level 7.8.11.49 - Bundle 88.11.21.0 in the following IBM z13® (z13) environment:

IBM hereby confirms that testing for the support of FICON® and FCP connectivity of the following has been successfully completed:

CPU	IBM z13 2964-N30 Driver 27 + MCL Bundle Level S26G8C2 in LPAR mode
OS&GDPS®	z/OS® V2.2
	GDPS 3.13
Functions	GDPS/PPRC HyperSwap® Manager <ul style="list-style-type: none"> • Freeze/run • Planned HyperSwap • Unplanned HyperSwap • HyperSwap Failover/Failback
	GDPS/PPRC <ul style="list-style-type: none"> • Freeze/run • Planned HyperSwap • Unplanned HyperSwap • HyperSwap Failover/Failback • FlashCopy® V2, FlashCopy Space Efficient and Remote Pair FlashCopy
	GDPS/XRC <ul style="list-style-type: none"> • FlashCopy Zero suspend for FlashCopy V2 and FlashCopy Space Efficient • SDM clustering
Storage Devices	IBM DS8886 <ul style="list-style-type: none"> • PPRC and XRC volumes • FlashCopy V2

More detailed testing results are available from IBM on request.

David B Petersen
 IBM Distinguished Engineer
 z Systems
 IBM Systems
 International Business Machines
 Corporation

Attachment A -- Test Matrix

<u>GDPS/PPRC</u> <u>HyperSwap Manager</u>		
Test Case Suite	Successfully Completed	Test Case Suite Description
<ul style="list-style-type: none"> • Initial Tests 	✓	Basic remote copy operations using panels Basic Freeze tests (GO/STOP/COND)
<ul style="list-style-type: none"> • Planned Actions 	✓	Remote copy operations using HYPERSW command Simulate Site maintenance (Site 1) and (Site 2)
<ul style="list-style-type: none"> • Unplanned Actions 	✓	GDPS reacts to a failure, depending on the FREEZE option (GO / STOP / COND / SWAP&GO / SWAP & STOP) Test failures were generated by PPRC links unplug, Chpid unplug, DASD control Unit power off and elongated I/O response times
<ul style="list-style-type: none"> • Disruptive Testing (aka Config Testing) 	✓	GDPS reacts to a failure, depending on the FREEZE policy. Failures were generated by Control Unit Emergency power off and control unit internal failures
<ul style="list-style-type: none"> • HyperSwap Stress test 	✓	Run a planned HyperSwap, with the application systems and the controlling system having CPU contention
<ul style="list-style-type: none"> • Miscellaneous 	✓	HyperSwap extension (checking of secondary PPRC status – failure, XRC session, Concurrent Copy, etc.)

<u>GDPS/PPRC</u>		
Test Case Suite	Successfully Completed	Test Case Suite Description
<ul style="list-style-type: none"> • Initial Tests 	✓	Basic remote copy operations using panels Basic Freeze tests (GO/STOP/COND)
<ul style="list-style-type: none"> • Planned Actions 	✓	Remote copy operations using scripts (START/STOP SECONDARY, Flashcopy, HyperSwap (Resync & Suspend), etc.) Simulate Site maintenance (Site 1) and Site 2)
<ul style="list-style-type: none"> • Unplanned Actions 	✓	GDPS reacts to a failure, depending on the FREEZE option (GO / STOP / COND / SWAP&GO / SWAP & STOP) Failures were generated by PPRC links unplug, Chpid unplug, DASD control Unit power off and elongated I/O response times
<ul style="list-style-type: none"> • Disruptive Testing (aka Config Testing) 	✓	GDPS reacts to a failure, depending on the FREEZE policy. Failures were generated by Control Unit Emergency power off and control unit internal failures
<ul style="list-style-type: none"> • HyperSwap Stress test 	✓	Run a planned HyperSwap, with the application systems and the controlling system having CPU contention
<ul style="list-style-type: none"> • Miscellaneous 	✓	HyperSwap extension (checking of secondary PPRC status – failure, XRC session, Concurrent Copy, etc.)
<ul style="list-style-type: none"> • FlashCopy 	✓	Prior FlashCopy limitations (Space Efficient, Remote Pair) are removed. Note that the traditional FlashCopy testcases are executed as part of Planned Actions and Unplanned Actions.

<u>GDPS/XRC</u>		
Test Case Suite	Successfully Completed	Test Case Suite Description
<ul style="list-style-type: none"> • Initial Tests 	✓	Basic remote copy operations using panels. Tests using single SDM and coupled SDMs
<ul style="list-style-type: none"> • Planned Actions 	✓	Remote copy operations using scripts (START/STOP, SUSPEND session, etc.) Simulate Site maintenance (Site 1) and Site 2) Simulate Site 1 failure and restart Production in recovery site.
<ul style="list-style-type: none"> • FlashCopy 	✓	Prior FlashCopy limitation (Space Efficient) is removed. Note that the traditional FlashCopy testcases are executed as part of Planned Actions.