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IBM® GDPS® and Server Time Protocol (STP) Application Qualification support for the following Dense Wave Division Multiplexing (DWDM) Platforms: The Huawei OptiX OSN 9800 running NeSoft release 5.111.03.50, OptiX OSN 9800UPS and OptiX OSN 8800 running NeSoft release 5.51.12.17, and the OptiX OSN 1800 running NeSoft release 5.67.06.35.

International Business Machines Corporation and Huawei Technologies Co., Ltd. have successfully completed application qualification testing of the following Dense Wave Division Multiplexing (DWDM) Platforms: The Huawei OptiX OSN 9800 running NeSoft release 5.111.03.50, OptiX OSN 9800UPS and OptiX OSN 8800 running NeSoft release 5.51.12.17, and the OptiX OSN 1800 running NeSoft release 5.67.06.35, for the following IBM Parallel Sysplex® and Geographically Dispersed Parallel Sysplex™(GDPS) IBM z13, IBM z13s, IBM zEnterprise EC12 (zEC12), IBM zEnterprise BC12 (zBC12), IBM zEnterprise 196 (z196), IBM zEnterprise 114 (z114), IBM zEnterprise BladeCenter Extension (zBX) environments:

- GDPS / Peer-to-Peer Remote Copy (PPRC) (Metro Mirror) using the following protocols:
    - High Performance FICON for z Systems (zHPF) & FICON for Storage Access
    - FCP for disk mirroring
    - 1x InfiniBand (1x IFB) or ISC-3[1] peer mode for exchanging Server Time Protocol (STP) messages to provide synchronization of servers
    - ISC-3[1] for coupling facility (CF) messaging
- GDPS / Extended Remote Copy (XRC) (z/OS Global Mirror) using zHPF & FICON for asynchronous remote copy
- zBX intraensemble data network (IEDN) over 10 Gigabit Ethernet (10 GbE)
- 10GbE RoCE Express[2] feature (Remote Direct Memory Access over Converged Ethernet) using Shared Memory Communications – Remote Direct Memory Access (SMC-R)

Distances for the protocols supported for these GDPS applications are defined in the Qualification Results Summary below. Although STP applications have been successfully tested to a distance of 200km, IBM requires an RPQ – 8P2340 (z196, z114), 8P2581 (zEC12), 8P2781 (zBC12), 8P2981 (z13), 8P2781 (z13s) to assure applications between 100km and 200km adhere to the bounds of our qualification. This is due to the critical requirement of assuring that no more than 900 meters of differential delay was introduced into the network. Additional testing may be required to approve the RPQ if the application exceeds the distance tested noted in the table below with *.

Qualification Results Summary:
The Huawei OptiX OSN 9800, OptiX OSN 9800UPS, OptiX OSN 8800 and the OptiX OSN 1800 Dense Wavelength Division Multiplexing (DWDM) Platforms met IBM Qualification criteria for the protocols listed in the table below.

Cards supported in the Optix ONS 9800 - Running NeSoft Release 5.111.03.50				
Module and Firmware	**Description**	**Part Number**	**Protocols Supported**	**Supported Distance**
T230 Client card and G404 Line side card pair [R,3,4] Firmware: 3.50	30 Client port TDM Client and Line side card pair: 30:4 1G FCP/FICON/ISL 30:4 2G FCP/FICON/ISL 30:4 4G FCP/FICON/ISL 30:4 8G FCP/FICON/ISL 8:4 16G FCP/FICON/ISL 30:4 GbE 30:4 10GbE	TNV3T230 Ver. A TNU1G404 Ver. A	1,2,4,8,16 Gbps FICON/FCP/ ISL[3,4], 1,10GbE	100km*
DCM	Dispersion Compensation Module (based on fiber bragg grating)	DCM-CB-SN-100-H-I-LP DCM-CB-SN-80-H-I-LP	All protocols including 1x IFB/ ISC-3[1]	N/A

Cards supported in both the Optix ONS 9800UPS and Optix ONS 8800 Platforms - Running NeSoft Release 5.51.12.17				
Module and Firmware	**Description**	**Part Number**	**Protocols Supported**	**Supported Distance**
11LOA[R] Firmware: 5.08	8 Client Ports, 1 (10G) Line Port Maximum Ports Supported Per Protocol: 1:1　5G InfiniBand (1x IFB DDR) 4:1　ISC-3[1] Peer Mode 8:1　1G FCP/FICON/ISL 4:1　2G FCP/FICON/ISL 2:1　4G FCP/FICON/ISL 1:1　8G FCP/FICON/ISL 1:1　10G ISL 8:1　GbE 1:1　10GbE	TN11LOA Ver. A	1x IFB 5 Gbps (DDR), ISC-3[1] Peer Mode, 1,2,4,8 Gbps FICON/FCP/ ISL, 10 Gbps ISL, 1,10GbE	100km*
17LTX[R] Firmware: 5.08	10 Client Ports, 1 (100G) Line Port Maximum Ports Supported Per Protocol: 10:1　5G InfiniBand (1x IFB DDR) 10:1　8G FCP/FICON/ISL 10:1　10G ISL 10:1　10GbE	TN17LTX Ver. A	1x IFB 5 Gbps (DDR), 8 Gbps FICON/FCP/ ISL, 10 Gbps ISL, 10GbE	100km*
12OLP[5] Firmware: 1.11	Bi-Directional optical line protection switching module	TN12OLP Ver. F	All protocols including 1x IFB/ ISC-3[1]	100km*
DCM	Dispersion Compensation Module (based on fiber bragg grating)	DCM-CB-SN-100-H-I-LP DCM-CB-SN-80-H-I-LP	All protocols including 1x IFB/ ISC-3[1]	N/A

Cards supported in the Optix ONS 1800 Platform – Running NeSoft Release 5.67.06.35				
Module and Firmware	**Description**	**Part Number**	**Protocols Supported**	**Supported Distance**
F2ELOM[R,6] Firmware: 3.33	8 Client Ports, 1 (10G) Line Port Maximum Ports Supported Per Protocol: 1:1　5G InfiniBand (1x IFB DDR) 4:1　ISC-3[1] Peer Mode 8:1　1G FCP/FICON/ISL 4:1　2G FCP/FICON/ISL 2:1　4G FCP/FICON/ISL 1:1　8G FCP/FICON/ISL 1:1　10G ISL 8:1　GbE 1:1　10GbE	TNF2ELOMC Ver. B, TNF2ELOMB Ver. C	1x IFB 5 Gbps (DDR), ISC-3[1] Peer Mode, 1,2,4,8 Gbps FICON/FCP/ ISL, 10 Gbps ISL, 1,10GbE	100km*

F1CE6[R,7]
Firmware: 3.33
	6 Client Ports, 1 (10G) Line Port
	Maximum Ports Supported Per
	Protocol:
	  1:1 5G InfiniBand (1x IFB DDR)
	  6:1 1G FCP/FICON/ISL
	  4:1 2G FCP/FICON/ISL
	  2:1 4G FCP/FICON/ISL
	  1:1 8G FCP/FICON/ISL
	  1:1 10G ISL
	  6:1 GbE
	  1:1 10GbE
		TNF1CE6 Ver. A	1x IFB 5 Gbps (DDR),
			1,2,4,8 Gbps
			FICON/FCP/ ISL,
			10 Gbps ISL,
			1,10GbE
				100km*

F2LTX [R,3,7,8]
Firmware: 3.33
	10 Client Ports, 1 (100G) Line Port
	Maximum Ports Supported Per
	Protocol:
	  10:1 5G InfiniBand (1x IFB DDR)
	  10:1 8G FCP/FICON/ISL
	  6:1 16G FCP/FICON/ISL
	  10:1 10G ISL
	  10:1 10GbE
		TNF2LTXA Ver. A,
		TNF2LTXB Ver. A
			1x IFB 5 Gbps (DDR),
			8,16 Gbps
			FICON/FCP/ ISL [3,8],
			10 Gbps ISL [8],
			10GbE
				100km*

F2LDX [R,6]
Firmware: 3.33
	2 Client Ports, 2 (10G) Line Ports
	Maximum Ports Supported Per
	Protocol:
	  2:2 5G InfiniBand (1x IFB DDR)
	  2:2 8G FCP/FICON/ISL
	  2:2 10G ISL
	  2:2 10GbE
		TNF2LDX Ver. A	1x IFB 5 Gbps (DDR),
			8 Gbps FICON/FCP/
			ISL,
			10 Gbps ISL,
			10GbE
				100km*

DCM	Dispersion Compensation Module (based on fiber bragg grating)	DCM-CB-SN-100- H-I-LP DCM-CB-SN-80-H- I-LP	All protocols including 1x IFB/ ISC-3[1]	N/A

[1] The zEC12 and zBC12 are the last z Systems servers to support InterSystem Channel-3 (ISC-3).

[2] 10GbE RoCE Express for SMC-R is only supported on the z13, z13s, zEC12 and zBC12 servers. DWDM client modules that support 10GbE RoCE Express for SMC-R are noted in the table above with [R].

[3] The T230 and F2LTX client cards only supports 850nm Multimode optics for 16Gbps FC/FICON/ISL.

[4] The T230 and G404 client and line side card pair configured for 8Gbps FC/FICON are not supported for direct attachment to the IBM z systems FICON Express16s card. ISLs between Cascaded Directors/switches are required.

[5] All OLP trunk protected networks should be designed with two OLP modules in Bi-Directional mode and four site-to-site fibers carried over two diverse routes. Client level protection should be used with this double OLP protection design to ensure path connectivity is not lost between sites during a switchover on one of the OLP modules.

[6] In-card 1+1 line side protection, configured in Bi-Directional mode is supported on the F2ELOM and F2LDX cards for all protocols including 1 x IFB and ISC-3[1].

[7] The OLP, residing in an OSN 9800UPS or OSN 8800 platform chassis, can also be used to for line side protection of links from the F1CE6 and F2LTX cards from the OSN 1800 platform.

[8] In order to use the F2LTX card with 16Gbps Inter Switch Links (ISLs) from Brocade switches/Directors, both the ISL_R_Rdy setting and FEC (using the PortCfgFec command) may need to be enabled on the switches for the ISL to come online. However, Huawei recommends that both FEC and "ISL_R_Rdy" be disabled on the switches for 16Gbps ISLs over the F2LTX card.

GDPS Application Limitations:

• IBM GDPS support is limited to DWDM product applications which utilize point-to-point fixed dark fiber network interconnect between Parallel Sysplexes.

• DWDM end-to-end networks, including DWDM components, transport elements and dark fiber links, must not exceed the equivalent of 900 meters differential delay between transmit and receive paths used for GDPS links for Server Time Protocol (STP) message passing (which includes ISC-3 and 1x IFB links).

• Fiber-based dispersion compensation units that have not been qualified by IBM are not supported for STP applications.

• Redundant DWDM platforms, utilizing two site-to-site fiber pairs over diverse routes, are recommended for fiber trunk protection of links used for STP message passing (ISC-3 and 1x IFB). STP links should connect using different trunk switching modules to ensure that a fiber trunk protection event does not interrupt all timing links simultaneously.

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