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**IBM® GDPS® and Server Time Protocol (STP) Application Qualification support for Ciena 6500 Packet-Optical Platform running software Release 10.21.**

International Business Machines Corporation and Ciena Communications Inc. have successfully completed application qualification testing of the Ciena 6500 Packet-Optical Platform running software release level 10.21, for the following IBM Z®, Parallel Sysplex® and Geographically Dispersed Parallel Sysplex™(GDPS), IBM z14® (z14), IBM z14 Model ZR1 (z14 ZR1), IBM z13® (z13), IBM z13s® (z13s), IBM zEnterprise® EC12® (zEC12), IBM zEnterprise BC12® (zBC12), IBM zEnterprise 196® (z196), IBM zEnterprise 114® (z114), IBM zEnterprise BladeCenter Extension® environments:

- GDPS / Peer-to-Peer Remote Copy (PPRC) (Metro Mirror) using the following protocols:
  - High Performance FICON for IBM Z (zHPF®) & FICON for Storage Access
  - FCP for disk mirroring
  - 10G RoCE based Coupling Express® Long Reach (10G CE LR)<sup>1</sup>, 1x InfiniBand (1x IFB) or ISC-3<sup>2</sup> peer mode for exchanging Server Time Protocol (STP) messages to provide synchronization of servers
  - ISC-3<sup>2</sup> 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<sup>3</sup> 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 (z14, z13), 8P2781 (z14 ZR1, 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 Ciena 6500 Packet-Optical Platform running software release 10.21 met IBM Qualification criteria for protocols listed in the table below.

<b>Ciena 6500 Packet-Optical Platform running software release 10.21</b>				
<b>Transport Interface</b>	<b>Description</b>	<b>Part Number</b>	<b>Protocols Supported</b>	<b>Supported Distance</b>
SuperMux 10 Port SFP 10G DWDM <sup>4</sup>	Multiplexer Optical Transponder aggregating up to 10 1G, 5 2G or 2 4G signals: 10:1 1G FICON/FCP/ISL 5:1 2G FICON/FCP/ISL 2:1 4G FICON/FCP/ISL <sup>4</sup> 9:1 1GbE	NTK535EAE5	1,2,4 Gbps FCP/FICON <sup>4</sup> , 1,2,4 Gbps ISL, 1 GbE	100km
SuperMux 24 Port I/O 1x XFP/10x SFP <sup>4</sup>	Multiplexer Optical Transponder aggregating up to 10 1G, 5 2G or 2 4G signals: 10:1 1G FICON/FCP/ISL 5:1 2G FICON/FCP/ISL 2:1 4G FICON/FCP/ISL <sup>4</sup> 9:1 1GbE	NTK535FAE5	1,2,4 Gbps FCP/FICON <sup>4</sup> , 1,2,4 Gbps ISL, 1 GbE	100km, 150km*

Flex MOTR 8xSFP, 2xXFP	Multiplexer Optical Transponder aggregating 1G, 2G or 4G signals with flexible mappings: 8:1 1G FICON/FCP/ISL 8:2 2G FICON/FCP/ISL 8:2 ISC-3 Peer Mode <sup>2</sup> 4:2 4G FICON/FCP/ISL 7:1 1GbE	NTK531YAE5	ISC-3 Peer Mode <sup>2</sup> 1,2,4 Gbps FCP/FICON, 1,2,4 Gbps ISL, 1 GbE	100km, 150km*
OTN Flex MOTR 1xXFP/8xSFP <sup>4</sup>	Flexible OTN Multiplexer Optical Transponder aggregating 1/2/4G signals: 8:1 1G FICON/FCP/ISL 4:1 2G FICON/FCP/ISL 2:1 4G FICON/FCP/ISL <sup>4</sup> 8:1 1GbE	NTK532DA	1,2,4 Gbps FCP/FICON <sup>4</sup> , 1,2,4 Gbps ISL, 1 GbE	100km, 150km*
2x10G OTR with strong FEC and FC800/FC1200 <sup>5,R</sup>	Dual client, dual line Optical Transponder for transparent transport of 5G, 8G and 10G client services: 2:2 5G InfiniBand (1x IFB DDR) <sup>5</sup> 2:2 8G FICON/FCP/ISL 2:2 10G ISL 2:2 10GbE 2:2 10G CE LR	NTK530PME5	1x IFB 5 Gbps (DDR) <sup>5</sup> , 10G CE LR, 8 Gbps FCP/FICON, 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*
eDC40G OCLD MetroHSR <sup>R</sup>  4xOC-192/STM-64/10GbE/OTU2/FC Mux OCI XFP	Multirate 4x10G Combiner with 40G Coherent Line: 4:1 8G FICON/FCP/ISL 4:1 10G ISL 4:1 10GbE	Client Card: NTK525CFE5  Line Card: NTK539PFE5	8 Gbps FCP/FICON, 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*
4X10G OTR 4X XFP/4X SFP+ <sup>R</sup>	Quad client, quad line Optical Transponder for transparent transport of 2G, 4G, 5G, 8G and 10G client services: 4:4 5G InfiniBand (1x IFB DDR) 4:4 ISC-3 Peer Mode <sup>2</sup> 4:4 4G FICON/FCP/ISL 4:4 8G FICON/FCP/ISL 4:4 10G ISL 4:4 10GbE 4:4 10G CE LR	NTK530QA	1x IFB 5 Gbps (DDR), ISC-3 Peer Mode <sup>2</sup> , 10G CE LR, 4, 8 Gbps FCP/FICON, 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*
4X10G OTR 4X XFP/4X SFP+ with Encryption <sup>R</sup>	Quad client, quad line Optical Transponder for Encrypted transparent transport of 4G, 8G and 10G client services: 4:4 4G FICON/FCP/ISL 4:4 8G FICON/FCP/ISL 4:4 10G ISL 4:4 10GbE	NTK530QE	4, 8 Gbps FCP/FICON, 4, 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*

eDC100G WL3 OCLD (Metro) <sup>4,R</sup> 10x10G Mux Multi-Protocol XFP	Multirate 10x10G Combiner with 100G WL3 Coherent Line: 10:1 8G FICON/FCP/ISL 10:1 10G ISL 10:1 10GbE	Client Card: NTK529BBE5  Line Card: NTK539UD	8 Gbps FCP/FICON <sup>4</sup> , 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*
100G MOTR WL3n Basic C-Band 10xSFP+ <sup>4,R</sup>	Multirate 10x10G Combiner with 100G WL3 Coherent Line: 10:1 8G FICON/FCP/ISL 10:1 10G ISL 10:1 10GbE	NTK538BM	8 Gbps FCP/FICON <sup>4</sup> , 8,10 Gbps ISL, 10GbE <sup>R</sup>	100km, 150km*
Optical Protection Switch 1x OPSM <sup>6</sup>	In-skin optical splitter and switch module	NTK554TA	1,2,4,8 Gbps FCP/FICON 1,2,4,8,10 Gbps ISL 10GbE  Not supported for STP applications (10G CE LR, 1 x IFB or ISC-3)	
Enhanced Trunk Switch (ETS) <sup>6</sup>	Optical splitter and switch module	NTUG90ANE5	1,2,4,8 Gbps FCP/FICON 1,2,4,8,10 Gbps ISL 10GbE  Not supported for STP applications (10G CE LR, 1 x IFB or ISC-3)	
Photonic Trunk Switch (PTS) <sup>6</sup>	Bi-directional optical splitter and switch module	NTUG75BAE5	All Protocols including 10G CE LR, 1x IFB and ISC-3	

<sup>1</sup>Coupling Express LR links are only supported on the z14, z14 ZR1, z13 and z13s servers.

<sup>2</sup> The zEC12 and zBC12 are the last IBM Z servers to support InterSystem Channel-3 (ISC-3).

<sup>3</sup> 10GbE RoCE Express is only supported on the z14, z14 ZR1, z13, z13s, zEC12 and zBC12 servers. DWDM client modules that support 10GbE RoCE Express are noted in the table above with <sup>R</sup>.

<sup>4</sup> The Supermux 10 port and 24 port cards, OTN Flex MOTR, eDC100G WL3 OCLD and 100G MOTR WL3n cards are not supported for direct attachment to the IBM Z FICON Express16s or FICON Express16S+ cards. ISLs between Cascaded Directors/switches are required.

<sup>5</sup> The 2x10G OTR card between two HCA3-O LR (4 port IBM Z PS-IFB) cards, may cause PS-IFB ports to go into a disabled state in a link recovery scenario. A link recovery scenario could be caused by a fiber cut, hardware failure or manual intervention. Customers may need to disable and re-enable the ports on both sides of the PS-IFB link via the SE in "Service" in the "Advanced Facilities - Card Specific Advanced Facilities" to get the port back online. PS-IFB links were qualified over the 2x10G OTR in steady state operation.

<sup>6</sup> All networks utilizing a protection switch should be designed with two protection switch modules and four site-to-site fibers carried over two diverse routes. Client level protection should be used with this double protection switch design to ensure path connectivity is not lost between sites during a switchover on one of the protection switches.

**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 10G CE LR, 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 (10G CE LR, 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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The terms IBM Z, z14, z13, z13s, zEC12, zBC12, zEnterprise, Coupling Express, ESCON, FICON, GDPS, Geographically Dispersed Parallel Sysplex, IBM, Parallel Sysplex, zSeries, and z/OS are trademarks or registered trademarks of International Business Machines Corporation.



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**Qualification Letter Version History:**

- 05/24/2015: Initial Version
- 09/11/2017: Updated to include support for IBM z14 as well as 10G RoCE Express Coupling Links on certain DWDM cards.  
-WL3n card added to footnote 4 above.
- 06/20/2018: Added support for z14 Model ZR1
- 02/27/2020: Specified CE LR as 10G CE LR