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June 1, 2020

IBM® GDPS® and Server Time Protocol (STP) Application Qualification support for the ADVA FSP 3000* Dense Wavelength Division Multiplexer (DWDM) Platform running software release 19.1.2

International Business Machines Corporation and ADVA Optical Networking SE have successfully completed application qualification testing of the ADVA FSP 3000* Dense Wavelength Division Multiplexer (DWDM) Platform running software release 19.1.2 for the following IBM Z®, Parallel Sysplex® and Geographically Dispersed Parallel Sysplex™(GDPS), IBM z15™ Model T01 (z15 T01), IBM z15™ Model T02 (z15 T02), 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 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)[1] or 1x InfiniBand (1x IFB)[6] for exchanging Server Time Protocol (STP) messages to provide synchronization of servers
- 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[3] 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. Longer distances may be approved but require IBM RPQ –8P2581 (zEC12), 8P2781 (zBC12), 8P2981 (z15 T01, z14, z13), 8P2781 (z15 T02, z14 ZR1, z13s). Additional testing may be required to approve the RPQ.

Qualification Results Summary:
The ADVA FSP 3000* Dense Wavelength Division Multiplexer (DWDM) Platform running software release 19.1.2 met IBM Qualification criteria for protocols listed in the table below.

ADVA FSP 3000* Dense Wavelength Division Multiplexer (DWDM) Platform running software release 19.1.2

Module	Description	Model	Protocols Supported	Supported Distance
5TCE[2]	5-port 10G TDM module: 2:1 5G InfiniBand (1x IFB DDR) 3:1 4G FCP/ISL 1:1 8G FCP/ISL 1:1 10G ISL 1:1 10GbE	5TCE-PCTN-10GU+10G-xx#Dy	1x IFB 5 Gbps (DDR), 4,8 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
5TCE-AES[2]	5-port 10G TDM module with AES 256 Encryption: 2:1 5G InfiniBand (1x IFB DDR) 3:1 4G FCP/ISL 1:1 8G FCP/ISL 1:1 10G ISL 1:1 10GbE	5TCE-PCTN-10GU+AES10G-xx#Dy	1x IFB 5 Gbps (DDR), 4,8 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km

5TCE-PCN[2]	5-port 10G TDM module with pluggable network: 2:1 5G InfiniBand (1x IFB DDR) 3:1 4G FCP/ISL 1:1 8G FCP/ISL 1:1 10G ISL 1:1 10GbE	5TCE-PCN-10GU+10G	1x IFB 5 Gbps (DDR), 4,8 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
5TCE-PCN-AES[2]	5-port 10G TDM module with pluggable network interface and AES 256 Encryption: 2:1 5G InfiniBand (1x IFB DDR) 3:1 4G FCP/ISL 1:1 8G FCP/ISL 1:1 10G ISL 1:1 10GbE	5TCE-PCN-10GU+AES10G	1x IFB 5 Gbps (DDR), 4,8 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
5WCA[2, R]	5-port 16G Transponder Module: 5:5 5G InfiniBand (1x IFB DDR) 5:5 8G FCP/ISL 5:5 16G FCP/ISL 5:5 10G CE LR 5:5 10GbE	5WCA-PCN-16GU	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10GbE	110km
10TCE-100G-16G[2, R]	10-port 16G TDM Module with either coherent 100G or 4x28G line side modules: 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE	10TCE-PCN-16GU+100G	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
10TCE-100G AES-16G[2, R]	10-port 16G TDM Module with AES 256 Encryption with coherent 100G or 4x28G line side modules: 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE	10TCE-PCN-16GU+AES100G	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
10TCE-100G AES-16G-BSI[2, R]	BSI Compliant 10-port 16G TDM Module with AES 256 Encryption with coherent 100G or 4x28G line side modules: 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE	10TCE-PCN-16G+AES100G-BSI	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km

10TCE-PCN-16GU-AES-100G-F[2, R]	10-port 16G TDM Module with pluggable network interface and AES 256 Encryption with coherent 100G or 4x28G line side modules: 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE	10TCE-PCN-16GU+AES100G-F	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
9TCE-PCN-10GU-10G-F[2, R]	Quad 8/10G Transponder module with AES 256 Encryption: 4:4 8G FCP/ISL 4:4 10G CE LR 4:4 10GbE	9TCE-PCN-10GU+10G-F	8 Gbps FCP[2]/ISL 10G CE LR, 10GbE	135km
9TCE-PCN-10GU-10G-G[2, R]	Quad 8/10G Transponder module with AES 256 Encryption: 4:4 8G FCP/ISL 4:4 10G CE LR 4:4 10GbE	9TCE-PCN-10GU+AES10G-G	8 Gbps FCP[2]/ISL 10G CE LR, 10GbE	135km
4TCA-PCN[2]	4-port 4G TDM module: 2:2 4G FCP/ISL	4TCA-PCN-4GU+4G	4 Gbps FCP[2]/ISL	135km
2WCA[2, R]	Dual 10G Transponder Module: 2:2 4G FCP/ISL 2:2 8G FCP/ISL 2:2 10G ISL 2:2 10GbE	2WCA-PCN-10G	4,8 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
OPPM[4,5]	Fiber Protection Switch	OPPM	All Protocols (including 10G CE LR and 1x IFB)	135km
RSM[4]	Fiber Protection Switch	RSM-OLM#1630	All Protocols (including 10G CE LR and 1x IFB)	80km
Y-Cable Protection[4,7]	Y-Cable protection using redundant DWDM client cards	1PM/SM 1PM/MM 2PM/SM 2PM/MM Y-CABLE/SM Y-CABLE/MM	All Protocols (including 10G CE LR and 1x IFB)	135km
DCG-M DCG50-M	Managed DCM using Chirped Fiber Bragg Gratings (CFG)	DCG-M/060/SSMF DCG-M/080/SSMF DCG-M/100/SSMF DCG50-M/020/SMFF DCG50-M/040/SMFF DCG50-M/060/SSMF DCG50-M/080/SSMF DCG50-M/100/SSMF	All Protocols (including 10G CE LR and 1x IFB)	N/A

ADVA FSP 3000CC* Dense Wavelength Division Multiplexer (DWDM) Platform running software release 19.1.2

Module	Description	Model	Protocols Supported	Supported Distance
MA-2C5LT[2, R] with MP-2B4CT	Client and Line Side card pair: Client card – 5 QSFP client ports, each 4x28Gbps, 2 QSFP Network ports, each 4x28Gbps Line card – 4 QSFP client ports, each 4x28Gbps, 2 fixed Network ports, each 200Gbps Card pair supports: 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-2C5LT MP-2B4CT	8,16,32Gbps ISL, 10GbE [R],25 GbE	135km
MA-2C2C3LT-A[2, R] with MP-2B4CT	Client and Line Side card pair: Client card – 5 QSFP client ports, each 4x28Gbps, 2 QSFP Network ports, each 4x28Gbps and AES 256 Encryption Line card – 4 QSFP client ports, each 4x28Gbps, 2 fixed Network ports, each 200Gbps Card pair supports: 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-2C2C3LT-A MP-2B4CT	8,16,32Gbps ISL, 10GbE [R],25 GbE	135km
MA-B2C3LT-A[2, R]	5 QSFP client ports, each 4x28Gbps, 1 CFP2 Network port, 224 Gbps and AES 256 Encryption 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-B2C3LT-A	8,16,32Gbps ISL, 10GbE [R],25 GbE	135km
MA-B5LT[2, R]	5 QSFP client ports, each 4x28Gbps, 1 CFP2 Network port 224 Gbps: 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-B5LT	8,16,32Gbps ISL, 10GbE [R],25 GbE,	135km

MA-2C5LT[2, R] with MP-2D12CT	Client and Line Side pair: Client Card- 5 QSFP client ports, each 4x28Gbps, 2 QSFP Network ports, each 4x28Gbps: Line card – 12 x QSFP 112Gbps, 2x fixed network ports, each 600Gbps Card pair supports: 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-2C5LT MP-2D12CT	8,16,32Gbps ISL, 10GbE [R],25 GbE	135km
MA-2C2C3LT-A[2, R] with MP-2D12CT	Client and Line Side pair: Client Card- 5 QSFP client ports, each 4x28Gbps, 2 QSFP Network ports, each 4x28Gbps: Line card – 12 x QSFP 112Gbps, 2x fixed network ports, each 600Gbps Card pair supports: 20 x 8G ISL 12 x 16G ISL 6 x 32G ISL 20 x 10GbE 6 x 25GbE	MA-2C2C3LT-A MP-2D12CT	8,16,32Gbps ISL, 10GbE [R],25 GbE	135km
10TCE-PCN-16GU+100G with MP-2D12CT	Client and Line Side pair: 10-port 16G TDM Module with pluggable CFP LR4 100G network interface 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE Line card – 12 x QSFP 112Gbps, 2x fixed network ports, each 600Gbps	10TCE-PCN-16GU+100G MP-2D12CT	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
10TCE-PCN-16GU+AES100G, 10TCE-PCN-16GU+AES100G-BSI, 10TCE-PCN-16GU+AES100G-F with MP-2D12CT	Client and Line Side pair: 10-port 16G TDM Module with pluggable CFP LR4 100G network interface and AES 256/Encryption 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE Line card – 12 x QSFP 112Gbps, 2x fixed network ports, each 600Gbps	10TCE-PCN-16GU+AES100G, 10TCE-PCN-16GU+AES100G-BSI, 10TCE-PCN-16GU+AES100G-F MP-2D12CT	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km

10TCE-PCN-16GU+100G with MP-2B4CT	Client and Line Side pair: 10-port 16G TDM Module with pluggable CFP LR4 100G network interface 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE Line card – 4 QSFP client ports, each 4x28Gbps, 2 fixed Network ports, each 200Gbps	10TCE-PCN-16GU+100G MP-2B4CT	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km
10TCE-PCN-16GU+AES100G, 10TCE-PCN-16GU+AES100G-BSI, 10TCE-PCN-16GU+AES100G-F with MP-2B4CT	Client and Line Side pair: 10-port 16G TDM Module with pluggable CFP LR4 100G network interface and AES 256/Encryption 10:1 or 10:4 5G InfiniBand (1x IFB DDR) 10:1 or 10:4 8G FCP/ISL 8:1 or 8:4 10G ISL 7:1 or 7:4 16G FCP/ISL 10:1 or 10:4 10G CE LR 10:1 or 10:4 10GbE Line card – 4 QSFP client ports, each 4x28Gbps, 2 fixed Network ports, each 200Gbps	10TCE-PCN-16GU+AES100G, 10TCE-PCN-16GU+AES100G-BSI, 10TCE-PCN-16GU+AES100G-F MP-2B4CT	1x IFB 5 Gbps (DDR), 10G CE LR, 8,16 Gbps FCP[2]/ISL, 10 Gbps ISL, 10GbE	135km

[1]Coupling Express LR links are only supported on the z15 T01, z15 T02, z14, z14 ZR1, z13 and z13s servers.

[2] The FSP 3000 and 3000CC do not perform link data rate auto-negotiation. Therefore, use of these platforms for FCP requires cascaded Directors/switches to set the link data rate.

[3] DWDM client modules that support 10GbE RoCE Express for SMC-R are noted in the table above with [R].

[4] The OPPM, RSM, or protection schemes cannot be used alone; they must be used in conjunction with client layer protection to ensure cross site connectivity is not lost during a switchover.

[5] To ensure bi-directional protection switching, at least one module must support an APS channel. For APS channel signaling, all 5TCE or 10TCE variants could be used. The OPPM must be configured for channel card trigger in conjunction with APS.

[6] PS-IFB is not supported on the z15 T01, z15 T02, or z14 ZR1.

[7] Y-cable/power splitter protection is only supported for use with the 5TCE card variants.

Note: Fujitsu OEMs the ADVA FSP 3000 under the name “Flashwave 7420”. The Fujitsu Flashwave 7420 branded platform has also been tested and qualified at release level 19.1.2 for all protocols and distances included in this qualification letter. ADVA FSP 3000CC Dense Wavelength Division Multiplexer (DWDM) Platform has been tested as a sub shelf with Fujitsu Flashwave 7420

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 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 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.

Results achieved were in a test environment under laboratory conditions. IBM does not make any representations or warranties regarding ADVA products. ADVA retains sole responsibility for its products, the performance of such products and all claims relating to such products, including without limitation its products' compliance with product specifications, industry standards and safety and other regulatory requirements.

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Qualification Letter Version History:
- 06/01/2020: Initial Version