

अनिवार्य आवश्यकताएँ

संख्या : TEC14762407

Essential Requirements

ER No. : TEC14762407

PON Family of Broadband Equipment

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Government of India

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Essential Requirements for:

PON Family of Broadband Equipment

Certification Scheme: **SCS**

Product Fee Group: **B**

This ER covers equipment used in all types of PON Systems

Note: Annexures referred to in this ER are Annexures as mentioned in "Annexures to ERs" No. TEC/SD/DD/TCP-222/02/June19 as updated from time to time and available on MTCTE portal.

This product has the following variants:

1. PON OLT
2. PON ONT
3. PON ONU

1. Variant 1 : PON OLT

1.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
1.1.1	Automatic Laser Shut-Down (ALS) or Automatic Power Shut-Down (APSD)	ITU-T G.664. IEC 60825. Annex-A1
1.1.2	Conducted And Radiated Emission - Class A or Class B	TEC EMI EMC Standard CISPR 32 EN55032. Class A or Class B applicability as defined in Notes to Annex-B.
1.1.3	ECR	TEC 74046 Annex-R
1.1.4	Frameloss of PON	RFC 2544. Annex-J3
1.1.5	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
1.1.6	Immunity to DC Voltage Dips and Short	EN/IEC:61000-4-29. Annex-B

	Interruptions	
1.1.7	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
1.1.8	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
1.1.9	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
1.1.10	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
1.1.11	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
1.1.12	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
1.1.13	Latency of PON	RFC 2544. Annex-J3
1.1.14	MAC Address Learning and Aging Control	G.984.1. Annex-J3
1.1.15	MAC Learning Support at OLT	G.984.1. Annex-J3
1.1.16	Maximum Bandwidth Limiting in PON	Annex-J3
1.1.17	Minimum Guaranteed Bandwidth in PON	Annex-J3
1.1.18	Minimum Two Classification in PON	Annex-J3
1.1.19	Port-id Based VLAN Support at OLT	Annex-J3
1.1.20	Switch Fabric Throughput Capability OLT	Annex-J3
1.1.21	VLAN Stacking to Network Support at OLT	IEEE 802.1ad. IEEE 802.1Q(testing procedure). Annex-J3

1.2 Interface 1 : 100 G Optical Ethernet

S.No.	Parameter Name	Standard Name
1.2.1	Average Launch power for 100 GE Opt	IEEE 802.3ba Cl. 86 88. Annex-H
1.2.2	Receiver Sensitivity 100 GE Opt	IEEE 802.3ba Cl. 86 88. Annex-H
1.2.3	Wavelength for 100 GE Opt	IEEE 802.3ba Cl. 86 88. Annex-H

1.3 Interface 2 : 10 100 1000 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
1.3.1	Link Speed and Autonegotiation Test GE	IEEE 802.3. Annex-H

1.4 Interface 3 : 10G EPON

S.No.	Parameter Name	Standard Name
1.4.1	Operating Wavelength in Downstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
1.4.2	Operating Wavelength in Upstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
1.4.3	Opt Output Power for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
1.4.4	Opt Output Power for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
1.4.5	Protocol test for 10G-EPON Int	IEEE 802.3av. BBF-TR-201. Annex-J2
1.4.6	Receiver Sensitivity for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
1.4.7	Receiver Sensitivity for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
1.4.8	Throughput for 10G-EPON Int	IEEE 802.3av. RFC 2544. Annex-J3

1.5 Interface 4 : 10 G Optical Ethernet

S.No.	Parameter Name	Standard Name
1.5.1	Average Launch power for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
1.5.2	Receiver Sensitivity 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
1.5.3	Wavelength for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H

1.6 Interface 5 : 1 G Optical Ethernet

S.No.	Parameter Name	Standard Name
1.6.1	Average Launch power for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
1.6.2	Receiver Sensitivity 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
1.6.3	Wavelength for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H

1.7 Interface 6 : 25 G Optical Ethernet

S.No.	Parameter Name	Standard Name
1.7.1	Average Launch Power for 25 GE Opt	IEEE 802.3 - 2018 Cl. 114
1.7.2	Receiver Sensitivity for 25 GE Opt	IEEE 802.3 - 2018 Cl. 114
1.7.3	Wavelength for 25 GE Opt	IEEE 802.3 - 2018 Cl. 114

1.8 Interface 7 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
1.8.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
1.8.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
1.8.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
1.8.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
1.8.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

1.9 Interface 8 : 40 G Optical Ethernet

S.No.	Parameter Name	Standard Name
1.9.1	Average Launch power for 40 GE Opt	IEEE 802.3ba Cl. 86 87. Annex-H
1.9.2	Receiver Sensitivity 40 GE Opt	IEEE 802.3ba Cl. 86 87. Annex-H
1.9.3	Wavelength for 40 GE Opt	IEEE 802.3ba Cl. 86 87. Annex-H

1.10 Interface 9 : EPON

S.No.	Parameter Name	Standard Name
1.10.1	Operating Wavelength in Downstream direction for EPON Int	IEEE 802.3ah. Annex-J2
1.10.2	Operating Wavelength in upstream direction for EPON Int	IEEE 802.3ah. Annex-J2
1.10.3	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
1.10.4	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
1.10.5	Protocol Test for EPON Int.	IEEE 802.3ah. BBF-TR-201. Annex-J2
1.10.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
1.10.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
1.10.8	Throughput for EPON Int	IEEE 802.3ah. RFC 2544. Annex-J3

1.11 Interface 10 : GPON

S.No.	Parameter Name	Standard Name
1.11.1	Interoperability Test for GPON Int	ITU-T G.984.x G.988 and BFF-TR-255 Annex-J5

1.11.2	Protocol Test for GPON Int	G.984.x. Annex-J2
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1.12 Interface 11 : MPS Multi PON

S.No.	Parameter Name	Standard Name
1.12.1	Operating Wavelength in Downstream direction MPS Int	G.984.5. amendment-2. Annex-J2
1.12.2	Operating Wavelength in Upstream direction MPS Int	G.984.5. amendment-2. Annex-J2
1.12.3	Opt Output Power MPS Int at OLT	G.984.5. amendment-2. Annex-J2
1.12.4	Opt Output Power MPS Int at ONT	G.984.5. amendment-2. Annex-J2
1.12.5	Protocol test for MPS int	G.984.x. Annex-J2 and G.9807.x. Annex-J2
1.12.6	Receiver Sensitivity MPS Int at OLT	G.984.5. amendment-2. Annex-J2
1.12.7	Receiver Sensitivity MPS Int at ONT	G.984.5. amendment-2. Annex-J2
1.12.8	Throughput for MPS Int	G.984.1 RFC 2544. Annex-J3 and G.9807.1 RFC 2544. Annex-J3

1.13 Interface 12 : MPX Multi PON

S.No.	Parameter Name	Standard Name
1.13.1	Operating Wavelength in downstream direction MPX Int	G.984.5. amendment-2. Annex-J2
1.13.2	Operating Wavelength in upstream direction MPX Int	G.984.5. amendment-2. Annex-J2
1.13.3	Opt Output Power MPX Int at OLT	G.984.5. amendment-2. Annex-J2
1.13.4	Opt Output Power MPX Int at ONT	G.984.5. amendment-2. Annex-J2
1.13.5	Protocol test for MPX int	G.984.x. Annex-J2 and G.987.x. Annex-J2
1.13.6	Receiver Sensitivity MPX Int at OLT	G.984.5. amendment-2. Annex-J2
1.13.7	Receiver Sensitivity MPX Int at ONT	G.984.5. amendment-2. Annex-J2
1.13.8	Throughput for MPX Int	G.984.1 RFC 2544. Annex-J3 and G.987.1 RFC 2544. Annex-J3

1.14 Interface 13 : NGPON2

S.No.	Parameter Name	Standard Name
1.14.1	Operating Wavelength in Downstream	G.989.2. Annex-J2

	direction NGPON2 Int	
1.14.2	Operating Wavelength in upstream direction NGPON2 Int	G.989.2. Annex-J2
1.14.3	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
1.14.4	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
1.14.5	Protocol Test for NGPON2 Int	G.989.x. Annex-J2
1.14.6	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
1.14.7	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
1.14.8	Throughput for NGPON2 Int	G.989.2. RFC 2544. Annex-J3

1.15 Interface 14 : Nx25G EPON

S.No.	Parameter Name	Standard Name
1.15.1	Operating Wavelength in Downstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
1.15.2	Operating Wavelength in Upstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
1.15.3	Opt Output Power for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
1.15.4	Opt Output Power for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
1.15.5	Protocol test for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
1.15.6	Receiver Sensitivity for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
1.15.7	Receiver Sensitivity for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
1.15.8	Throughput for Nx25G-EPON Int	IEEE 802.3ca. RFC 2544. Annex-J3

1.16 Interface 15 : RF Video

S.No.	Parameter Name	Standard Name
1.16.1	RF Video Output Bandwidth	52 + 870 MHz. - 870 MHz. Annex-J2
1.16.2	RF Video Output Level	14 dBmV. Annex-J2

1.17 Interface 16 : STM-1 Optical

S.No.	Parameter Name	Standard Name
1.17.1	Input Jitter Tolerance for STM-1 Opt	ITU-T G.825. Annex-K
1.17.2	Mean Launched Power for STM-1 Opt Int	ITU-T G.957. Annex-K
1.17.3	Nominal Bit Rate with Tolerance STM-1 Opt Int	ITU-T G.957. Annex-K
1.17.4	Operating Wavelength Range for STM-1 Opt Int	ITU-T G.957. Annex-K
1.17.5	Output Jitter for STM-1 Opt Int	ITU-T G.783 Annex-K
1.17.6	Receiver Overload for STM-1 Opt Int	ITU-T G.957. Annex-K
1.17.7	Receiver Sensitivity for STM-1 Opt Int	ITU-T G.957. Annex-K

1.18 Interface 17 : WDM PON

S.No.	Parameter Name	Standard Name
1.18.1	Operating Wavelength Downstream Direction WDM PON Int	G.694.1. Annex-J2
1.18.2	Operating Wavelength Upstream Direction WDM PON Int	G.694.1. Annex-J2
1.18.3	Opt Output Power WDM PON Int at OLT	G.694.1. Annex-J2
1.18.4	Opt Output Power WDM PON Int at ONT	G.694.1. Annex-J2
1.18.5	Protocol test for WDM PON Int	G.698.x. Annex-J2
1.18.6	Receiver Sensitivity WDM PON Int at OLT	G.694.1. Annex-J2
1.18.7	Receiver Sensitivity WDM PON Int at ONT	G.694.1. Annex-J2
1.18.8	Throughput for WDM PON Int	G.694.1.RFC 2544. Annex-J3

1.19 Interface 18 : XGPON

S.No.	Parameter Name	Standard Name
1.19.1	Operating Wavelength Downstream Direction for XGPON Int	G.987.2. Annex-J2
1.19.2	Operating Wavelength Upstream Direction for XGPON Int	G.987.2. Annex-J2
1.19.3	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
1.19.4	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2
1.19.5	Protocol test for XGPON Int	G.987.x. Annex-J2

1.19.6	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
1.19.7	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
1.19.8	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

1.20 Interface 19 : XGSPON

S.No.	Parameter Name	Standard Name
1.20.1	Operating Wavelength Downstream Direction XGSPON Int	G.9807.1. Annex-J2
1.20.2	Operating Wavelength Upstream Direction XGSPON Int	G.9807.1. Annex-J2
1.20.3	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
1.20.4	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
1.20.5	Protocol Test for XGSPON Int	G.9807.x. Annex-J2
1.20.6	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
1.20.7	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
1.20.8	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3

2. Variant 2 : PON ONT

2.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
2.1.1	Automatic Laser Shut-Down (ALS) or Automatic Power Shut-Down (APSD)	ITU-T G.664. IEC 60825. Annex-A1
2.1.2	Conducted And Radiated Emission - Class A or Class B	TEC EMI EMC Standard CISPR 32 EN55032. Class A or Class B applicability as defined in Notes to Annex-B.
2.1.3	Dual IP Layer Operation RFC 4213 - Address	RFC 4213 Cl. 2.1. Annex-P6
2.1.4	Dual IP Layer Operation RFC 4213 - DNS	RFC 4213 Cl. 2.1. Annex-P6
2.1.5	ECR	TEC 74046 Annex-R
2.1.6	Frameloss of PON	RFC 2544. Annex-J3
2.1.7	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
2.1.8	Immunity to DC Voltage Dips and Short	EN/IEC:61000-4-29. Annex-B

	Interruptions	
2.1.9	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
2.1.10	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
2.1.11	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
2.1.12	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
2.1.13	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
2.1.14	IPV6 Extn Header Parameters	RFC 2460 or RFC 8200 . Annex-P7
2.1.15	IPV6 Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
2.1.16	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
2.1.17	Latency of PON	RFC 2544. Annex-J3
2.1.18	MAC Address Limitation in PON	IEEE 802.3. Annex-J3
2.1.19	Password Based Authentication in PON	ITU-T G.984.3 section 9.2.2 12. Annex-J3

2.2 Interface 1 : 10 100 1000 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.2.1	Link Speed and Autonegotiation Test GE	IEEE 802.3. Annex-H

2.3 Interface 2 : 10 100 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.3.1	Link Speed and Autonegotiation Test FE	IEEE 802.3 Annex-H

2.4 Interface 3 : 10 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.4.1	Link Speed	IEEE 802.3 Annex-H

2.5 Interface 4 : 10G EPON

S.No.	Parameter Name	Standard Name
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2.5.1	Operating Wavelength in Downstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
2.5.2	Operating Wavelength in Upstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
2.5.3	Opt Output Power for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
2.5.4	Opt Output Power for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
2.5.5	Protocol test for 10G-EPON Int	IEEE 802.3av. BBF-TR-201. Annex-J2
2.5.6	Receiver Sensitivity for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
2.5.7	Receiver Sensitivity for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
2.5.8	Throughput for 10G-EPON Int	IEEE 802.3av. RFC 2544. Annex-J3

2.6 Interface 5 : 10 G Optical Ethernet

S.No.	Parameter Name	Standard Name
2.6.1	Average Launch power for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
2.6.2	Receiver Sensitivity 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
2.6.3	Wavelength for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H

2.7 Interface 6 : 1 G Optical Ethernet

S.No.	Parameter Name	Standard Name
2.7.1	Average Launch power for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
2.7.2	Receiver Sensitivity 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
2.7.3	Wavelength for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H

2.8 Interface 7 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
2.8.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
2.8.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
2.8.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
2.8.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
2.8.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

2.9 Interface 8 : 2 Wire

S.No.	Parameter Name	Standard Name
2.9.1	Idle State Current for 2 wire Int	ETSI EN 300 001 ETSI TBR-21 Cl. 4.4.1. Annex-D
2.9.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
2.9.3	Longitudinal Conversion Loss for 2W Int	Q.552 Cl. 2.2.2. Annex-D
2.9.4	Maximum Loop Current for 2W Int	ETSI EN 300 001 ETSI TBR-21 Cl.4.4.3. Annex-D
2.9.5	Return Loss for 2W Int	Q.552 Cl. 2.2.1.2. Annex-D

2.10 Interface 9 : EPON

S.No.	Parameter Name	Standard Name
2.10.1	Operating Wavelength in Downstream direction for EPON Int	IEEE 802.3ah. Annex-J2
2.10.2	Operating Wavelength in upstream direction for EPON Int	IEEE 802.3ah. Annex-J2
2.10.3	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
2.10.4	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
2.10.5	Protocol Test for EPON Int.	IEEE 802.3ah. BBF-TR-201. Annex-J2
2.10.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
2.10.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
2.10.8	Throughput for EPON Int	IEEE 802.3ah. RFC 2544. Annex-J3

2.11 Interface 10 : Fast Ethernet Optical

S.No.	Parameter Name	Standard Name
2.11.1	Average Launch power for FE Opt	IEEE 802.3u. Annex-H
2.11.2	Receiver Sensitivity for FE Opt	IEEE 802.3u. Annex-H
2.11.3	Wavelength for FE Opt	IEEE 802.3u. Annex-H

2.12 Interface 11 : GPON

S.No.	Parameter Name	Standard Name
2.12.1	Interoperability Test for GPON Int	ITU-T G.984.x G.988 and BFF-TR-255

		Annex-J5
2.12.2	Protocol Test for GPON Int	G.984.x. Annex-J2

2.13 Interface 12 : NGPON2

S.No.	Parameter Name	Standard Name
2.13.1	Operating Wavelength in Downstream direction NGPON2 Int	G.989.2. Annex-J2
2.13.2	Operating Wavelength in upstream direction NGPON2 Int	G.989.2. Annex-J2
2.13.3	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
2.13.4	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
2.13.5	Protocol Test for NGPON2 Int	G.989.x. Annex-J2
2.13.6	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
2.13.7	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
2.13.8	Throughput for NGPON2 Int	G.989.2. RFC 2544. Annex-J3

2.14 Interface 13 : Nx25G EPON

S.No.	Parameter Name	Standard Name
2.14.1	Operating Wavelength in Downstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
2.14.2	Operating Wavelength in Upstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
2.14.3	Opt Output Power for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
2.14.4	Opt Output Power for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
2.14.5	Protocol test for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
2.14.6	Receiver Sensitivity for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
2.14.7	Receiver Sensitivity for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
2.14.8	Throughput for Nx25G-EPON Int	IEEE 802.3ca. RFC 2544. Annex-J3

2.15 Interface 14 : WDMPON

S.No.	Parameter Name	Standard Name
2.15.1	Operating Wavelength Downstream Direction WDMPON Int	G.694.1. Annex-J2
2.15.2	Operating Wavelength Upstream Direction WDMPON Int	G.694.1. Annex-J2
2.15.3	Opt Output Power WDMPON Int at OLT	G.694.1. Annex-J2
2.15.4	Opt Output Power WDMPON Int at ONT	G.694.1. Annex-J2
2.15.5	Protocol test for WDMPON Int	G.698.x. Annex-J2
2.15.6	Receiver Sensitivity WDMPON Int at OLT	G.694.1. Annex-J2
2.15.7	Receiver Sensitivity WDMPON Int at ONT	G.694.1. Annex-J2
2.15.8	Throughput for WDMPON Int	G.694.1.RFC 2544. Annex-J3

2.16 Interface 15 : WiFi

S.No.	Parameter Name	Standard Name
2.16.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
2.16.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 and or ETSI EN 302 502 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
2.16.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
2.16.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E) 1048(E). Annex-G1

2.17 Interface 16 : XGPON

S.No.	Parameter Name	Standard Name
2.17.1	Operating Wavelength Downstream Direction for XGPON Int	G.987.2. Annex-J2
2.17.2	Operating Wavelength Upstream Direction for XGPON Int	G.987.2. Annex-J2
2.17.3	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
2.17.4	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2

2.17.5	Protocol test for XGPON Int	G.987.x. Annex-J2
2.17.6	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
2.17.7	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
2.17.8	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

2.18 Interface 17 : XGSPON

S.No.	Parameter Name	Standard Name
2.18.1	Operating Wavelength Downstream Direction XGSPON Int	G.9807.1. Annex-J2
2.18.2	Operating Wavelength Upstream Direction XGSPON Int	G.9807.1. Annex-J2
2.18.3	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
2.18.4	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
2.18.5	Protocol Test for XGSPON Int	G.9807.x. Annex-J2
2.18.6	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
2.18.7	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
2.18.8	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3

3. Variant 3 : PON ONU

3.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
3.1.1	Automatic Laser Shut-Down (ALS) or Automatic Power Shut-Down (APSD)	ITU-T G.664. IEC 60825. Annex-A1
3.1.2	Conducted And Radiated Emission - Class A or Class B	TEC EMI EMC Standard CISPR 32 EN55032. Class A or Class B applicability as defined in Notes to Annex-B.
3.1.3	DOS Prevention SSH v1-2 for CLI in PON	ITU-T G.984.3 section V.2 SSH v2 RFC 4251. Annex-J3
3.1.4	Dual IP Layer Operation RFC 4213 - Address	RFC 4213 Cl. 2.1. Annex-P6
3.1.5	Dual IP Layer Operation RFC 4213 - DNS	RFC 4213 Cl. 2.1 and 2.2. Annex-P6
3.1.6	ECR	TEC 74046 Annex-R
3.1.7	Frameloss of PON	RFC 2544. Annex-J3

3.1.8	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
3.1.9	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
3.1.10	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
3.1.11	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
3.1.12	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
3.1.13	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
3.1.14	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
3.1.15	Inbuilt-port or MAC Based 802.1x Authentication in PON	IEEE 802.1x. Annex-J3
3.1.16	IPV6 Extn Header Parameters	RFC 2460 or RFC 8200 . Annex-P7
3.1.17	IPV6 Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
3.1.18	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
3.1.19	Latency of PON	RFC 2544. Annex-J3
3.1.20	MAC Address Limitation in PON	IEEE 802.3. Annex-J3
3.1.21	Over Voltage and over Current Protection on 2W	K.21. Annex-D
3.1.22	Password Based Authentication in PON	ITU-T G.984.3 section 9.2.2 12. Annex-J3

3.2 Interface 1 : 10 100 1000 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
3.2.1	Link Speed and Autonegotiation Test GE	IEEE 802.3. Annex-H

3.3 Interface 2 : 10 100 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
3.3.1	Link Speed and Autonegotiation Test FE	IEEE 802.3 Annex-H

3.4 Interface 3 : 10 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
3.4.1	Link Speed	IEEE 802.3 Annex-H

3.5 Interface 4 : 10G EPON

S.No.	Parameter Name	Standard Name
3.5.1	Operating Wavelength in Downstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
3.5.2	Operating Wavelength in Upstream direction for 10G-EPON Int	IEEE 802.3av. Annex-J2
3.5.3	Opt Output Power for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
3.5.4	Opt Output Power for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
3.5.5	Protocol test for 10G-EPON Int	IEEE 802.3av. BBF-TR-201. Annex-J2
3.5.6	Receiver Sensitivity for 10G-EPON Int at OLT	IEEE 802.3av. Annex-J2
3.5.7	Receiver Sensitivity for 10G-EPON Int at ONT	IEEE 802.3av. Annex-J2
3.5.8	Throughput for 10G-EPON Int	IEEE 802.3av. RFC 2544. Annex-J3

3.6 Interface 5 : 10 G Optical Ethernet

S.No.	Parameter Name	Standard Name
3.6.1	Average Launch power for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
3.6.2	Receiver Sensitivity 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
3.6.3	Wavelength for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H

3.7 Interface 6 : 1 G Optical Ethernet

S.No.	Parameter Name	Standard Name
3.7.1	Average Launch power for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
3.7.2	Receiver Sensitivity 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
3.7.3	Wavelength for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H

3.8 Interface 7 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
3.8.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.8.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
3.8.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
3.8.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.8.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

3.9 Interface 8 : 2 Wire

S.No.	Parameter Name	Standard Name
3.9.1	Idle State Current for 2 wire Int	ETSI EN 300 001 ETSI TBR-21 Cl. 4.4.1. Annex-D
3.9.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
3.9.3	Longitudinal Conversion Loss for 2W Int	Q.552 Cl. 2.2.2. Annex-D
3.9.4	Maximum Loop Current for 2W Int	ETSI EN 300 001 ETSI TBR-21 Cl.4.4.3. Annex-D
3.9.5	Return Loss for 2W Int	Q.552 Cl. 2.2.1.2. Annex-D

3.10 Interface 9 : ADSLx

S.No.	Parameter Name	Standard Name
3.10.1	Bit Rate for ADSLx Int	Annex-J1
3.10.2	Impulse Noise Protection for ADSL Int	Annex-J1
3.10.3	Insulation Test for ADSL Int	Annex-J1
3.10.4	Line Port impedance for ADSLx Int	Annex-J1
3.10.5	Loop resistance for ADSLx	ETSI EN 300 001. Annex-J1
3.10.6	PSD for ADSLx Int	Annex-J1
3.10.7	Transmitted Power At ATU-C for ADSLx Int	Annex-J1

3.11 Interface 10 : EPON

S.No.	Parameter Name	Standard Name
3.11.1	Operating Wavelength in Downstream direction for EPON Int	IEEE 802.3ah. Annex-J2
3.11.2	Operating Wavelength in upstream direction	IEEE 802.3ah. Annex-J2

	for EPON Int	
3.11.3	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
3.11.4	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
3.11.5	Protocol Test for EPON Int.	IEEE 802.3ah. BBF-TR-201. Annex-J2
3.11.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
3.11.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
3.11.8	Throughput for EPON Int	IEEE 802.3ah. RFC 2544. Annex-J3

3.12 Interface 11 : Fast Ethernet Optical

S.No.	Parameter Name	Standard Name
3.12.1	Average Launch power for FE Opt	IEEE 802.3u. Annex-H
3.12.2	Receiver Sensitivity for FE Opt	IEEE 802.3u. Annex-H
3.12.3	Wavelength for FE Opt	IEEE 802.3u. Annex-H

3.13 Interface 12 : G.FAST

S.No.	Parameter Name	Standard Name
3.13.1	Impulse Noise Protection for G.FAST Int	Annex-J1
3.13.2	Insulation Test for G.FAST Int	Annex-J1
3.13.3	Loop Resistance for G.FAST IntSLx	EN 300 001. Annex-J1
3.13.4	PPPoE for G.FAST Int	RFC 2516. Annex-J1
3.13.5	Profiles for G.FAST Int	G.9700. Annex-J1
3.13.6	PVC Support for G.FAST Int	Annex-J1
3.13.7	Throughput Test for G.FAST Int	Annex-J1
3.13.8	VPI-VCI Support for G.FAST Int	Annex-J1

3.14 Interface 13 : G.HN

S.No.	Parameter Name	Standard Name
3.14.1	Profiles for G.HN Int	G.9960 Cl. 6. Annex-J1
3.14.2	PSD for G.HN	G.9964. Annex-J1

3.15 Interface 14 : GPON

S.No.	Parameter Name	Standard Name
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3.15.1	Interoperability Test for GPON Int	ITU-T G.984.x G.988 and BFF-TR-255 Annex-J5
3.15.2	Protocol Test for GPON Int	G.984.x. Annex-J2

3.16 Interface 15 : NGPON2

S.No.	Parameter Name	Standard Name
3.16.1	Operating Wavelength in Downstream direction NGPON2 Int	G.989.2. Annex-J2
3.16.2	Operating Wavelength in upstream direction NGPON2 Int	G.989.2. Annex-J2
3.16.3	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
3.16.4	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
3.16.5	Protocol Test for NGPON2 Int	G.989.x. Annex-J2
3.16.6	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
3.16.7	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
3.16.8	Throughput for NGPON2 Int	G.989.2. RFC 2544. Annex-J3

3.17 Interface 16 : Nx25G EPON

S.No.	Parameter Name	Standard Name
3.17.1	Operating Wavelength in Downstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
3.17.2	Operating Wavelength in Upstream direction for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
3.17.3	Opt Output Power for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
3.17.4	Opt Output Power for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
3.17.5	Protocol test for Nx25G-EPON Int	IEEE 802.3ca. Annex-J2
3.17.6	Receiver Sensitivity for Nx25G-EPON Int at OLT	IEEE 802.3ca. Annex-J2
3.17.7	Receiver Sensitivity for Nx25G-EPON Int at ONT	IEEE 802.3ca. Annex-J2
3.17.8	Throughput for Nx25G-EPON Int	IEEE 802.3ca. RFC 2544. Annex-J3

3.18 Interface 17 : VDSLx

S.No.	Parameter Name	Standard Name
3.18.1	Bit Rate for VDSLx Int	G.993.1 or G993.2. Annex-J1
3.18.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
3.18.3	Line Port impedance for VDSLx Int	G.993.1 or G.993.2 Annex-J1
3.18.4	Loop resistance for VDSLx	ETSI EN 300 001. Annex-J1
3.18.5	Profiles for VDSLx	G.993.1 or G.993.2 Annex-J1
3.18.6	PSD for VDSLx Int	G.993.1(cl 6.2). G.993.2(cl 7.2) Ann-A B C. Annex-J1
3.18.7	Return Loss for VDSLx	G.993.1 or G.993.2 Annex-J1
3.18.8	Transmitted Power At ATU-C for VDSLx Int	G.993.1 or G.993.2 Annex-J1

3.19 Interface 18 : WDMPON

S.No.	Parameter Name	Standard Name
3.19.1	Operating Wavelength Downstream Direction WDMPON Int	G.694.1. Annex-J2
3.19.2	Operating Wavelength Upstream Direction WDMPON Int	G.694.1. Annex-J2
3.19.3	Opt Output Power WDMPON Int at OLT	G.694.1. Annex-J2
3.19.4	Opt Output Power WDMPON Int at ONT	G.694.1. Annex-J2
3.19.5	Protocol test for WDMPON Int	G.698.x. Annex-J2
3.19.6	Receiver Sensitivity WDMPON Int at OLT	G.694.1. Annex-J2
3.19.7	Receiver Sensitivity WDMPON Int at ONT	G.694.1. Annex-J2
3.19.8	Throughput for WDMPON Int	G.694.1.RFC 2544. Annex-J3

3.20 Interface 19 : WiFi

S.No.	Parameter Name	Standard Name
3.20.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
3.20.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 and or ETSI EN 302 502 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3

3.20.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
3.20.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E) 1048(E). Annex-G1

3.21 Interface 20 : XGPON

S.No.	Parameter Name	Standard Name
3.21.1	Operating Wavelength Downstream Direction for XGPON Int	G.987.2. Annex-J2
3.21.2	Operating Wavelength Upstream Direction for XGPON Int	G.987.2. Annex-J2
3.21.3	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
3.21.4	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2
3.21.5	Protocol test for XGPON Int	G.987.x. Annex-J2
3.21.6	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
3.21.7	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
3.21.8	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

3.22 Interface 21 : XGSPON

S.No.	Parameter Name	Standard Name
3.22.1	Operating Wavelength Downstream Direction XGSPON Int	G.9807.1. Annex-J2
3.22.2	Operating Wavelength Upstream Direction XGSPON Int	G.9807.1. Annex-J2
3.22.3	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
3.22.4	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
3.22.5	Protocol Test for XGSPON Int	G.9807.x. Annex-J2
3.22.6	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
3.22.7	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
3.22.8	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3