

**अनिवार्य आवश्यकताएँ**

**संख्या : TEC56422005**

**Essential Requirements**

**ER No. : TEC56422005**

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**PTP PMP Microwave Fixed Radio Systems**

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**Government of India**

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## Essential Requirements for:

# PTP PMP Microwave Fixed Radio Systems

Certification Scheme: **GCS**

Product Fee Group: **C**

This ER covers all types of Point to Point and Point to Multi-point Microwave Fixed Radio 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. PTP/ PMP Full Outdoor Microwave Systems
2. PTP/ PMP Split MW Outdoor Unit
3. PTP/ PMP Split MW Indoor Unit

### 1. Variant 1 : PTP/ PMP Full Outdoor Microwave Systems

#### 1.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
1.1.1	Conducted And Radiated Emission - Class A	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
1.1.2	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
1.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
1.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
1.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B

1.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
1.1.7	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
1.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
1.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
1.1.10	IT Equipment Safety for Radio Products	EN/IEC 60215:2016. Annex-A3
1.1.11	Frequency for PMP Radio Interface	NFAP. Annex-C1
1.1.12	Frequency for PTP Radio Interface	NFAP. Annex-C1
1.1.13	PMP Fixed Digital Radio Conformance	ETSI EN 302 326-2. Annex-C3
1.1.14	PTP Fixed Digital Radio Conformance	ETSI EN 302 217-2. Annex-C3
1.1.15	Transmit Power for PMP Radio Interface	As per DoT/WPC license conditions. Annex-C2
1.1.16	Transmit Power for PTP Radio interface	As per DoT/WPC license conditions. Annex-C2

## 1.2 Interface 1 : 1 G Optical Ethernet

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

## 1.3 Interface 2 : Fast Ethernet Electrical

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

## 1.4 Interface 3 : Gigabit Ethernet Electrical

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

## 1.5 Interface 4 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
1.5.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
1.5.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
1.5.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
1.5.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
1.5.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

### 1.6 Interface 5 : STM-1 Electrical

S.No.	Parameter Name	Standard Name
1.6.1	Input Jitter Tolerance STM-1 Electrical	ITU-T G.825. Annex-K
1.6.2	Input Return Loss for STM-1 Electrical	ITU-T G.703. Annex-K
1.6.3	Nominal Bit Rate with Tolerance STM-1 Electrical Int	ITU-T G.703. Annex-K
1.6.4	Output Jitter for STM-1 Electrical Int	ITU-T G.825. Annex-K
1.6.5	Pulse Mask for STM-1 Electrical Int	ITU-T G.703. Annex-K

### 1.7 Interface 6 : STM-1 Optical

S.No.	Parameter Name	Standard Name
1.7.1	Input Jitter Tolerance for STM-1 Opt	ITU-T G.825. Annex-K
1.7.2	Mean Launched Power for STM-1 Opt Int	ITU-T G.957. Annex-K
1.7.3	Nominal Bit Rate with Tolerance STM-1 Opt Int	ITU-T G.957. Annex-K
1.7.4	Operating Wavelength Range for STM-1 Opt Int	ITU-T G.957. Annex-K
1.7.5	Output Jitter for STM-1 Opt Int	ITU-T G.783 G.825 Annex-K
1.7.6	Receiver Overload for STM-1 Opt Int	ITU-T G.957. Annex-K
1.7.7	Receiver Sensitivity for STM-1 Opt Int	ITU-T G.957. Annex-K

### 1.8 Interface 7 : STM-16 Optical

S.No.	Parameter Name	Standard Name
1.8.1	Input Jitter Tolerance for STM-16 Opt	G.825. Annex-K
1.8.2	Mean Launched Power for STM-16 Opt Int	ITU-T G.957. Annex-K

1.8.3	Nominal Bit Rate with Tolerance STM-16 Opt Int	ITU-T G.957. Annex-K
1.8.4	Operating Wavelength Range for STM-16 Opt Int	ITU-T G.957. Annex-K
1.8.5	Output Jitter for STM-16 Opt Int	ITU-T G.783. Annex-K
1.8.6	Receiver Overload for STM-16 Opt Int	ITU-T G.957. Annex-K
1.8.7	Receiver Sensitivity for STM-16 Opt Int	ITU-T G.957. Annex-K

### 1.9 Interface 8 : STM-4 Optical

S.No.	Parameter Name	Standard Name
1.9.1	Input Jitter Tolerance for STM-4 Opt	ITU-T G.825. Annex-K
1.9.2	Mean Launched Power for STM-4 Opt Int	ITU-T G.957. Annex-K
1.9.3	Nominal Bit Rate with Tolerance STM-4 Opt Int	ITU-T G.957 Annex-K
1.9.4	Operating Wavelength Range for STM-4 Opt Int	ITU-T G.957. Annex-K
1.9.5	Output Jitter for STM-4 Opt Int	ITU-T G.783. Annex-K
1.9.6	Receiver Overload for STM-4 Opt Int	ITU-T G.957. Annex-K
1.9.7	Receiver Sensitivity for STM-4 Opt Int	ITU-T G.957. Annex-K

## 2. Variant 2 : PTP/ PMP Split MW Outdoor Unit

### 2.101 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
2.1.1	Conducted And Radiated Emission - Class A	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
2.1.2	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
2.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
2.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
2.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B

2.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
2.1.7	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
2.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
2.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
2.1.10	IT Equipment Safety for Radio Products	EN/IEC 60215:2016. Annex-A3
2.1.11	Frequency for PMP Radio Interface	NFAP. Annex-C1
2.1.12	Frequency for PTP Radio Interface	NFAP. Annex-C1
2.1.13	PMP Fixed Digital Radio Requirements	ETSI EN 302 326-2. Annex-C3
2.1.14	PTP Fixed Digital Radio Requirements	ETSI EN 302 217-2. Annex-C3
2.1.15	Transmit Power for PMP Radio Interface	As per DoT/WPC license conditions. Annex-C2
2.1.16	Transmit Power for PTP Radio interface	As per DoT/WPC license conditions. Annex-C2

### 3. Variant 3 : PTP/ PMP Split MW Indoor Unit

#### 3.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
3.1.1	Conducted And Radiated Emission - Class A	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
3.1.2	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
3.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
3.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
3.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
3.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
3.1.7	Immunity to RF Field Induced Conducted	TEC EMI EMC Standard EN/IEC:61000-4-6.

	Disturbance	Annex-B
3.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
3.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1

### 3.2 Interface 1 : 1 G Optical Ethernet

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

### 3.3 Interface 2 : Fast Ethernet Electrical

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

### 3.4 Interface 3 : Gigabit Ethernet Electrical

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

### 3.5 Interface 4 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
3.5.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.5.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
3.5.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
3.5.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.5.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

### 3.6 Interface 5 : STM-1 Electrical

S.No.	Parameter Name	Standard Name
3.6.1	Input Jitter Tolerance STM-1 Electrical	ITU-T G.825. Annex-K
3.6.2	Input Return Loss for STM-1 Electrical	ITU-T G.703. Annex-K

3.6.3	Nominal Bit Rate with Tolerance STM-1 Electrical Int	ITU-T G.703. Annex-K
3.6.4	Output Jitter for STM-1 Electrical Int	ITU-T G.825. Annex-K
3.6.5	Pulse Mask for STM-1 Electrical Int	ITU-T G.703. Annex-K

### 3.7 Interface 6 : STM-1 Optical

S.No.	Parameter Name	Standard Name
3.7.1	Input Jitter Tolerance for STM-1 Opt	ITU-T G.825. Annex-K
3.7.2	Mean Launched Power for STM-1 Opt Int	ITU-T G.957. Annex-K
3.7.3	Nominal Bit Rate with Tolerance STM-1 Opt Int	ITU-T G.957. Annex-K
3.7.4	Operating Wavelength Range for STM-1 Opt Int	ITU-T G.957. Annex-K
3.7.5	Output Jitter for STM-1 Opt Int	ITU-T G.783 G.825 Annex-K
3.7.6	Receiver Overload for STM-1 Opt Int	ITU-T G.957. Annex-K
3.7.7	Receiver Sensitivity for STM-1 Opt Int	ITU-T G.957. Annex-K

### 3.8 Interface 7 : STM-16 Optical

S.No.	Parameter Name	Standard Name
3.8.1	Input Jitter Tolerance for STM-16 Opt	G.825. Annex-K
3.8.2	Mean Launched Power for STM-16 Opt Int	ITU-T G.957. Annex-K
3.8.3	Nominal Bit Rate with Tolerance STM-16 Opt Int	ITU-T G.957. Annex-K
3.8.4	Operating Wavelength Range for STM-16 Opt Int	ITU-T G.957. Annex-K
3.8.5	Output Jitter for STM-16 Opt Int	ITU-T G.783. Annex-K
3.8.6	Receiver Overload for STM-16 Opt Int	ITU-T G.957. Annex-K
3.8.7	Receiver Sensitivity for STM-16 Opt Int	ITU-T G.957. Annex-K

### 3.9 Interface 8 : STM-4 Optical

S.No.	Parameter Name	Standard Name
3.9.1	Input Jitter Tolerance for STM-4 Opt	ITU-T G.825. Annex-K
3.9.2	Mean Launched Power for STM-4 Opt Int	ITU-T G.957. Annex-K



3.9.3	Nominal Bit Rate with Tolerance STM-4 Opt Int	ITU-T G.957 Annex-K
3.9.4	Operating Wavelength Range for STM-4 Opt Int	ITU-T G.957. Annex-K
3.9.5	Output Jitter for STM-4 Opt Int	ITU-T G.783. Annex-K
3.9.6	Receiver Overload for STM-4 Opt Int	ITU-T G.957. Annex-K
3.9.7	Receiver Sensitivity for STM-4 Opt Int	ITU-T G.957. Annex-K