

Essential Requirements
under the
MTCTE Framework
for
Mobile Radio Trunking System
Equipments

This document defines the technical parameters for the telecommunication equipment mentioned in the scope of this document against which Testing & Certification has to be carried as prescribed by G.S.R No. 1131(E) dated 5th September, 2017 (Amendment (2017) to Indian Telegraph Rules, 1951).

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HISTORY SHEET

Sr. No.	Document name/No.	Issued on	Version
1.	Essential Requirements under the MTCTE Framework for Mobile Radio Trunking System Equipments (No:	XXXX-2018	1

REFERENCES

Sr No.	Document No.	Document Title
1.	TEC/SD/DD/EMC-221/05/OCT-16	Electromagnetic compatibility standard for Telecommunication Equipment
2.	CISPR 22 (2008)	Limits and methods of measurement of radio disturbance characteristics of Information Technology equipment
3.	CISPR 32 (2015)	Electromagnetic compatibility of multimedia equipment - Emission requirements
4.	IEC 61000-4-2 (2008)	Testing and measurement techniques of Electrostatic discharge immunity test
5.	IEC 61000-4-3 (2010)	Radiated RF Electromagnetic Field Immunity test
6.	IEC 61000-4-4 (2012)	Testing and measurement techniques of electrical fast transients/burst immunity test
7.	IEC 61000-4-5(2014)	Test & Measurement techniques for Surge immunity tests
8.	IEC 61000-4-6(2013)	Immunity to conducted disturbances, induced by radio frequency fields
9.	IEC 61000-4-11(2004)	Voltage dips, shot interruptions and voltage variations immunity tests
10.	IEC 61000-4-29(2000)	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
11.	IS 13252 part 1: 2010 Amd 2013 & Amd 2015	Information Technology Equipment –Safety-Part 1: General Requirements
12.	IEC 60950-1:2005+A1:2009+A2:2013	Information Technology Equipment –Safety-Part 1: General Requirements
13.	IEC 62368: 2014	Audio/video, information and communication technology equipment - Part 1: Safety requirements
14.	IEC 60215: 2016	Safety requirements for radio transmitting equipment - General requirements and terminology

15.	IS 16046: 2015	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
16.	IEC 62133: 2012	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
17.	ETSI EN 300 113	Land Mobile Service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
18.	ETSI EN 300 390	Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
19.	ETSI EN 300 086	Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
20.	ETSI EN 300 296	Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
21.	ETSI EN 300 219	Land Mobile Service; Radio equipment transmitting signals to initiate a specific response in the receiver; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
22.	ETSI EN 300 341	Land Mobile Service; Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

23.	ETSI EN 301 166	Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
24.	ETSI EN 302 561	Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

Scope

This document lays down the essential requirements for radio equipment to be used in Mobile Radio Trunking System (MRTS). MRTS equipment may be base stations used in fixed locations, mobile stations used in vehicles or as transportable stations, or handheld portable stations that come with an external antenna or an integral antenna.

The document also defines the necessary testing requirements for certification under the MTCTE framework.

Applicability Matrix

The applicability of tests under different sections of this ER as per the category of equipment is as below:

Equipment Type/Variant	EMC Requirements	Safety Requirements	Technical Requirements	Other Requirements	Security Requirements
Base Stations used in fixed locations	A	A	A	A	Applicable as and when prescribed by Department of Telecommunications, Ministry of Communications, Government of India.
Mobile stations used in vehicles or as transportable stations	A	A	A	A	
Handheld portable stations	A	A	A	A	
Baseband processing equipments like modems etc.	A	A	NA	A	

A- Applicable

NA- Not Applicable

SECTION I**Electromagnetic Compatibility (EMC) Requirements**

The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein.

Sr. No	Technical Parameters	Testing requirements
i.	<p>Conducted and radiated emission (applicable to telecom equipment): Name of EMC Standard: "CISPR 22 (2008) - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment". Limits:-</p> <ul style="list-style-type: none"> i. To comply with Class B for indoor equipment and Class A of CISPR 22 (2008) for outdoor equipment. ii. The values of limits shall be as per TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. iii. For Radiated Emission tests, limits below 1 GHz shall be as per Table 4 (a1) (for Class B) or 5 (a1) (for Class A) for measuring distance of 3m. <p style="text-align: center;">OR</p> <p>Name of EMC Standard: "CISPR 32 (2015) - Electromagnetic compatibility of multimedia equipment - Emission requirements"</p> <ul style="list-style-type: none"> i. To comply with Class B for indoor equipment and Class A of CISPR 32 (2015) for outdoor equipment and the limits specified therein. ii. For Radiated Emission tests, limits below 1 GHz shall be for measuring distance of 3m. <p><i>Note: Test Reports as per limits of CISPR 22 (2008) mentioned above shall be acceptable only upto March 31, 2019.</i></p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

<p>ii.</p>	<p>Immunity to Electrostatic discharge: Name of EMC Standard: IEC 61000-4-2 {2008} "Testing and measurement techniques of Electrostatic discharge immunity test". Limits: -</p> <ul style="list-style-type: none"> i. Contact discharge level 2 {± 4 kV} or higher voltage; ii. Air discharge level 3 {± 8 kV} or higher voltage; <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>
<p>iii.</p>	<p>Immunity to radiated RF: Name of EMC Standard: IEC 61000-4-3 (2010) "Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test" Limits:- For Telecom Equipment and Telecom Terminal Equipment with Voice interface (s)</p> <ul style="list-style-type: none"> i. Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and ii. Under test level 3 (10 V/m) for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz. <p>For Telecom Terminal Equipment without Voice interface (s) Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16	
iv.	<p>Immunity to fast transients (burst): Name of EMC Standard: IEC 61000- 4- 4 {2012} "Testing and measurement techniques of electrical fast transients/burst immunity test"</p> <p>Limits:- Test Level 2 i.e. a) 1 kV for AC/DC power lines; b) 0. 5 kV for signal / control / data / telecom lines;</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
v.	<p>Immunity to surges: Name of EMC Standard: IEC 61000-4-5 (2014) "Testing & Measurement techniques for Surge immunity test"</p> <p>Limits:-</p> <ul style="list-style-type: none"> i. For mains power input ports: (a)2 kV peak open circuit voltage for line to ground coupling (b) 1 kV peak open circuit voltage for line to line coupling ii. For telecom ports: (a) 2 kV for common mode. <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
vi.	<p>Immunity to conducted disturbance induced by Radio frequency fields: Name of EMC Standard: IEC 61000-4-6 (2013) "Testing & measurement techniques-Immunity to conducted disturbances induced by radio- frequency fields"</p> <p>Limits:- Under the test level 2 {3 V r.m.s.} in the</p>	Test results from Designated CAB of TEC to be submitted for compliance.

	<p>frequency range 150 kHz-80 MHz for AC / DC lines and Signal /Control/telecom lines.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	
vii.	<p>Immunity to voltage dips & short interruptions (applicable to only ac mains power input ports, if any): Name of EMC Standard: IEC 61000-4-11 (2004) "Testing & measurement techniques- voltage dips, short interruptions and voltage variations immunity tests" Limits:-</p> <ul style="list-style-type: none"> i. a voltage dip corresponding to a reduction of the supply voltage of 30% for 500ms (i.e. 70 % supply voltage for 500ms) ii. a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e. 40% supply voltage for 200ms) iii. a voltage interruption corresponding to a reduction of supply voltage of > 95% for 5s. iv. a voltage interruption corresponding to a reduction of supply voltage of >95% for 10ms. <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>
viii.	<p>Immunity to voltage dips & short interruptions (applicable to only DC power input ports, if any): Name of EMC Standard: IEC 61000-4-29:2000: Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>Limits:</p> <ul style="list-style-type: none">i. Voltage Interruption with 0% of supply for 10ms. Applicable Performance Criteria shall be B.ii. Voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms. Applicable Performance Criteria shall be C.iii. Voltage dip corresponding to 40% & 70% of supply for 10ms, 30 ms. Applicable Performance Criteria shall be B.iv. Voltage dip corresponding to 40% & 70% of supply for 100ms, 300ms and 1000 ms. Applicable Performance Criteria shall be C.v. Voltage variations corresponding to 80% and 120% of supply for 100 ms to 10s as per Table 1c of IEC 61000-4-29. Applicable Performance Criteria shall be B.	
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SECTION II**Safety Requirements**

The safety requirements shall be as below:

Sr. No	Technical Parameters	Testing requirements
i.	<p>a) The equipment shall conform to IS 13252 part 1: 2010+Amd 2013+Amd 2015 “Information Technology Equipment – Safety- Part 1: General Requirements” [equivalent to IEC 60950-1:2005+A1:2009+A2:2013 “Information Technology Equipment –Safety- Part 1: General Requirements”]</p> <p style="text-align: center;">OR</p> <p>The equipment shall conform to IEC 62368: 2014 “Audio/video, information and communication technology equipment - Part 1: Safety requirements”.</p> <p>b) In case of radio transmitting equipments, the equipment shall conform to IEC 60215: 2016 “Safety requirements for radio transmitting equipment - General requirements and terminology”.</p> <p><i>Note: Test reports as per IEC 60215:1987 shall be acceptable only till March 31, 2019.</i></p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>
ii.	<p>In case of secondary cells and batteries used in portable equipments, conformance to standard IS 16046:2015 (equivalent to IEC 62133: 2012) “Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications”.</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

SECTION III**Technical Requirements**

Sr. No	Requirements	Testing requirements												
i.	<p>Frequency band of operation:</p> <p>The equipment shall operate in the following frequency bands as applicable/ specified by prevalent NFAP as revised from time to time:-</p> <p>300 MHz/ 400 MHz, 800 MHz</p> <p><i>Note: Frequency of operation requirements are as per the latest NFAP issued by WPC and the requirements in NFAP supersede the requirements listed here.</i></p>	<p>Test report from TEC Designated CAB shall be submitted for compliance as per the test setup and procedure prescribed for Frequency Error as per relevant clause of standard (as per applicability) mentioned in Sr. No. iii of this section.</p>												
ii.	<p>Maximum RF Power Output:</p> <p>The equipment shall allow the maximum transmitted RF power output as specified below:</p> <p>Table 2: Maximum RF Power Output Limits</p> <table border="1" data-bbox="379 1106 962 1523"> <thead> <tr> <th>S.No.</th> <th>Name of Equipment where power to be measured</th> <th>Maximum Transmitter Output power limits as per license</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Base Station</td> <td>100 Watts</td> </tr> <tr> <td>2.</td> <td>Fixed Station/ Mobile Station</td> <td>30 Watts</td> </tr> <tr> <td>3.</td> <td>Hand Held Station</td> <td>3 Watts</td> </tr> </tbody> </table>	S.No.	Name of Equipment where power to be measured	Maximum Transmitter Output power limits as per license	1.	Base Station	100 Watts	2.	Fixed Station/ Mobile Station	30 Watts	3.	Hand Held Station	3 Watts	<p>Test report from TEC Designated CAB shall be submitted for compliance as per the test setup and procedure prescribed for Transmitter Power (for equipment with antenna connector)/ Effective Radiated Power (for equipment without antenna connector) as per relevant clause of standard (as applicable) mentioned in Sr. No. iii of this section.</p>
S.No.	Name of Equipment where power to be measured	Maximum Transmitter Output power limits as per license												
1.	Base Station	100 Watts												
2.	Fixed Station/ Mobile Station	30 Watts												
3.	Hand Held Station	3 Watts												
iii.	<p>Conformance to the following standards as applicable:</p> <table border="1" data-bbox="343 1700 999 2024"> <thead> <tr> <th>Sr. No.</th> <th>Standard</th> <th>Applicable in respect of MRTS Equipments</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>ETSI EN 300 113</td> <td>Applicable to Radio Equipment intended for transmission of data (and/or speech) and having an antenna connector.</td> </tr> </tbody> </table>	Sr. No.	Standard	Applicable in respect of MRTS Equipments	1.	ETSI EN 300 113	Applicable to Radio Equipment intended for transmission of data (and/or speech) and having an antenna connector.	<p>Test results and certificate from TEC Designated CAB shall be submitted for compliance.</p>						
Sr. No.	Standard	Applicable in respect of MRTS Equipments												
1.	ETSI EN 300 113	Applicable to Radio Equipment intended for transmission of data (and/or speech) and having an antenna connector.												

	2.	ETSI EN 300 390	Applicable to Radio equipment intended for the transmission of data (and/or speech) and using an integral antenna.	
	3.	ETSI EN 300 086	Applicable to Radio equipment with an internal or external RF connector intended primarily for analogue speech.	
	4.	ETSI EN 300 296	Applicable to Radio equipment using integral antennas intended primarily for analogue speech.	
	5.	ETSI EN 300 219	Applicable to Radio equipment transmitting signals to initiate a specific response in the receiver.	
	6.	ETSI EN 300 341	Applicable to Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver.	
	7.	ETSI EN 301 166	Applicable to Radio equipment for analogue and/ or digital communication (speech and/ or data) and operating on narrow band channels (less than 10 KHz, e.g. 6.25 KHz) and having an antenna connector.	
	8.	ETSI EN 302 561	Applicable to Terrestrial Trunked Radio (TETRA)	

SECTION IV

Other Requirements

1. **RoHS:** Applicable as and when prescribed. Deferred for now.
2. **SAR:** Applicable as and when prescribed. Deferred for now.
3. **IPv6:** As per applicable order of Department of Telecommunications, Ministry of Communications, Government of India.

SECTION V

Security Requirements

As and when prescribed by Department of Telecommunications, Ministry of Communications, Government of India.

ABBREVIATIONS

CAB	Conformance Assessment Body
CISPR	Comité International Spécial des Perturbations Radioélectriques
DoT	Department of Telecommunications
EMC	Electromagnetic Compatibility
ER	Essential Requirements
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
GHz	Giga Hertz
GSR	General Statutory Rules
IEC	International Electrotechnical Commission
IPv6	Internet Protocol version 6
MHz	Mega Hertz
MRTS	Mobile Radio Trunking System
ms	millisecond
MTCTE	Mandatory Testing and Certification of Telecom Equipment
NFAP	National Frequency Allocation Plan
RoHS	Restriction of Hazardous Substances
SAR	Specific Absorption Rate
TEC	Telecommunication Engineering Centre
WPC	Wireless Planning & Coordination

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