

Essential Requirements
for
PABX of NGS Division

Scope

This document lays down the essential requirements for **Private Automatic Branch Exchange (PABX)** of NGS division under Mandatory Testing & Certification of Telecommunication Equipment (MTCTE) notified by Government of India vide Gazette Notification no. G.S.R. 113 (E) dated 5th September 2017.

The document also defines the necessary testing requirements for certification under the MT&CTE framework.

Following are the variants named “PABX”

Name of Equipment	Variant 1
Private Automatic Branch Exchange (PABX)	Only one variants named “PABX”

History

Sno.	Name of ER	ER Number	Remark
1.	Private Automatic Branch Exchange (PABX)	TEC/ER/NGS/PBX-001/01/APR-2018	ISSUE 01

Note Approval of Ethernet interface against this ER, does not entitle the user to connect the equipment to the network of Internet Service Provider’s (ISP).

SECTION I

(A) Electromagnetic Compatibility (EMC) Requirements

The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein. (Category -Class : A)

Sr. No	Requirements	Testing requirements
i.	<p>Conducted and radiated emission (applicable to telecom equipment): Name of EMC Standard: "CISPR 22 (2008) or CISPR 32 (2015) - 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 A of CISPR 22 (2008) or CISPR 32 (2015). 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 (a) or 5 (a) for measuring distance of 10m or Table 4(a1) or 5(a1) for measuring distance of 3m. 	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>
ii.	<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) 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. 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>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>iv.</p>	<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" Limits:- Test Level 2 i.e. a) 1 kV for AC/DC power lines; b) 0.5 kV for signal / control / data / telecom lines; 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.	
v.	<p>Immunity to surges: Name of EMC Standard: IEC 61000-4-5 (2014) "Testing & Measurement techniques for Surge immunity test" Limits:- 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 peak open circuit voltage for line to ground (b) 2 kV peak open circuit voltage for line to line coupling.</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.
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" Limits:- Under the test level 2 {3 V r.m.s.} in the 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>	Test results from Designated CAB of TEC to be submitted for compliance.
vii.	<p>Immunity to voltage dips & short interruptions (applicable to only ac mains power input ports, if any):</p>	Test results from Designated CAB of TEC to be submitted for compliance.

	<p>Name of EMC Standard: IEC 61000-4-11 (2004) “Testing & measurement techniques- voltage dips, short interruptions and voltage variations immunity tests”</p> <p>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>	
viii.	<p>Immunity to voltage dips & short interruptions (applicable to only DC power input ports, if any):</p> <p>Name of EMC Standard: IEC 61000-4-29:2000: Electromagnetic compatibility (EMC)-PART 4-29: Testing & measurement techniques- voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests.</p> <p>Limits:-</p> <ul style="list-style-type: none"> i. voltage Interruption with 0% of supply for 10ms. Applicable Performance Criterion shall be B. ii. voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms. Applicable Performance Criterion shall be C. iii. voltage dip corresponding to 40% & 70% of supply for 10ms, 30ms. Applicable Performance Criterion shall be B. 	Test results from Designated CAB of TEC to be submitted for compliance.

	<ul style="list-style-type: none"> iv. voltage dip corresponding to 40% & 70% of supply for 100ms, 300ms and 1000ms. Applicable Performance Criterion shall be C. v. voltage variations corresponding to 80% & 120% of supply for 100ms to 10s as per table 1c of IEC 61000-4-29. Applicable Performance Criterion shall be B. 	
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Note-1: For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC/SD/RD/EMC-002/02.OCT.2016 and the references mentioned therein.

Note-2: Amendment if any will be incorporated as and when notified by Radio Division

SECTION II

(B) Safety Requirements

Sr. No	Requirements	Testing requirements
i.	The equipment shall conform to IS 13252 part 1: 2010 "Information Technology Equipment – Safety- Part 1: General Requirements" [equivalent to IEC 60950-1 {2005} "Information Technology Equipment –Safety-Part 1: General Requirements" or IEC 62368]	Test results from Designated CAB of TEC to be submitted for compliance.

Note-1: Amendment if any will be incorporated as and when notified by Radio Division

SECTION III

(C) Technical Requirements

Technical Requirements of equipment & its variants are mentioned in the table.

Remark

- 1) For all RFC mentioned in this ER, Conformance testing report is must for the all clauses of that RFC mentioned in this ER.

Table 1: List of Interfaces for products and their variants(OPTIONAL)

Applicable to→ Interface↓	PABX
2 Wire	Y
PRI	Y
10/100/1000 BASE-T Ethernet Electrical Interface	Y
10/100 BASE-T Ethernet Electrical Interface	Y

Table 2: List of Test Parameters Applicable to Interfaces and their international standards

Applicable to→ Test Parameter↓	Standard	2 Wire	PRI	10/100/1000 BASE-T Ethernet Electrical Interface	10/100 BASE-T Ethernet Electrical Interface
Return Loss	Q.552(Clause no. 2.1.1.2)	Y			
LCL	Q.552(clause 2.1.2)	Y			
Minimum Current on Junction/trunk line in PABX	In any case, current drawn by PABX shall not exceed 60 mA.	Y			
Transmission of DTMF Signalling	Q.23	Y			
Nominal Bit Rate& Bit rate accuracy	G.703 (Clause no. 11.1) / ETSI-TBR-4 (Clause no. 9.2.3)		Y		
Output Jitter	G.823/ I.431(Clause no. 5.4.3) / ETSI-TBR-4 (Clause no. 9.2.4)		Y		
DC Resistance	ETSI TBR-21 (Clause no.4.4.1)	Y			
Resistance to Earth	ETSI TBR-21 (Clause no.4.4.4)	Y			
Input Jitter Tolerance	G.823 / ETSI-TBR-4		Y		

	(Clause no. 9.3.3)				
Pulse Shape /wave form shape	G.703 (Clause 11.2 of (4/2014)/ TBR-4 (Clause no. 9.2.1)		Y		
Input port return Loss	G.703 (Clause no. 11.3) / ETSI-TBR (Clause no. 9.3.1)		Y		
Layer – III specification	Q.931		Y		
Link speed test	802.3			Y*	Y*
Duplex(Full or Half)	IEEE 802.3 (Clause no. 28)			Y*	Y*
Auto Negotiation	IEEE 802.3 (Clause no. 28)			Y*	Y*

***modifications subjected to IT division inputs**

Table 3: List of Test Parameters Applicable to product variants and their international standards

Applicable to→ Test Parameter↓	Standard	PABX
SIP	RFC 3261	Y
Addressing IPv4	RFC 791	y
DTMF	RFC 4733	y
TCP	RFC 793	Y
RTP	RFC 3550	Y
UDP	RFC 768	y

Layer –III Specification

Applicable to→ Test Parameter↓	Standard
Messages for circuit-mode connection basic call control.	
ALERTING	Q.931 (Clause no. 3.1.1)
CALL PROCEEDING	Q.931 (Clause no. 3.1.2)
CONNECT	Q.931 (Clause no. 3.1.3)
SETUP	Q.931 (Clause no. 3.1.14)
SETUP ACKNOWLEDGE	Q.931 (Clause no. 3.1.15)
DISCONNECT	Q.931 (Clause no. 3.1.5)
RELEASE	Q.931 (Clause no. 3.1.9)
RELEASE COMPLETE	Q.931 (Clause no. 3.1.10)
Bearer capability	Q.931 (Clause no. 4.5.5)
Called party number	Q.931 (Clause no. 4.5.8)
Calling party number	Q.931 (Clause no. 4.5.10)
Channel identification	Q.931 (Clause no. 4.5.13)
Call clearing	
Normal call clearing (cause No. 16)	Q.931 (As per Table 6-5)
User Busy(clause No. 17)	Q.931 (As per Table 6-5)
Invalid number format or incomplete number (cause No. 28)	Q.931 (As per Table 6-5)
No answer (cause No. 19)	Q.931 (As per Table 6-5)
SIP	RFC 3261
SIP Header : Message Body Type	RFC 3261 (Clause no.7.4.1)
Generating SIP request (To, R-URI, From, Call-ID, CSeq, Max-Forwards, Via)	RFC 3261 (Clause no.8.1.1, 8.1.1.2 to 8.1.1.7)
SIP Dialog and Transaction	RFC 3261 (Clause no.12. 12.1.1, 12.1.2)
SIP Terminating a Session with a BYE request.	RFC 3261 (Clause no. 15)
SIP Creating the initial invite	RFC 3261 Clause no.13.2.1)
User Authentication	RFC 3261 (Clause no. 21)
DTMF	4733
Verification of sequence no. and time stamp	RFC 4733 (Clause no.2.2.1)
DTMF duration negotiation	RFC 4733 (Clause no.2.3.5)
Negotiation of Payload	RFC 4733 (Clause no. 2.5.1.1)
Transmission of Event Packet	RFC 4733 (Clause no. 2.5.1.2)
RTP	3550
RTP Version and Port	RFC 3550 (Clause no. 5.1)
RTP : Sender report RTCP packet version	RFC 3550 (Clause no. 6.4.1)
RTP : Payload Type	RFC 3550 (Clause no. 5.1)
RTP : Sequence number	RFC 3550 (Clause no. 5.1)
RTP : SSRC Identification	RFC 3550 (Clause no. 5.1)
Addressing IPv4	RFC 791
Model of operation	RFC 791 (Clause no. 2.2)
Internet Header Format	RFC 791 (Clause no. 3.1)
Addressing	RFC 791 (Clause no. 3.2)
TCP	RFC 793
Header Format	RFC 793 (Clause no. 3.1)
Terminology	RFC 793 (Clause no. 3.2)
Sequence numbers	RFC 793 (Clause no. 3.3)

UDP	RFC 768
UDP Format	RFC 768
User Terminology	RFC 768
Sequence numbers	RFC 768

SECTION IV

(D) Other Requirements

SECTION V

(E) Security Requirements

Security Requirements finalized by Security Wing of DoT HQ.