

Essential Requirements
for
Signalling Gateway of NGS Division

Scope

This document lays down the essential requirements for **Signalling Gateway** 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 SG is used to facilitate seamless interworking between Signalling System Number 7 (SS7) network and IP based network. The Signalling Gateway has the capability of terminating SS7 signalling as well as translate and relay messages over an IP network to a Softswitch or another signalling gateway.

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

Following are the variants under **Signalling Gateway**.

Name of Equipment	Variant 1
Signalling Gateway	Only one variants named " Signalling Gateway "

History

Sno.	Name of ER	ER Number	Remark
1.	Signalling Gateway	TEC/ER/NGS/SGW-001/01/APR-2018	ISSUE 01

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. Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. 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. 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>v.</p>	<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. Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. 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>vi.</p>	<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. Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. 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>vii.</p>	<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:- i. a voltage dip corresponding to a reduction of the supply voltage of 30%</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>for 500ms (i.e. 70 % supply voltage for 500ms)</p> <ul style="list-style-type: none"> 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. 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. 	Test results from Designated CAB of TEC to be submitted for compliance.

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 “Signalling Gateway” are mentioned in the tables as below.

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↓	Signalling Gateway
10/100/1000 BASE-T Ethernet Electrical Interface	Y
1 GE optical Ethernet Interface	Y
10 GE optical Ethernet Interface	Y
2 Mbps / E1 / 2048 kbps	Y
STM-1 Optical Interface	Y

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

Applicable to→ Test Parameter↓	Standard	10/100/1000 BASE-T Ethernet Electrical Interface	1 GE optical Ethernet Interface	10 GE optical Ethernet Interface	2 Mbps / E1 / 2048 kbps	STM-1 Optical Interface
Nominal Bit Rate	G.703				Y	
Bit Rate Accuracy	G.703				Y	
Bit Code	G.703				Y	
Output Jitter	G.823				Y	Y (G.825)
Input Jitter Tolerance	G.823				Y	Y (G.825)
Pulse Mask	G.703				Y	
Input port return Loss	G.703				Y	
Optical output power	802.3		Y	Y		Y (G.957)
Operating Wavelength	802.3		Y	Y		Y(G.957)
Receiver Sensitivity	802.3		Y	Y		Y (G.957)
Eye pattern	G.957					Y
Link speed test	802.3	Y*				
Duplex(Full or Half)	802.3	Y*				
Auto Negotiation	802.3	Y*				

*will be modified as per IT division inputs

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

Applicable to→ Test Parameter↓	Standard	Signalling Gateway
Addressing IPv4	RFC 791	Y
SCTP	RFC 4960	Y
CCS7 Signalling	Test Specification as per Q.781, Q.782 & Q.784	Y
Frame work architecture for signalling support	RFC 2719	Y
M3UA	RFC 3332	Y

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)
SCTP	RFC 4960
SCTP packet Format	RFC 4960 (Clause no. 3)
SCTP common header field descriptions	RFC 4960 (Clause no. 3.1)
Chunk field descriptions	RFC 4960 (Clause no. 3.2)
Optional/variable-length parameters format	RFC 4960 (Clause no. 3.2.1)
Reporting of unrecognized parameters	RFC 4960 (Clause no. 3.2.2)
SCTP association state diagram	RFC 4960 (Clause no. 4)
Frame Work Architecture for Signalling Support	RFC 2719
Gateway Component Functions	RFC 2719 (Clause no. 2.1)
SS7 Interworking for Connection Control	RFC 2719 (Clause no. 2.2)
ISDN Interworking for Connection Control	RFC 2719 (Clause no. 2.3)
Architecture for Database Access	RFC 2719 (Clause no. 2.4)
SG to SG	RFC 2719 (Clause no. 3.5)
M3UA	RFC 3332
Procedures to Support the M3UA-User	RFC 3332 (Clause no. 4.1)
Establishment of Association and Traffic Between SGs and ASPs	RFC 3332 (Clause no. 5.1)
M3UA Port Number	RFC 3332 (Clause no. 7.2)
M3UA Protocol Extensions	RFC 3332 (Clause no. 7.3)

SS7 Signalling Tests

MTP-2 (ITU-T Q.781)

Sr.No	Test No	Test Description
1	1.2	Timer T2
2	1.3	Timer T3
3	1.4	Timer T4 and T1
4	1.5	Normal Alignment
5	1.19	Emergency Alignment T4E

MTP-3 (ITU-T Q.782)

Sr.No	Test No	Test Description

1	1.2	Signalling Linkset deactivation
2	1.3	Signalling Linkset activation
3	2.2	Message with Invalid DPC
4	2.3	Message with erroneous SI
5	4.3	Additional CBD
6	4.4	No acknowledgement to first CBD
7	7.1.1	Inhibition of available link
8	7.1.2	Inhibition of unavailable link
9	12.1	Signaling Link test: After activation of a link

ISUP (ITU-T Q.784)

Sr.No	Test No	Test Description
1	1.2.1	Reset Received
2	1.2.2	Reset Sent
3	1.2.5	Circuit Group Reset Received
4	1.2.6	Circuit Group Reset Sent
5	1.3.1.1	CGB and CGU Received
6	1.3.1.2	CGB and CGU Sent
7	1.3.2.1	Circuit Blocking received
8	1.3.2.2	Circuit Blocking sent

SECTION IV

(D) Other Requirements

SECTION V

(E) Security Requirements

As per Security Requirements finalized by Security Wing of DoT HQ.