सत्यमेव जयते

अंतरापफलक आवश्यकताओं के लिए मानक

टीईसी 59062:2023

(सं.: टीईसी 59062:2018 को अधिक्रमित करता है)

STANDARD FOR INTERFACE REQUIREMENTS

TEC 59062:2023

(Supersedes No.: TEC 59062:2018)

ट्रंक मीडिया गेटवे

TRUNK MEDIA GATEWAY

ISO 9001:2015

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FOREWORD

Telecommunication Engineering Centre (TEC) is the technical arm of Department of Telecommunications (DOT), Government of India. Its activities include:

- Framing of TEC Standards for Generic Requirements (GR), Interface Requirements (IR), Service Requirements (SR) & Standard document for Telecom Products and Services
- Formulation of Essential Requirements (ERs) under Mandatory Testing and Certification of Telecom Equipment (MTCTE)
- Field evaluation of Telecom Products and Systems
- Designation of Conformity Assessment Bodies (CABs)/Testing facilities
- Testing & Certification of Telecom products
- Adoption of Standards
- Support to DoT on technical/technology issues

For the purpose of testing, four Regional Telecom Engineering Centers (RTECs) have been established which are located at New Delhi, Bangalore, Mumbai, and Kolkata.

ABSTRACT

This IR pertains to Trunk Media Gateway (TMG). The TMG shall accept the TDM traffic which may consist of voice, FAX, and voice band data and convert it to IP packet format for transmission over the Packet Network and vice versa.

CONTENTS

HISTORY SHEET

S. No.	Standard No.	Title	Remarks
1.	IR/MGW-01/01.JUL 2001	IP Based Integrated Media Gateway for NLD / ILD Applications	Issue 1
2.	IR/MGW-01/02.SEP 2002	IP based Integrated Media Gateway for NLD/ILD Applications.	Issue 2 (Name of the IR was changed to IP based Integrated Media Gateway for NLD/ILD Applications. The ISDN PRI /BRI interface was deleted. STM-1 optical interface was added. The support for carrying the packetized voice protocols, future support for IP ver6 and static /dynamic routing protocols were added.)
3.	IR/MGW-01/02.SEP 2002	IP based Integrated Media Gateway for NLD/ILD Applications.	Issue 2 with Amendment No.1 (The amendment was issued for the inclusion of Synchronisation, Jitter tolerance, Clock stability, Slip and Junction testing in Interface Requirements of IMG. The ambiguity in the clauses 1.2 and 2.1 was removed. Safety Requirements and EMC requirements recently modified were incorporated the amendment. Generation of call metering pulses and charge band messages were added.)

4.	IR/MGW-01/03. FEB 2005	IP based Integrated Media Gateway for NLD/ILD Applications.	Issue 3 (Reviewed the Amendment no. 1 and deleted the clauses related to Synchronisation, Jitter tolerance, Clock stability and Slip in Interface Requirements of IMG. The support of generation of metering pulses and generation of charge band messages were deleted.)
5.	TEC/IR/MGW-001/04/OCT - 12	IP based Integrated Media Gateway for NLD/ILD Applications.	Issue 4 Clause No. 1.1 (iii), 1.2, 2.1, 2.2, 2.2.4 and 2.2.5, are modified. Safety and EMC requirements recently modified are incorporated.
6.	TEC/IR/SW/MGW-001/05/JAN 2015	IP Media Gateway	Issue 5 Name of the IR was changed to IP Media Gateway. Revision and conversion to new format, Change of Name and Division
7.	TEC59062:2018 (Earlier No: TEC/IR/SW/TMG-101/06/NOV-18	Trunk Media Gateway	Issue 6 Prepared as per new format. Major changes done are 1) removal of WAN interface 2) minor modification in EMI/EMC
8.	TEC59062:2023	Trunk Media Gateway	Issue 7 Major changes done are 1) EMI/EMC Template
Document number changed as per Revised Numbering scheme of TEC for conversion of existing TEC document to Standard vide document no.4-47/2019-RC/TEC dated 0709-2020			

Note:

1. Since the documents have been renumbered as per revised numbering scheme, kindly refer the Mapping- Listing Table pertaining to old and revised document number available on TEC website www.tec.gov.in/. In case of further clarification, please contact at e mail id adgdoc.tec@gov.in

2. Inside the document, General Requirements may be read as Standard for General Requirements, Interface Requirements as Standard for Interface Requirements, Service Requirements as Standard for Service Requirements and Test Schedule & Test Procedure (TSTP) as TEC Test Guide."

REFERENCES

S.No.	Document No.	Title/Document Name
(I)	: TEC GR/IR/SDs	
1.	TEC/SD/DD/EMC-221/05/OCT-16	Electromagnetic Compatibility Standard for Telecommunication Equipment
2.	SD/SIP-01/01.SEP-08	National Standard for SIP
(II)	: ITU-T Standard/IETF RFCs	
1.	G.711	Pulse code modulation (PCM) of voice frequencies
2.	G.729	Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)
3.	G.722	7 kHz audio-coding within 64 kbit/s
4.	G.723	Speech codec using Adaptive Differential Pulse Code Modulation (ADPCM)
5.	G.726	40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code
9.	T.38	Procedures for real-time Group 3 facsimile communication over IP networks
10	RFC 768	User Datagram Protocol
11.	RFC 793	Transmission Control Protocol
12.	RFC 1981	Path MTU Discovery for IP version 6
13.	RFC 2460	Internet Protocol, Version 6 (IPv6) Specification
14.	RFC 2960	Stream Control Transmission Protocol
15.	RFC 3550	RTP: A Transport Protocol for Real-Time Applications
16.	RFC 3551	RTP Profile for Audio and Video Conference with Minimal Control
17.	RFC 4443	Internet Control Message Protocol (ICMPv6) for the IPv6 Specification
18.	RFC 4861	Neighbor Discovery for IP version 6 (IPv6)
19.	RFC 4862	IPv6 Stateless Address Auto configuration
(III)	: IEEE Standard	
1.	802.3u/802.3z/803.3ae	Particular Safety requirements for equipment to be connected to telecommunication networks (1991
(IV)	: Other Standards	
1.	CISPR 11	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific & medical (ISM) radiofrequency equipment

2.	CISPR 22	Limits and methods of measurement of radio disturbance characteristics of ITE
3.	IEC/EN 61000-4-2	Testing and measurement techniques – Electrostatic discharge immunity test
4.	IEC/EN 61000-4-3	Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
5.	IEC/EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
6.	IEC/EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
7.	IEC/EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
8.	IEC/EN 61000-4-11	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques Voltage dips, short interruptions and voltage variations immunity tests
9.	IS 13252 / IEC 60950	Information Technology Equipment -- Safety, Part 1: General Requirements
10.	EN 55011	Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
11.	EN 55022	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement

CHAPTER-1

1.0 INTRODUCTION

1.1 This document specifies the Interface Requirements (IR) of Trunk Media Gateway (TMG) for interconnection of IP and TDM networks of Telecom Service Providers. The TMG shall accept the TDM traffic which may consist of voice, FAX and Voice band data and convert it to IP packet format for transmission over the Packet Network and vice versa. The TMG shall be capable of handling the requirements in terms of the DTMF Relay, support for supplementary services and call handling capabilities.

1.2 The Trunk Media Gateway consists of following sub components;

i) Media Gateway: Media Gateway shall interface with circuit switched network to carry voice traffic from circuit format to packet format and vice-versa. This is the mandatory component of a Trunk Media Gateway.

ii) Signaling Gateway: Signaling Gateway shall interface with circuit switched network for transferring the signaling information of CCS7 PSTN Network over appropriate interface.

Note:

1. Signalling Gateway component may be integrated unit to Media Gateway or as an external unit interfacing with the Service Provider network.
2. In case, TMG is integrated with SBC then relevant clauses of SBC IR will also be applicable for testing in addition to this TMG IR.

1.3 The TMG shall interface with the PSTN/PLMN and IP network as per the interfaces defined in clause 2.0 of this IR. A typical scenario is described in the figure-1given below

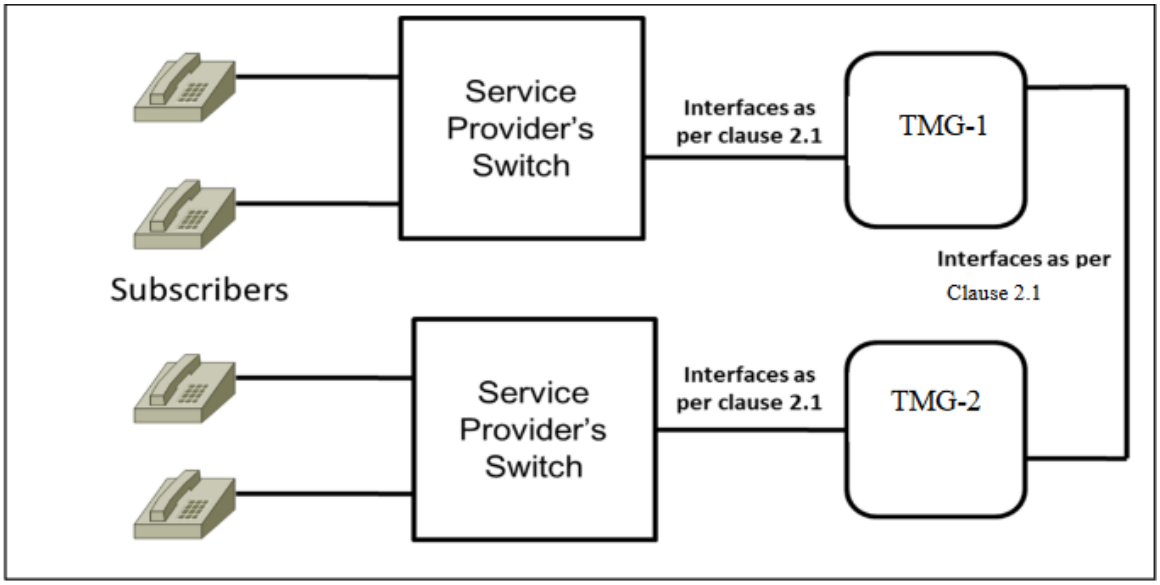

Figure-1

1.4 (a) For all ITU–T/ETSI/3GPP/IEEE recommendations, TEC standards/ specification and other standards referred in this document, the latest release/issue with all associated amendments, addendum and corrigendum shall be applicable.

(b) The RFC documents of IETF are subject to periodic revision. Hence, where ever RFCs are mentioned in this document, the offered product shall meet either the referred RFC or its previous version or its previous draft or its updated version. Wherever a feature of RFC is mentioned, the product shall comply with the part of RFC specifying the feature.

(c) For all IETF RFCs, the interpretation of clauses of RFCs shall be as per RFC 2119

2.0 INTERFACE REQUIREMENT

2.1 The TMG shall interface to the PSTN/PLMN with any one or any combination of the following signaling interfaces;

TDM Interface

1) 2048 Kbps 120 ohms balanced as per clause 9 of ITU-T G.703
2) STM-1 Electrical as per clause 15.0 of ITU-T G.703
3) STM-1 optical interface for short haul and long haul operation using Monomode or Multimode laser diode as per Table 2 of ITU-T G.957.
4) STM-4 optical interface for long haul operation using monomode or multimode laser diode as per Table 3 of ITU-T G.957
5) STM-16 optical interface for long haul operation using monomode or multimode laser diode as per Table 4 of ITU-T G.957

IP Interface

1) 10/100 Ethernet electrical interface as per IEEE 802.3
2) 10/100/1000 Ethernet electrical interface as per IEEE 802.3
3) GE optical interface as per as per IEEE 802.3
4) 10GE optical interface as per as per IEEE 802.3

Note:

1. The 2048Kbps/STM-1 /4/16 Electrical interfaces shall meet the Output Pulse Mask, Output Jitter, Output Return Loss, Input Jitter Tolerance and Input Return Loss tests as per ITU-T G.703.
2. The optical output power, extinction ratio, spectrum receiver sensitivity and eye pattern of the STM-1 /4/16 optical interfaces shall be as per ITU-T G.957 and Input Jitter tolerance shall be as per ITU-T G.825
3. The optical output power, extinction ratio, spectrum and receiver sensitivity of the Ethernet optical interfaces shall be as per IEEE 802.3.
4. The Ethernet electrical interfaces shall meet the Differential output voltage, AC Differential input impedance and Output Jitter tests as per IEEE 802.3.

2.2 Signaling:

The TMG shall support one or any combination of the following signaling: -

2.2.1 CCS7 Interface (applicable only for TDM Interface)

The TMG shall support ISUP and MTP as per Standard No. S/CCS-02.

1) The CCS7 Junction from PSTN shall interface with Signaling Gateway for exchange of Signaling information. Media Gateway shall interconnect with PSTN for voice over 2048 Kbps lines as per ITU-T G.703. The typical connectivity is shown in Figure 2 below. The Signaling and Media information can be carried over common or separate E-1 links in case of integrated unit

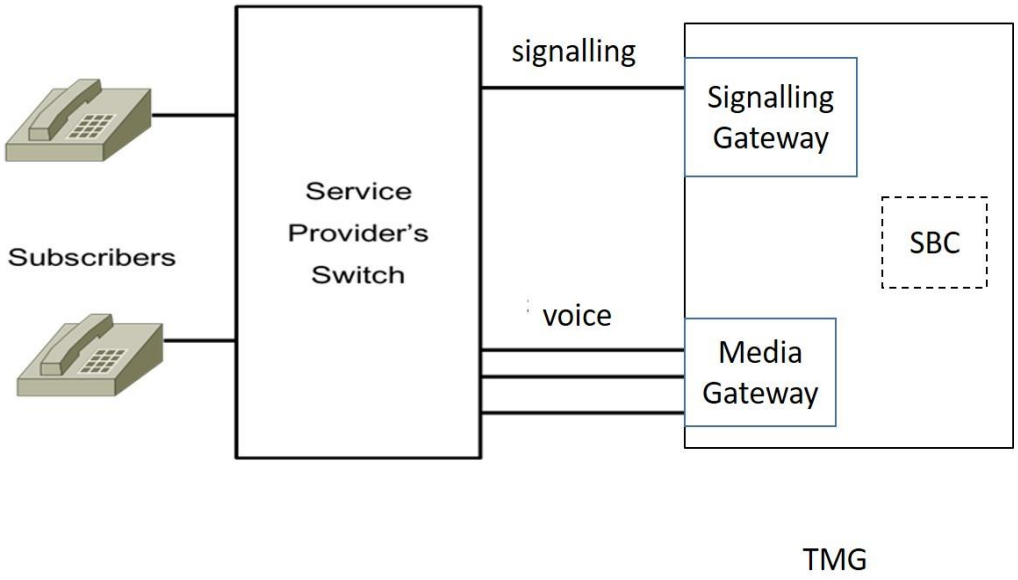

Figure - 2

i) The TMG shall support the receipt of charge band message (charging information) on CCS-7 link, including the configurability to ignore the charge-band message without rejecting the call setup."

ii) For CCS-7 signaling, 'no charge' indication in ACM, CPG, CON and ANM shall not be sent over inter-working trunk group between PSTN/PLMN and TMG.

2.3 Protocols

2.3.1 The TMG shall support any one of the following Signaling Control Protocols (between soft switch and media gateway)

1. H.248 / MEGACO
2. MGCP

2.3.2 TMG shall support any one of the following addressing:

1. IPv4 as per IETF RFC 791
2. Dual stack as per IETF RFC 4213
3. IPv6 as per IETF RFC 2460

Applicant may apply any one of the above and the same shall be indicated in IAC.

2.3.3 TMG shall support Transmission Control Protocol as per IETF RFC 793, UDP as per RFC 768 and SCTP as per RFC 4960.

2.3.4 The TMG shall support Static or Dynamic Routing Protocols or Layer-2 forwarding for routing/forwarding the packets to the IP transport network.

2.4 Other Requirements

2.4.1 The Dual Tone Multi Frequency (DTMF) dialed by the subscribers after the call set up shall be transparently passed by the TMG as per RFC 4733.

2.4.2 The TMG shall be able to store and dial out at least 22 dialed digits.

2.4.3 The TMG shall allow the calling of PSTN/PLMN terminals by their E.164 number. It shall pass the E.164 number transparently.

2.4.4 The TMG shall be connected to the PSTN/PLMN through SS7 for signaling. The TMG shall use SIGTRAN signaling for carrying signaling over the IP network.

2.4.5 The software or hardware in the equipment shall not pose any problem in case of change over in, leap year, etc. in the normal functioning of the equipment.

2.5 **Synchronisation:**

2.5.1 The Trunk Media Gateway shall be capable of synchronising with an external timing signal derived from any one or more of the following input PSTN interfaces.

i. 2048Kbps E1interface

ii. STM-1/4/16 interface

iii. Any one of the E1 channels in an STM-1/4/16interface carrying clock

iv. 2048 KHz external timing reference as per clause 13.0 of ITU-T G.703, 75 ohms coaxial.

The Trunk Media Gateway shall be capable of selecting the clock from any one of the above provisioned interfaces depending on the pre-set priority in case more than one external timing source is provided.

2.5.2 Bit Error Rate

I. A long term bit error rate of the signalling data link should be less than 10^{-6}

II. A medium term bit error rate should be less than 10^{-4}

III. The acceptable slip rate shall be in accordance with ITU-T G.822

3.0 EMI/EMC REQUIREMENTS

General Electromagnetic Compatibility (EMC) Requirements: - The equipment shall conform to the following EMC requirements for Class A, as per the following standards and limits indicated therein. A test certificate and test report shall be furnished from an accredited test agency.

3.1. **Conducted and radiated emission (applicable to telecom equipment):**

Name of EMC Standard: “CISPR 32 (2015) with amendments - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".

Limits: -

i. To comply with Class B OR Class A of CISPR 32 (2015) with amendments.
ii. The values of limits shall be as per TEC Standard No. TEC 11016:2016 (old 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.

OR

Conducted and radiated emission (applicable to instruments such as power meter, frequency counter etc.):

Name of EMC Standard: "CISPR 11 {2015} - Industrial, scientific and medical (ISM) radio- frequency Equipment-Electromagnetic disturbance characteristics-

Limits and methods of measurement"

Limits: -

i. To comply with the category of Group 1 of Class A of CISPR 11 {2015}
ii. The values of limits shall be as per clause no. 8.5.2 of TEC Standard No. TEC 11016:2016 (old No: TEC/SD/DD/EMC-221/05/OCT-16).

3.2. **Immunity to Electrostatic discharge:**

Name of EMC Standard: IEC 61000-4-2 {2008) "Testing and measurement techniques of Electrostatic discharge immunity test".

Limits: -

i. Contact discharge level 2 {± 4 kV} or higher voltage;

ii. Air discharge level 3 {± 8 kV} or higher voltage;

3.3. **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.

3.4. **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;

3.5. **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.

3.6. **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.

3.7. **Immunity to voltage dips & short interruptions (applicable to only ac mains power input ports, if any):**

Name of EMC Standard: IEC 61000-4-11 (2014) “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% 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.

3.8. **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 & measurement techniques voltage dips, short interruptions and voltage variations on DC input power port immunity tests" for the following.

Limits:-

i) Voltage Interruption with 0% of supply for 10ms.
ii) Voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms.
iii) Voltage dip corresponding to 40% & 70% of supply for 10ms, 30 ms.
iv) Voltage dip corresponding to 40% & 70% of supply for 100ms, 300ms and 1000ms.
v) Voltage variations corresponding to 80% and 120%of supply for 100ms to 10s as per Table 1c of IEC 61000-4-29.

Note 1: Classification of the equipment:

Class B: Class B is a category of apparatus which satisfies the class B disturbance limits. Class B is intended primarily for use in the domestic environment and may include:

- Equipment with no fixed place of use; for example, portable equipment powered by built in batteries;
- Telecommunication terminal equipment powered by the telecommunication networks
- Personal computers and auxiliary connected equipment.

Please note that the domestic environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10 m of the apparatus connected.

Class A: Class A is a category of all other equipment, which satisfies the class A limits but not the class B limits.

Note 2: The test agency for EMC tests shall be an accredited agency and details of accreditation shall be submitted.

Note 3: For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16 and the references mentioned therein unless otherwise specified specifically. Alternatively, corresponding relevant Euro Norms of the above IEC/CISPR standards are also acceptable subject to the condition that frequency range and test level are met as per above mentioned sub clauses and TEC Standard No. TEC/SD/DD/EMC221/05/OCT-16. The details of IEC/CISPR and their corresponding Euro Norms are as follows:

IEC/CISPR	Euro Norm
CISPR 11	EN 55011
CISPR 32	EN 55022
IEC 61000-4-2	EN 61000-4-2
IEC 61000-4-3	EN 61000-4-3
IEC 61000-4-4	EN 61000-4-4
IEC 61000-4-5	EN 61000-4-5
IEC 61000-4-6	EN 61000-4-6
IEC 61000-4-11	EN 61000-4-11

The manufacturer / supplier shall submit a test certificate and test report for EMI/EMC compliance from test agency. The test agency for EMI/EMC tests shall be an accredited agency and details of accreditation shall be submitted.

4.0 SAFETY REQUIREMENTS

4.1. 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” and

4.2. A test certificate and test report shall be furnished from an accredited test agency.

5.0 Security Requirements

5.1. The TMG shall have the capability of provisioning of target, delivery of Intercept Related Information (IRI) and Call Content (CC) for the purpose of Lawful Interception.

5.2. TMG shall pose no limitation in Lawful interception and monitoring.

CHAPTER-2

6.0 Specific items to be mentioned in the certificate

6.1 The following information shall be mentioned in the certificate:

i) PSTN Interfaces supported as per Clause 2.0 regarding TDM/IP interface

ii) Applicable CCS7 signaling in case of TDM interface (yes/no)

iii) Applicable signaling control protocol between soft switch and media gateway as per clause 2.3.1

iv) Routing Protocols supported as per clause 2.3.4

v) External synchronization interfaces supported as per clause 2.5.1

vi) The product name and model number of the associated equipment's (Controller/Soft Switch) used for testing. (This Media Gateway is not a stand-alone equipment and is tested in association with …….)

vii) If SBC is integrated in TMG testing of SBC will be carried out separately.

ABBREVIATIONS

For the purpose of this document the following abbreviations apply:

AC : Alternating Current
ACM : Address Complete Message
ANM : Answer Message
CC : Call Content
CCS7 : Common Channel Signaling No. 7
CIC : Circuit Identification Code
CISPR: Special international committee on radio interference
CON : Connect
CPG : Call Progress
DC : Direct Current
DOT : Department of Telecommunications
DTMF : Dual Tone Multi Frequency
EMI : Electro Magnetic Induction
EMC : Electro Magnetic Compatibility
GR : Generic Requirements
IAM : Initial Address Message
IEC : International Electrotechnical Commission
IEEE : Institute of Electrical and Electronic Engineers
IETF : Internet Engineering Task Force
ILD : International Long Distance
IP : Internet Protocol
IR : Interface Requirements
ISDN : Integrated Services Digital Network
ISUP : ISDN User Part
ITU-T :International Telecommunication Union – Telecommunication Standardisation
MGCP: Media Gateway Control Protocol
MTP : Media Transfer Protocol
NLD : National Long Distance
PLMN : Public Land Mobile Network
PSTN : Public Switch Telephone Network
RFC : Request For Comments
RLC : Release Complete
SAM : Subsequent Address Message

TDM : Time Division Multiplexing
TMG : Trunk Media Gateway
TEC : Telecommunications Engineering Centre
RTEC : Regional Telecom Engineering Center
WAN : Wide Area Network

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