अंतराफलक आवश्यकताओं के लिए मानक

टीईसी 58082:2014

(पूर्वसं:टीईसी/आईआर/एसडब्ल्यू/एसटीएम-001/03/दिसंबर2014)

STANDARD FOR INTERFACE REQUIREMENTS

TEC 58082:2014

(Earlier No. : TEC/IR/SW/STM-001/03/DEC 2014)

एसटीएम-1 पर नेटवर्क नेटवर्क इंटरफेस के साथ एक स्विचिंग नोड की इंटरफ़ेस आवश्यकताएँ

INTERFACE REQUIREMENTS OF A SWITCHING NODE WITH NETWORK-NETWORK INTERFACE AT STM-1

ISO 9001:2015

दूरसंचार अभियांत्रिकी केंद्र

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FOREWORD

Telecommunication Engineering Centre(TEC)functions under Department of Telecommunications (DOT), Government of India. Its activities include:

- Issue of Generic Requirements (GR), Interface Requirements (IR), Service Requirements (SR) and Standards for Telecom Products and Services
- Field evaluation of products and Systems
- National Fundamental Plans
- Support to DOT on technology issues
- Testing & Certification of Telecom products

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 document specifies the Interface Requirements (IR) of a Switching Node such as digital exchange, TDM based Mobile Switching Centre (MSC), Remote Switching Equipment (RSE) or any other TDM based Switching Equipment with a Network-Network interface at STM-1 for interconnection with Public Switched Telephone Network (PSTN)/Public Land Mobile Network (PLMN).

CONTENTS

HISTORY SHEET

S.No.	*IR No.*	*Particulars*	*Remarks*
1	IR/PNI-04/01.JUL 2004	Interface requirement of digital exchange with STM interface	Issue 1
2	TEC/IR/SWN-1ST/06/JUN-10	Interface requirement of a switching node with network-network interface at STM-1	Issue 2 This includes: 1. Amendment 1 issued on dated 23.8.2005 2. Amendment 2 issued on dated 21.8.2007 3. Following clauses have been changed: i) Clause 1.1 ii) Clause1.2 iii) deleted iii) Clauses 1.6(i),1.6(ii) iv) Clauses 3.2 and 3.6 v)Clause 10.4
3	TEC/IR/SW/STM-001/03/DEC 2014	Interface requirement of a switching node with network-network interface at STM-1	Issue 3 (new format) (This IR is made only for TDM based switching equipments)
4	TEC 58082:2014 (Earlier No. TEC/IR/SW/STM-001/03/DEC 2014)	Interface requirement of a switching node with network-network interface at STM-1	Issue 3 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 07-09-2020

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, GR may be read as Standard for GR, IR as Standard for IR, SR as Standard for SR and TSTP as TEC Test Guide."

REFERENCES

S.No.	*Document No.*	*Title/Document Name*
1	TEC/EMI/TEL-001/01/FEB-09	EMI/EMC Standards
2	TEC/IR/MFR-SIG	Multi Frequency Register Signaling (R2MF)
3	IR/DMX-06	Interface requirements for interchange of STM-1, STM-4, STM-16, STM-64 & STM-256 signals.
4	S/CCS-02/	National Standard for ISUP and MTP
5	G.652	Characteristics of a single-mode optical fiber and cable
6	G.703	Physical/electrical characteristics of hierarchical digital interfaces
7	G.783	Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks
8	G.813	Timing characteristics of SDH equipment slave clocks (SEC)
9	G.825	The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)
10	G.828	Error performance parameters and objectives for international, constant bit-rate synchronous digital paths
11	G.832	Transport of SDH elements on PDH networks - Frame and multiplexing structures
12	G.957	Optical interfaces for equipments and systems relating to the synchronous digital hierarchy
13	Q.552	Transmission characteristics at 2-wire analogue interfaces of digital exchange

14	Q.554	Transmission characteristics at digital interfaces of digital exchanges
15	CISPR 11	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific & medical (ISM) radiofrequency equipment
16	CISPR 22	Limits and methods of measurement of radio disturbance characteristics of ITE
17	EN 55011	Industrial, scientific and medical (ISM) radio-frequency equipment- Electromagnetic disturbance characteristics - Limits and methods of measurement
18	EN 55022	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
19	IEC/EN 61000-4-2	Testing and measurement techniques – Electrostatic discharge immunity test
20	IEC/EN 61000-4-3	Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
21	IEC/EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
22	IEC/EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
23	IEC/EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
24	IEC/EN 61000-4-11	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques Voltage dips, short interruptions and voltage variations immunity

		tests
25	IS 8437 / IEC 60479-1	Effects of current on human beings and livestock - Part 1: General aspects
26	IS 10437 / IEC 60215	Safety requirements for radio transmitting equipment
27	IS 13252 / IEC 60950	Information Technology Equipment -- Safety, Part 1: General Requirements
28	GR/LIS-03/01.May 2006	GR for Mediation Equipment and CDMA 2000 networks subsystems for Lawful Interception
29	GR/LIS-02/01. Mar2004	GR on Lawful Interception System for GSM network
30	GR/WS/LIS-003/01.Mar 2011	GR on Lawful Interception of Mobile (GSM/CDMA/ UMTS/EPS) Network
31	TEC/GR/SW/LIS-01/03/ JUN2010	GR on Requirements of Lawful Interception Systems for PSTN

CHAPTER-1

1.0 Introduction

1.1 This document specifies the Interface Requirements of a Switching Node used in service provider's network for interconnection with switching node of other service provider network with a Network-Network interface at STM-1. The Switching Node/ Equipment under Test (EUT) may be a digital exchange, TDM based MSC, Remote Switching Equipment (RSE) or any other TDM based switching network element.

1.2 Compliance to this IR does not guarantee any service to be offered by the switching node. Performance related parameters such as call completion ratio, BHCA, charging, Quality of Service etc. also do not form part of this IR.

1.3 Integrated STM-1 interface in a digital exchange (EUT) complying to this IR can beused at one or both ends of the interconnection at a Point Of Interconnection (POI).

1.4 The offered application code will be indicated on the Interface Approval Certificate. It shall be the responsibility of the service providers to engineer the interconnection link for optical path characteristics and limits specified as per ITU-T G.957.

1.5 For all ITU – T recommendations, TEC standards and other standards referred in this document, the latest release/issue with all associated amendments, addendum and corrigendum shall be applicable.

1.6 The applicant must have the Interface approval Certificate of 2048 kbps IR, before applying against this STM-1 Interface IR.

2.0 Interface Requirement

The Equipment Under Test (EUT) shall have the capability to interconnect with other switching network elements at POI/ networks using 155 Mbit/s optical interface as per ITU-T G.957 or electrical interface as per ITU-T G.703.

2.1 The optical path media shall be as per ITU-T G.652 single-mode fiber. The application code shall be chosen for the interconnection equipment accordingly.

2.2 The electrical / optical STM-1 interface characteristics shall be as per TEC document titled “Interface requirements for interchange of STM-1 signals at 155 Mbit/s ports between the networks” (No. IR/DMX-06).

2.3 Signalling

The signaling between the Switching Node (EUT) and other PSTN/PLMN networks may be one or any combination of following signaling.

2.3.1 Signaling system no. 7 (SS7 or CCS7)

i) The signaling between the digital Exchange/EUT and other PSTN/PLMN networks shall be as per ‘National CCS7 Standards for MTP and ISUP’ (No. S/CCS-02). The EUT shall support the receipt of Charge Band message on the CCS7 link, including the configurability to ignore the charge band message without rejecting the call.

(ii) For CCS7 signaling, `no charge' indication in ACM, CPG, CON, ANM messages shall not be sent over inter-working trunk group between PSTN/PLMN & digital exchange.

2.3.2 E1R2 Signaling :

(i) Line Signaling: Digital Type 1 and either Type 2 or Type 3 (as Per TEC IR No.TEC/IR/MFR-SIG). The EUT shall be able to detect/send the metering pulse on any of the designated trunk group.

(ii) Register Signaling: Indian R2 Modified (as Per TEC IR No. TEC/IR/MFR- SIG).

(iii) In case of Remote Switching Equipment, R2 signaling may not be supported. The same will be indicated on the IAC.

(iv) In case of Indian R2 Modified signaling, B7 and any other spare signal shall not be used for the interworking.

2.3.3 If the EUT is used as an international Gateway switch and in case no CLI is

received on the international junction then the EUT shall be capable to add carrier code and the country code.

2.3.4 The EUT/digital exchange shall be able to send Calling Line Identification (CLI) to the PSTN/PLMN exchange. It shall not be possible to change the CLI in digital exchange or PSTN/PLMN exchange.

2.3.5 The EUT/digital exchange shall be able to store and out-pulse at least 22 dialed digits.

2.4 Synchronisation

2.4.1 The digital exchange shall be capable of receiving the input timing reference supplied to it by the external transmission equipment (Interfaced Approved by TEC as per No. IR/DMX-06) which shall extract the timing from STM-1 signal, for the purpose of merging into a single synchronised network.

2.4.2 The external input timing interface shall be as follows:

(i) 2048 KHzSynchronisation Interface, in accordance with ITU-T G.703(para 13)

(ii) Impedance: 75 ohms /120 ohms

(iii) Type of pair: Coaxial /Twisted

2.4.3 The The External input timing interface for synchronization purpose shall be either 2048 khz or 2048 kbps or both as per G.703. The same will be mentioned in IAC.

2.4.4 The EUT/ Digital exchange shall be capable to get synchronized to the PSTN/ PLMN or international gateway exchange by using the timing reference supplied to it through 2048 Kbit/s network interface.

2.4.5 The synchronisation arrangement and equipment of the digital exchange shall comply the following requirements:

2.4.5.1 Frequency stability in Holdover mode

Minimum stability of clock in holdover mode shall be as $1*10^{-9}$ per day. The term 'minimum stability' implies that the stability should be equal to or better than the value specified.

2.4.5.2 Slip

Under synchronised condition, slips observed at the digital exchange shall be less than or equal to 2 slips in 24 hours.

2.4.5.3 Selection of priority

EUT / Digital exchange shall be capable of selecting the clock from the I/C PCM stream(s) or 2048 KHz synchronization signal, depending on the pre-set priority.

2.5 Jitter and Wander

Jitter performance of the equipment (with integrated STM-1) shall be as per ITU-T recommendation G.825.

2.6 Traffic measurements

Traffic report, trunk group wise or route wise, shall be generated by digital exchange/EUT for incoming and outgoing trunks between digital exchange and PSTN/PLMN exchange.

2.7 Performance Reporting

The switching node shall support performance reporting as per ITU-T G.828. It shall be possible to access B2 bytes.

2.8 Junction testing

The equipment shall detect availability of STM-1 interface based on transmission alarm indications.

2.9 Transmission Parameter

If the digital exchange does not provide any analog subscriber stage, transmission characteristics at digital interfaces of a digital exchange as Recommended in ITU-T Blue Book Recommendation Q.554 shall be applicable.

2.9.1 Parameters for Digital Interface

It shall be as given below, in accordance with ITU-T recommendation Q.554.

2.9.1.1 BER

BER shall be better than 1 in 10^{-9} for a 64 kbit/s connection through the EUT/ digitalexchange.

2.9.1.2 Group delay

Group delay between Digital to Digital interfaces shall meet the following requirements:

Frequency (Hz)	Permitted limit (micro second)
500	900
604	900
1000	900
1792	900
2604	900
2792	900

Note: 900 micro seconds is the mean value. However, the limit for 0.95 probability of not exceeding is 1500 micro seconds.

2.9.2 Parameters for Analog Interface (Applicable if Analog Subscriber stage is provided)

It shall be as given below, in accordance with ITU-T recommendation Q.552.

2.9.2.1 Transmission Loss

The transmission loss provided by the EUT/digital exchange for the input half connection (A-D) shall be in the range of 0 to 2.0 dB and for output half connection (D-A) in the range of 0 to 8 dB.

2.9.2.2 Weighted Noise

The total weighted noise level for the input half connection (A-D) shall not exceed -63.5 dBm op to -64.2 dBm op for input relative level of 0 dBr to 2.0 dBr respectively and the total weighted noise level for the output half connection (D-A) shall not exceed -66.4 dBm op to -66.9 dBm op for output relative level of 0 dBr to -8.0 dBr respectively.

2.9.2.3 Total Distortion

Total distortion including quantization distortion for input and output half connection shall be better than the following values:

Input level	Signal to total distortion ratio for	
	input half connection	output half connection
0 dBmO	35.0 dB	35.0 dB
-10 dBmO	35.0 dB	35.0 dB
-20 dBmO	35.0 dB	33.8 dB
-30 dBmO	32.9 dB	28.8 dB
-40 dBmO	24.9 dB	19.5 dB
-45 dBmO	19.9 dB	14.5 dB

2.9.2.4 Group delay

Group delay between Digital to Analog interfaces shall meet the following requirements:

Frequency(Hz)	Permitted limit(micro second)
500	1950
604	1950
1000	1950
1792	1950
2604	1950
2792	1950

Note: 1950 micro seconds is the mean value. However, the limit for 0.95 probability of not exceeding is 2700 micro seconds.

2.10 STM-1 Electrical Interface

2.10.1 General Characteristics

STM-1 electrical interface shall be as per para 15 of ITU-T Rec. G.703.

(a). Nominal Bit rate :155520 Kbps

(b). Tolerance : ± 20 ppm

(c). Code : CMI

2.10.2 Output Port (Transmission Port)

Specifications at output port are given as below and shall be as per Table-12 and Figures-22 & 23 of ITU-T Rec. G.703.

No.	Parameters	Limits
a.	Pulse shape	Nominally rectangular and conforming to the masks in Fig. 22 and 23 of ITU-T Rec. G.703.
b.	Pair(s) in each direction	One coaxial pair
c.	Test load impedance	75 Ω resistive
d.	Peak-to-peak voltage	1.0 V ± 0.1 V
e.	Rise time between 10% and 90% amplitudes of measured steady state amplitude	≤ 2 ns
f.	Transition timing tolerance referred to the mean value of 50% amplitude points of negative transitions	Negative transitions: ± 0.1 ns Positive transitions at unit interval boundaries: ± 0.5 ns Positive transitions at mid-unit intervals: ± 0.35 ns
g.	Return loss	≥ 15 dB over frequency range 8-240 MHz

2.10.3 Input port

Digital signal presented at input port shall conform to Table-12 of ITU-T Rec. G.703 and Fig.-22 and 23 of ITU-T Rec. G.703 modified by the characteristics of inter connecting coaxial pair. Attenuation of coaxial cable shall be assumed to follow an approximate 'square root of f' law, and shall have a maximum insertion loss of 12.7 dB at a frequency of 78 MHz. Return loss characteristics shall be the same as specified for output port.

2.10.4Jitter Performance

Jitter specifications at the STM-1 electrical interface shall be as specified below:

2.10.4.1 Jitter Generation (output jitter)

The output jitter at the STM-1 electrical interface shall meet jitter limits as specified in ITU-T Rec. G.783 and G.813.

2.10.4.2 Jitter Tolerance (Input Jitter)

Jitter tolerance of input port shall be as specified in ITU-T Rec. G.825. Equipment port shall tolerate, as a minimum, input jitter applied according to the mask in Figure-2 of G.825 with the parameter values specified in Table-4 of G.825.

2.11 STM-1 Optical Interface

2.11.1 General Characteristics

STM-1 Optical interface shall be in accordance with Table-2 of ITU-T Rec. G.957.

2.11.1.1Digital Signal

STM-1 line signal shall be in accordance with ITU-T Rec. G.707 and G.957.

2.11.1.2Nominal Bit Rate

Nominal bit rate in synchronized mode shall be in accordance with ITU-T Rec. G.957. Nominal bit rate in free running mode shall be 155.520 Mbps $\pm$ 4.6 ppm.

2.11.1.3Optical Parameters

Various parameters for the optical interface shall as per the Table-2 of ITU-T Rec. G.957.

2.11.1.4 Receiver Sensitivity

The values given in Table-2, ITU-T Rec. G.957 against minimum sensitivity of receiver at reference point "R" are worst case end-of-life {EOL} values for the application mentioned therein. The beginning-of-the-life {BOL} values are specified to be 2-4 dB better than the given values in above referred tables.

2.11.1.5Eye Pattern Mask

Shape of the optical pulse of transmitter, at the reference point ‘S’, shall conform to the eye pattern mask given in Figure-2 of ITU-T Rec. G.957.

2.11.2 Jitter & Wander Performance

The jitter specifications of SDH interface at STM-1 level shall be as per ITU-T Rec.G.825. Wander performance of STM-1 interface shall be as per ITU-T Rec. G.813

2.11.2.1Jitter Generation (output jitter)

The output jitter at the STM-1 optical interface as measured over a 60 second interval should not exceed the limit as specified in ITU-T Rec. G.825.

2.11.2.2 Jitter Tolerance (Input Jitter)

Jitter tolerance of STM-1 interface shall be as per ITU-T Rec. G.825.

2.12 Requirements specific to Leap year problem

The time clock will maintain consistency throughout the functioning of the equipment. It shall not pose any problem due to changes in date and time caused by events such as changeover of leap year etc. in the normal functioning of the equipment. The manufacturer / supplier shall submit a certificate in compliance to these requirements.

3.0 EMI/EMC Requirements

Electromagnetic Interference

The equipment shall conform to the following EMC requirements for Class A:

Electromagnetic Compatibility (EMC) Requirements:

The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein. A test certificate and test report shall be furnished from an accredited test laboratory.

a) Conducted and radiated emission (applicable to telecom equipment):

Name of EMC Standard: “CISPR 22 {2005} with amendment 1 (2005) &amendment 2 (2006) - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".

Limits:-

To comply with Class A of CISPR 22 {2005}with amendment 1 (2005) &amendment 2 (2006)

The values of limits shall be as per TEC Standard No. TEC/EMI/TEL-001/01/FEB-09.

b) Immunity to Electrostatic discharge:

Name of EMC Standard: IEC 61000-4-2 {2001) "Testing and measurement techniques of Electrostatic discharge immunity test".

Limits: -

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

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

c) Immunity to radiated RF:

Name of EMC Standard: IEC 61000-4-3 (2006) "Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test"

Limits:

Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and

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.

d) Immunity to fast transients (burst):

Name of EMC Standard: IEC 61000-4-4 {2004) "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;

e) Immunity to surges:

Name of EMC Standard: IEC 61000-4-5 (2005) “Testing & Measurement techniques for Surge immunity test"

Limits:-

For mains power input ports : (a)1.0 kV peak open circuit voltage for line to ground coupling (b) 0.5 kV peak open circuit voltage for line to line coupling

For telecom ports : (a) 0.5 kV peak open circuit voltage for line to ground (b) 0.5 KV peak open circuit voltage for line to line coupling.

f) Immunity to conducted disturbance induced by Radio frequency fields:

Name of EMC Standard: IEC 61000-4-6 (2003) with amendment 1 (2004) & amendment. 2 (2006) "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.

g)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% for 500ms (i.e. 70 % supply voltage for 500 ms)

(ii) a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e. 40% supply voltage for 200ms) and

(iii) a voltage interruption corresponding to a reduction of supply voltage of > 95% for 5s.

Note: For checking compliance with the above EMC requirements, the method of measurements shall be in accordance with TEC Standard No. TEC/EMI/TEL-001/01/FEB-09 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 (a) to (g) and TEC Standard No. TEC/EMI/TEL-001/01/FEB-09.The details of IEC/CISPR and their corresponding Euro

Norms are as follows:

IEC/CISPR	Euro Norm
CISPR 11	EN 55011
CISPR 22	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 from test agency. The test agency for EMI/EMC compliance shall be an accredited one and details of accreditation shall be submitted.

4.0 Safety Requirements

4.1 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” and

IS 10437 {1986} “Safety requirements for radio transmitting equipments” [equivalent to IEC 60215].

A test certificate and test report shall be furnished from a test agency.

The test agency for safety requirements tests shall be an ISO 17025 accredited agency and details of accreditation shall be submitted.

5.0 Security Requirements

5.1 Lawful Interception Capability

The equipment 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 The Lawful interception capability of equipment shall be as per the applicable TEC GR (i.e. PSTN/Mobile) on the lawful interception.

CHAPTER-2

6.0 Specific remarks / information to be mentioned in the Certificate

6.1 Remarks on the IAC shall mention as below (as applicable)

(1) Type of signaling tested

(CCS7 or Indian Modified R2 Signalling or both)

(2) In case of Remote Switching Equipment:

Deployment of Remote Switching Equipment Controlled by a Main switch is restricted as per the licensing condition of the service provider, if any.

(3) The applicant has given the undertaking that EUT is capable of provisioning of target, delivery of Intercepted Related Information (IRI) and Call Content (CC) for the purpose of Lawful interception, but this facility has not been tested.

(4) Type of Synchronization interface tested (either 2048 khz or 2048 kbps or both)

(5) STM-1 electrical or optical interface

(6) Application code for optical interface

(7) In case of Remote Switching Equipment:

It is not a stand-alone switching equipment and works only with the main switching equipment------- (product name and model No. of all associated equipment in the tested configuration).

Abbreviations

For the purpose of this document the following abbreviations apply:

Abbreviation	Expanded Form
ACM	Address Complete Message
ANM	Answer Message
BER	Bit Error Ratio
BHCA	Busy Hour Call Attempts
CCS7	Common Channel Signalling No. 7
CLI	Calling Line Identification
CON	Connect
CPG	Call Progress
CRG	Charge Information
dB	decibel
EMC	Electromagnetic Compatibility
GR	Generic Requirements
Hz	Hertz
ILD	International Long Distance
IR	Interface Requirements
ISUP	ISDN User Part
ITU-T	International Telecommunication Union (Telecom Sector)
MTP	Message Transfer Part
MSISDN	Mobile Station Integrated Service Digital Network
NLD	National Long Distance
Ns	nano seconds
POI	Point Of Interconnection
PCM	Pulse Code Modulation
PLMN	Public Land Mobile Network
PSTN	Public Service Telephone Network

STM-1	Synchronous Transport Modules at 155 Mb/s bit rate
TEC	Telecommunication Engineering Centre
UI	Unit Interval

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