वर्गीय अपेक्षाओं के लिए मानक

टीईसी ४९११०:२०२६

(स. टीईसी ४९११०:२०२५ को अधिक्रमित करता है)

STANDARD FOR GENERIC REQUIREMENTS

TEC 49110:2026

(Supersedes No. TEC 49110:2025)

तत्व प्रबंधन प्रणाली (ईएमएस) अगली पीढ़ी के नेटवर्क के लिए (एन जी एन)

Element Management System (eMS) for Next Generation Networks (NGN)

ISO 9001:2015

दूरसंचार अभियांत्रिकी केंद्र

खुर्शीदलाल भवन, जनपथ, नई दिल्ली-११०००१, भारत

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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 for a Product/Equipment, Standards for Interface Requirements for a Product/Equipment, Standards for Service Requirements & Standard document of TEC 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

Element Management System (eMS) for Next Generation Network (NGN) described in this document shall manage all the elements of NGN. Same type/make of individual elements shall be managed through the element management system which shall be controlled by network manager application over interfaces mentioned in the document. This document describes the functional, technical, general engineering and documentation requirement for eMS for NGN. Individual element managers shall provide network element information required by NMS and shall allow for configuration change and provisioning of network elements through eMS as described in the document.

CONTENTS

HISTORY SHEET

S.No.	*Standard / document No.*	*Title*	*Remarks*
1	TEC/GR/IT/NMS-001/01/MAR-09	First edition of the GR for NMS Platform for NGN for the management of IP based NGN. In addition to the other inputs some features of the GR is extracted from GR on NMS for IPTAX Networks.	1st issue
2.	TEC/GR/IT/NMS-001/02/AUG-16	Revision of the first edition with the inclusion of the IPv6 Protocols. NMS has been changed to eMS. The new standard on eMS has been referred.	2nd issue
3	TEC 49110:2025	Standard for Generic Requirements of eMs for NGN	3rd issue
4	TEC 49110:2026	Standard for Generic Requirements of eMs for NGN	4th issue

REFERENCES

S.No.	*Document No.*	*Title/Document Name*
1.	TEC GR/Standards:	Available on TEC website (https://tec.gov.in/standards-specifications)
2.	TEC 59030:2013	Generic Requirements for Soft switch for Local & Transit Wireline Application
3.	TEC 49050:2012	BGP/MPLS Virtual Private Network
4.	TEC 59100:2019	Generic Requirements for Media Server
5.	TEC 48140:2025	Generic Requirements for Servers
.6.	TEC 61040:2009	Generic Requirements for element management system
7.	TEC 59040:2024	Generic Requirements for Session Border controller
8.	TEC 59050:2019	Generic Requirements for Signalling Gateway
9.	TEC 59060:2025	Generic Requirements for Trunk Media Gateway
10.	TEC 48060:2026	Generic Requirements for LAN Switch
11.	TEC 49090:2023	Generic Requirements for Firewall System
12.	TEC 48090:2015	Generic Requirements for Layer 4-7 Load Balancer Switch
13.	TEC 49130:2023	Intrusion Detection System for IP Network Security.
14.	TEC 48050:2025	Generic Requirements for Routers for MPLS Transport Network
15.	TEC 49100:2015	Generic Requirements for Data Storage Infrastructure
16.	TEC 59070:2014	Generic Requirements for Line Media Gateway
17.	TEC 11016:2016	Electromagnetic Compatibility Standard for telecommunication Equipment
18.	TEC 52006:2016	Standard on eMS
	QM Standards:	
19.	TEC 14016:2010 (old no. QM-333:2010)	Standard for Environmental testing of Telecommunication equipment.
	IEC/EN Standards	

20.	IEC/EN 61000-4-2	Testing and measurement techniques – Electrostatic discharge immunity test
21.	IEC/EN 61000-4-3	Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
22..	IEC/EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
23.	IEC/EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
24.	IEC/EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
25.	EN 55011	Industrial, scientific and medical (ISM) radio- frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
26.	EN 55022	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
	ITU-T Standards	
27.	ITU-T M.3010	Principles for a telecommunications management network
28.	ITU-T X.800	Security architecture for Open Systems Interconnection for CCITT applications
29.	ITU-T H.248	Gateway control protocol
	Other Standards	
30.	SNMP Ver 3	Simple Network Management Protocol version-3

31.	ISO 9002 or 9001:2000	Series of standards, developed and published by the International Organization for Standardization (ISO), that define, establish, and maintain an effective quality assurance system for manufacturing and service industries
32.	IS 8473 (latest) (equipment & IEC publication 479-1)	Information technology -- Protocol for providing the connectionless-mode network service -- Part 2: Provision of the underlying service by an ISO/IEC 8802 subnetwork
33.	IS 13252 (equipment & IEC publication 95 & 215)	Information Technology Equipment -- Safety, Part 1: General Requirements
34.	CISPR 11	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific & medical (ISM) radiofrequency equipment
35.	CISPR 32	Limits and methods of measurement of radio disturbance characteristics of ITE

Note:

Unless otherwise explicitly stated, the latest approved issue of the standard/GR/IR, with all amendments in force, listed in references, on the issuance date of this GR/IR are applicable.

CHAPTER 1

1.0 INTRODUCTION

1.1 Scope: Element Management System (eMS) for Next Generation Network (NGN) described in this document shall manage all the elements of NGN. Same type/make of individual elements shall be managed through the element management system which shall be controlled by network manager application over interfaces mentioned in the document. This document describes the functional, technical, general engineering and documentation requirement for eMS for NGN. Individual element managers shall provide network element information required by NMS and shall allow for configuration change and provisioning of network elements through eMS as described in the document.

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

1.3 The RFC documents of the IETF are subject to periodic revision. Hence where ever RFC's 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 the RFC is mentioned, product shall comply with the part of the RFC specifying the feature.

1.4 The interpretation of the clauses of the RFC's shall be as per RFC 2119.

2.0 DESCRIPTION

2.1 Architecture: Element Management System (eMS) shall be designed to provide carrier class performance. The eMS shall have redundant connectivity to the IP/MPLS network. The various NGN components are shown in figure 1.

2.1.1 The eMS architecture shall be as per the latest TEC standard on eMS available on TEC website (https://tec.gov.in/standards-specifications) It shall be a horizontally layered architecture and shall use MPLS as core transport network with a separation of call control, switching and

transport functions. The eMS shall be able to manage the NGN which shall comprise of at least the following principal network elements:

2.1.1.1 Soft Switch (SSW): The soft switch provides the call control functionalities. The soft switch shall be as per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications).

2.1.1.2 The Trunk Media Gateway (TMGW): The trunk media gateway converts the circuit switched traffic to packet based traffic after applying suitable codecs. The media gateway shall be as per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications).

2.1.1.3 Signalling Gateway (SGW): The signalling gateway used for carrying SS7 signalling information over IP based bearer network to and from soft switch. It shall be as per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications).

2.1.1.4 Line Media Gateways (LMGW) and Line Access Gateway: these are used for local switching network applications. They interface with subscriber directly or to remote subscriber unit over v 5.2 interface. It shall be as per per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)

2.1.1.5 Media Server (MDS): Media server is used in the network for providing announcements & general media processing assistance to the services in the network, it shall be as per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)

2.1.1.6 Session Border Controller (SBC) : A session border controller is a VoIP session-aware device that controls call admission to a network at the border of that network, and optionally (depending on the device) performs a host of call-control functions to ease the load on the call agents within the network, it secures the service provider's network boundary & shall be as per the latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)

2.1.1.7 Any other components which are part of the NGN implementation

Generic Deployment of eMS in a network operating centre (NOC) is shown in figure 5 of eMS standard (_ TEC 52006:2016 available on TEC website (https://tec.gov.in/standards-specifications)

3.0 FUNCTIONAL REQUIREMENTS

This chapter describes the functional requirements for the eMS System for NGN.

3.1 Element Management:

3.1.1 The eMS functionality shall be achieved through one or more element managers depending upon the OEM of the NGN components i.e. one eMS per OEM of the NGN components.

3.2 Functional and Technical Requirements for eMS:

Architecture for eMS shall be as per TEC standard on eMS:.available on TEC website (https://tec.gov.in/standards-specifications) The functions of eMS shall meet the functional requirement including FCAPS requirement as mentioned in the TEC standard. FCAPS of individual type of elements shall be provided by eMS.

3.2.1 The element management system shall include tools to efficiently manage the network infrastructure. The network manager shall be able to provide a response to the interrogation command for node status within 4 seconds when all the operators are accessing the eMS concurrently either from local or remote terminal.

3.2.2 Administrative Management: The NGN network shall be administered under various heads, some of which are as given below:

i. Trunk and Junction Administration
ii. Routing Administration
iii. Traffic Administration
iv. Charging data Collection
v. IP based NGN Control Operation

3.2.3 Configuration Management:

3.2.3.1 Remote node configuration shall be possible from the eMS. Initial configuration of the NGN element shall be as such that it shall establish the link with the eMS through IP/MPLS network and download the software configuration from the eeS. The initial element configuration shall be carried out using the local craft terminal which shall be supplied along with the network elements it shall have all the authorization for the network element before the software (program and configuration) is

downloaded from the eMS. The authorizations allowed after successful connection to the eMS shall be restricted to only interrogation and listing commands.

3.2.3.2 The eMS shall have full capability to configure the whole network elements. eMS shall be web GUI based & friendly menu driven. eMS shall be able to monitor the whole IP based NGN by using GUI. The listing of soft switches, TMGWs, links and path etc. shall be provided. The local and remote operators shall only connect to the eMS for managing the entire network.

3.2.3.3 The eMS shall be capable to store the network element data for a minimum duration of three month with facility for back-up or as indicated by tendering authority.

3.2.3.4 The eMS shall be multi-user system and at least capable to provide support of 10 users simultaneously, upgradeable to 50 users simultaneously. The eMS shall support configuration of 200 users. The eMS shall have the capability of supporting the management of network through local and remote terminals. The authorisations and the privileges of the user (remote and local) shall depend upon the login and password.

Note: The exact requirement for number of users shall be indicated at the time of procurement by tendering authority.

3.2.3.5 The administrator only shall be able to copy a file to the terminal or the eMS. The administrator shall only be able to release the terminals.

3.2.3.6 It shall be possible to store at least the last 20 commands on the screen and by scrolling and editing any command shall be re-executable.

3.2.3.7 It shall be possible to read or modify the data related to a group of trunks by a single command.

3.2.3.8 The eMS shall enable operations like changing the system configuration, reconfiguration of input and output devices, loading a new software package, etc., both automatic and manual reconfiguration capabilities shall be available.

3.2.3.9 In case a fault is detected requiring reloading of the program/software, this shall be carried out automatically. In case of manual re-loading, it shall be possible to stop and start at any particular point in the program. It shall be possible to load a designated file or group of files of the entire software.

3.2.4 Performance Management:

3.2.4.1 Graphical display of percentage of link utilisation and the network element resource shall be provided. The traffic observation shall indicate, for each type of service and for each type of call processing/call handling unit the number of units installed, number of units in service, call attempts, calls processed, calls answered etc.

3.2.4.2 The eMS shall enable viewing of the availability of the network elements as part of the network and also as individual elements. It shall be possible to drill down to subsystem of a network element from network map being displayed at the eMS. This action shall be possible with minimum numbers of mouse clicks. There shall be multiple windows displaying the information as requested by the operator i.e. one window displaying the network, another window opens up after the operator clicks on a part of the network and so on.

3.2.4.3 Statistical Information

(a) The eMS shall be able to extract statistical information regarding IP/packet transmission and reception. It shall support the activation/deactivation, collection, storage and presentation of statistics as defined in the individual GRs of the network element like Softswitch, Signalling Gateway, Trunk Media Gateway, etc. available on TEC website (https://tec.gov.in/standards-specifications)

(b) It shall provide the consolidated report for performance and operator initiated measurement for the busy hour or for any hour or for programmed duration for the network element, part and whole network. The report may be output regularly at 15 minutes interval or any multiple thereof.

(c) The traffic measurement shall include the performance of the core network with statistical information like packets sent,

packetsreceived, packets rejected due to an error, time delay for a packet to be sent across the network, jitter, delay experienced by RTP streams etc.

(d) The traffic measurement feature shall also include capability for viewing the performance of media gateway, signaling gateway, soft switch and any other component of the network for processing of calls on the basis of E.164 number & IP address, signaling links, incoming and outgoing junctions etc.

(e) It shall be possible to analyse the failures (e.g. unsuccessful calls handled) by the soft switch etc. so as to find out the exact cause of the failure, whether it has failed in the MPLS network or failed due to congestion in the IP based NGN component or failed in the PSTN network etc.

(f) eMS should have layered performance monitoring for fault isolation. The layers shall have the following :

i. Point: Monitors key performance indicators (KPI) for all interfaces in the network.

ii. Point to Point : Gathering performance information between points and across layers on the network

iii. Network Performance : Latency, jitter, and packet loss are measured across the network

3.2.4.4 It shall be possible to store all the performance and traffic statistics for three months. It shall also be possible to generate daily, weekly, monthly reports for the individual element as well as complete network. The report generation shall be supported for text and graphic reports.

3.2.4.5 The eMS shall receive and report different conditions including the following:

i. Congestion on the incoming route, the final backbone route, the signaling devices and control units.

ii. Alarms of power supply units (PSU).

iii. Degradation of tones for levels, etc.

iv. Any abnormalities in processing.

v. Detection of trunks that are incapacitated for accepting traffic.

vi. Automatically blocked devices to ensure that conditions leading to traffic overload are not created.

3.2.5 Fault Management:

3.2.5.1 The eMS shall be able to diagnose its own faults by running diagnostic software.

3.2.5.2 The visual display and the devices for manual control of the different parts of the system shall be displayed on a management GUI.

3.2.5.3 Diagnostics: eMS shall support the following functionalities:

i. Diagnostics shall be possible to run on all the cards/subsystem/system after taking it out of service.

ii. Diagnostics shall be possible on all the common control elements active or standby after taking it out of service.

iii. It shall preferably be possible to diagnose to single PCB level in at least 95% of the type of PCBs.

iv. Detailed diagnostics report shall be stored, displayed & printed. The detail shall contain date, time, card no & nature of fault.

v. Port loop testing shall be possible through command.

3.2.5.4 On a faulty condition, the software shall provide for isolating the faulty network element, its sub-system and then automatically activating the diagnostic programs supported by eMS/testing system for diagnostic purposes as mentioned in clause 3.2.5.3. The eMS shall support the diagnostics on the eMS elements also.

3.2.5.5 The eMS shall generate visual/audible alarms to assist in efficient administration some of which are given below as example:

i. Audible and visual alarm on failure of any power supply unit(PSU), ethernet interface, eMS connectivity.

ii. Congestion condition on junctions, trunks, common control devices, processors etc. An audible/visual alarm shall also be activated to give instant warning of a developing overload situation.

iii. Record of the system configuration at any specified time, designating equipment which is in service, in standby mode or out of service. A visual display shall also be provided to indicate the operating status of the processors.

iv. Present status of the system or designated equipment such as trunks free, busy or blocked, input/output device in use or blocked, etc.

v. Faults detected with identification of faulty units. The print-out shall contain the date and the time. Details of any other print-outs provided in the design for supervision and efficient management of the system, details of the supervision panel and the control arrangement shall be furnished.

vi. Alarm report in case of failure of CCS7 signaling link.

3.2.5.6 Alarm Indications:

i. Alarm shall be detected and displayed in case of any failure/malfunction/abnormality of any network element including the eMS components, links etc.

ii. Facility shall exist for audio/visual alarm indication of `Route Busy' on any group or circuits to enable initiation of suitable remedial action.

iii. Audio/visual alarm indication shall be given when the processor load exceeds a certain pre-set value, to be set by a suitable man-machine command.

3.2.5.7 Discovery: eMS should discover NGN infrastructure and how they are connected and contained.

3.2.6 Service Quality Management:

i. The eMS shall support the computation and aggregation of KPI and KQI metrics indicative of the quality of service (QoS) for various services and applications delivered.

ii. The eMS shall support the modeling and representation of KPI and KQI metrics specific to various subscriber applications and services delivered. KPI and KQI metrics shall be designed where possible to provide indication of end-to-end service quality.

iii. The eMS shall support the modeling and representation of the logical and physical resources comprising the infrastructure of various monitored services and applications delivered.

iv. The eMS shall support the derivation of KPI and KQI metrics from performance statistics, fault management data and xDR data.

v. The eMS shall support the derivation of KPI and KQI metrics from additional sources of service performance data instrumented within the network such as signaling probes and test systems.

vi. The eMS shall support the population of resource models using inventory data.

vii. The eMS shall be able to provide indication of the impact on QoS of network faults.

viii. The eMS shall support the assessment of relative impact or prioritization of service-affecting faults.

ix. The eMS shall support the monitoring of QoS against defined thresholds on a KPI/KQI, service and resource specific basis and will generate alarm notifications in events of threshold violations.

x. The eMS shall support root cause analysis of QoS violations through “drill down” analysis of KQI and KPI metric data. Root cause analysis shall include the presentation of failure modes/cause codes and identification of failure distribution by location, service/device type, or other dimensions as appropriate to the monitored services.

xi. The eMS shall support historical reporting of KQI and KPI metric data.

xii. The eMS shall support the analysis of QoS for specific type/class of service

xiii. The eMS shall provide service KPI and KQI metric data to NMS.

xiv. The eMS shall support monitoring of service availability and QoS through near real time dynamically updated dashboard views.

xv. The eMS shall support configurable modeling and representation of service availability relationships and dependencies between service delivery elements.

4.0 INTERCONNECTIVITY & INTEROPERABILITY REQUIREMENTS

4.1 eMS applications shall be IPv6 compliant:

4.1.1 The IP address input fields in the GUI application as well as databases shall support IPv4 and IPv6

4.1.2 The eMS application interfacing with various NEs over packet based communication shall support IPv4 and IPv6

4.2 The eMS shall support the following north bound interfaces to the NMS

i. SNMP v2/v3 for alarms
ii. ASCII over TCP/IP
iii. XML/Web Services [WSDL]
iv. CSV/FTP/FTAM over TCP/IP (for passing the CDR's or bulk performance management information)

5.0 QUALITY REQUIREMENTS

5.1 QUALITATIVE REQUIREMENTS (QR): The system shall meet the following qualitative requirements:

5.1.1 The manufacturer shall furnish the MTBF value. Minimum value of MTBF shall be specified by the purchaser. The calculations shall be based on the guidelines given in either QA document No. QM-115 {January 1997} "Reliability Methods and Predictions" or any other international standards.

5.1.2 The equipment shall be manufactured in accordance with international quality management system ISO 9001:2015 or any other equivalent ISO certificate for which the manufacturer should be duly accredited. A quality plan describing the quality assurance system followed by the manufacturer would be required to be submitted.

5.1.3 The equipment shall conform to the requirements for Environment specified

in TEC QA standards QM-333 {Issue- March, 2010}(TEC 14016:2010) "Standard for Environmental testing of Telecommunication Equipments" or any other equivalent international standard, for operation, transportation and storage. The applicable environmental category A or B to be decided by the purchaser based on the use case.

6.0 EMI/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 a test agency.

a) 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 of CISPR 32 (2015) with amendments for indoor deployments and Class A of CISPR 32 (2015) with amendments with amendments for outdoor deployments.

b) 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;

c) 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 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.

d) 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;

e) 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) 2kV peak open circuit voltage for line to ground (b) 2KV 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 (2013) with amendments) "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.

iv) a voltage interruption corresponding to a reduction of supply voltage of >95% for 10s.

h) 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. Limits:-

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, 300 ms and 1000ms. Applicable Performance Criteria shall be C.

v. Voltage variations corresponding to 80% and 120%of supply for 100 ms to10s as per Table 1c of IEC 61000-4-29. Applicable Performance Criteria shall be B.

Note: - 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 (TEC 11016:2016) and the referenced base standards i.e. IEC and CISPR standards 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 (h) and TEC Standard TEC/SD/DD/EMC-221/05/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	EN55032
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
IEC 61000-4-29	EN 61000-4-29

7.0 SAFETY REQUIREMENTS

The equipment shall conform to relevant safety requirements as per IS/IEC 62368-1:2018 or Latest as prescribed under Table no. 1 of the TEC document 'SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT": TEC10009: 2024. The manufacturer/supplier shall submit a certificate in respect of compliance to these requirements

8.0 Security Requirements

The eMS shall meet the security requirements as per TEC standard on eMS available on TEC website (https://tec.gov.in/standards-specifications).

8.1. The security logs of eMS should be processed at Security Operations Centre (SoC) or SIEM of connected NMS. For that purpose, eMS should have facility for pushing logs to SoC/SIEM on real time basis.

8.2 It shall be possible to connect eMS to the IP network. The eMS to NMS links may be part of the common VPN providing the inherent security required for the Management information in addition to the login and Password based authorization for the operators of the Network Manager. The connectivity between eMS and the NMS shall be TCP/IP based with the Data Link layer being the Ethernet. However in case the connectivity between eMS and NMS is not supported over TCP/IP interface then suitable converters shall be provided for transporting the Management information over the IP network.

9.0 OTHER MANDATORY REQUIREMENTS

9.1 Man Machine Communication:

9.1.1 The man-machine language shall be English. Commands shall be English based and responses shall be in English.

9.1.2 The MMC shall be GUI based, easy to learn and use, easy to input the commands and to interpret the outputs.

9.1.3 The MMC shall have an open-ended structure such that any new function or requirement added shall have no influence on the existing ones. The language structure shall be such that subsets can be created. Product API shall be provided for future expansion and/or integration of new features.

9.1.4 The MMC shall provide facilities for editing, cancelling and stopping, the completion of commands.

9.1.5 The MMC shall have facility for restricting the use of certain commands or

procedures to certain staff/terminals.

9.1.6 Where several man-machine terminals are in use on a single network element a mechanism shall be available to avoid clashes of command.

9.1.7 The execution of any command shall not result in malfunctioning or/and over loading of the network.

9.1.8 The MMC shall be implemented in such a way that errors in commands or control actions shall not cause the network to stop or unduly alter the network configuration.

9.1.9 Command errors detected by the network shall be indicated by the output of error messages.

9.1.10 The eMS shall support priority messages to interrupt input or output message of lower priority.

9.1.11 Sufficient checks and safeguards shall be built in to the implementation of the MMC so as to ensure reliable operation of the network.

9.2 **Engineering Requirements:** The system shall meet the following engineering requirements:

9.2.1 The equipment shall adopt state of the art technology.

9.2.2 The actual dimensions and weight of the equipment shall be furnished by the manufacturers.

9.2.3 All connectors shall be reliable, low loss and standard type so as to ensure failure free operations over long operations.

9.2.4 All LAN cabling shall be of gigabit Ethernet ready standards.

9.2.5 The DC operated fans used shall be available in redundant configuration.

9.3 **Operational Requirement (OR):** The system shall meet the following maintenance & operational requirements:

9.3.1 The equipment shall be designed for continuous operation.

9.3.2 The equipment shall be able to perform satisfactorily without any degradation at an altitude upto 3000 meters above mean sea level.

9.3.3 Suitable visual indication shall be provided for displaying healthy, unhealthy conditions.

9.3.4 The design of the equipment shall not allow plugging of a module in the wrong slot or upside down.

9.3.5 The removal or addition of any interface cards shall not disrupt traffic on

other cards.

9.3.6 All critical modules shall be identified and shall be provided in full redundant configuration.

9.3.7 A single point failure on the equipment shall not result in network or network management system downtime.

9.3.8 Special tools required for wiring shall be provided along with the equipment.

9.3.9 In the event of a bug found in the software, the manufacturer shall provide patches and firmware replacement if involved, free of cost. Compatibility of the existing hardware shall be maintained with future software/firmware.

9.3.10 In the event of a full system failure, a trace area shall be maintained in non-volatile memory for analysis and problem resolution.

9.3.11 A power down condition shall not cause loss of connection configuration data storage.

9.3.12 Live insertion and hot swap of modules shall be possible to ensure maximum network availability and easy maintainability.

9.3.13 The hardware and software components shall not pose any problems in the normal functioning of all network elements wherever interfacing with service provider's network for voice, data and transmission systems, as the case may be.

9.4 **Other Requirements:**

9.4.1 The system hardware/software shall not pose any problem, due to changes in date and time caused by events such as changeover of millennium/century, leap year etc., in the normal functioning of the system.

9.4.2 Software Maintenance: The software related licenses for the support of all protocols and interfaces mentioned in this GR shall be ensured in the devices.

10.0 Desirable Requirements

10.1 Documentation

10.1.1 Introduction:

This clause describes the general requirements for documentation, installation and software maintenance to be provided. Hard copy of all

technical documents in English with complete layout, detailed block schematic shall be provided. A soft copy or QR code as well as a hard copy of the above shall also be provided both in Hindi and English.

10.1.2 Documentation:

The documents shall comprise of:

a) eMS description documents

b) Installation, Operation and Maintenance documents

c) Training documents

10.1.3 eMS Description Documents: The following eMS description documents shall be supplied along with the system:

a) Over-all eMS specification and description of hardware and software.

b) Detailed specification and description of all input/output devices

c) Adjustment procedures, if there are any field adjustable units.

d) Spare parts catalogue including information on individual component values, tolerances, etc. enabling procurement from alternative sources.

e) Detailed description of software describing the principles, functions, and interactions with hardware, structure of the program and data.

f) Detailed description of each individual software package indicating its functions and its linkage with the other packages, hardware, and data.

g) Graphical description of the system. In addition to the narrative description a functional description of the NGN Network using the functional specification.

10.1.4 eMS Operation Documents: The following NMS operation documents shall be available.

a) Installation manuals and testing procedures.

b) Precautions for installation, operations and maintenance.

c) Operating and maintenance manual of the system.

d) Safety measures to be observed in handling the equipment.

e) Man-machine language manual.

f) Fault location and troubleshooting instructions including fault dictionary.

g) Emergency action procedures and alarm dictionary.

10.1.5 Training Documents:

a) Training manuals and documents necessary for organising training in installation, operation and maintenance and repair of the system shall be made available.

b) Any provisional document, if supplied, shall be clearly indicated. The updates of all provisional documents shall be provided immediately following the issue of such updates.

c) The structure and scope of each document shall be clearly described.

d) The documents shall be well structured with detailed cross-referencing and indexing enabling easy identification of necessary information.

e) All diagrams illustrations and tables shall be consistent with the relevant text.

10.2 Installation:

a) All necessary interfaces, connectors, connecting cables and accessories required for satisfactory installation and convenient operations shall be supplied. Type of connectors, adopters to be used shall be in conformity with the interfaces defined in this GR.

b) It shall be ensured that all testers, tools and support required for carrying out the stage by stage testing of the equipment before final commissioning of the network shall be supplied along with the equipment.

c) All installation materials, consumables and spare parts to be supplied.

d) All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language.

e) For the installations to be carried out by the supplier, the time frames shall be furnished by the supplier including the important milestones of the installation process well before commencing the installations.

CHAPTER 2

11.0 Tendering Requirements

11.1 Tendering/Ordering information:

Clause No.	Description
3.2	Tendering authority shall specify the requirements as per eMS standard available on TEC website. (https://tec.gov.in/standards-specifications)

NGN Components

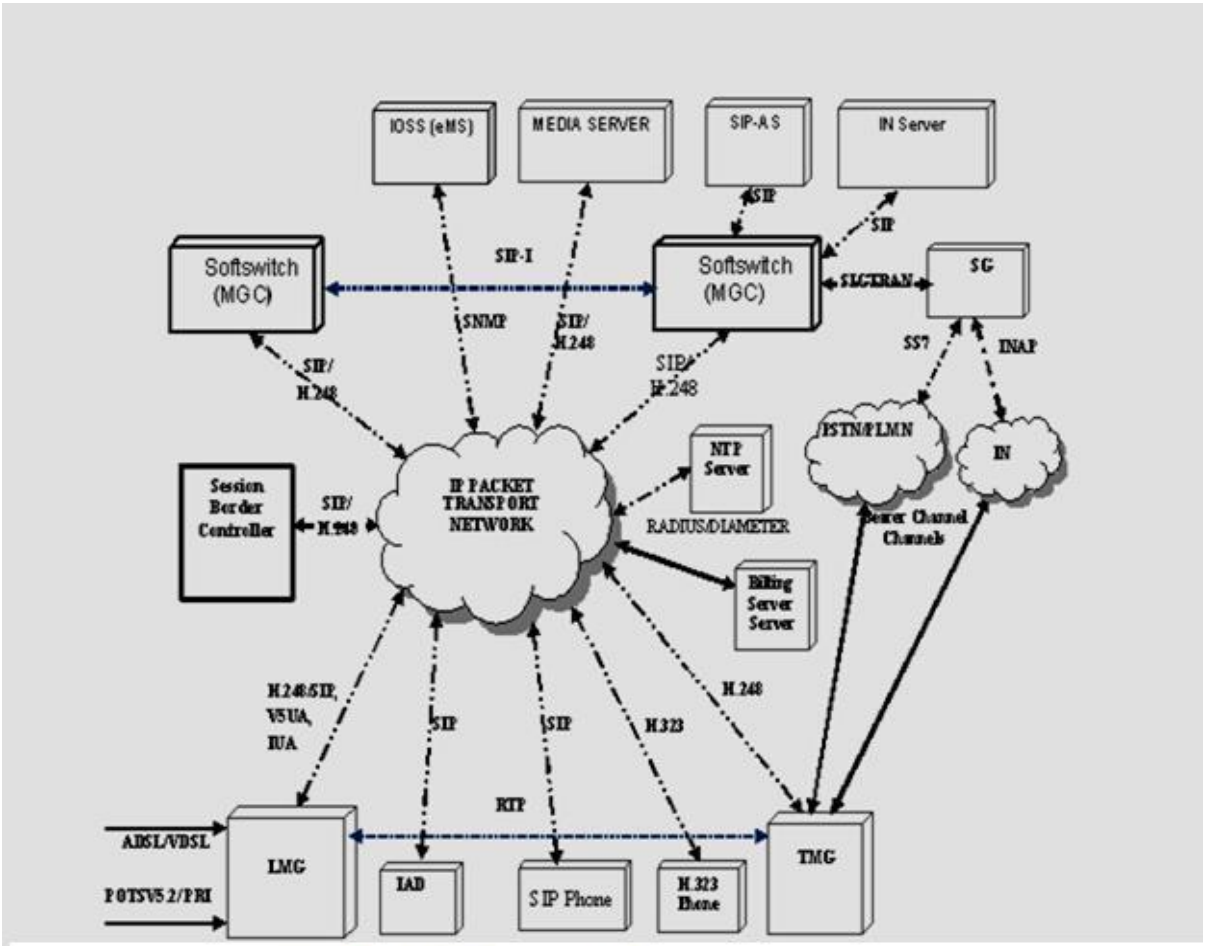

Figure-1: NGN Components

ABBREVIATIONS

ACL	Access Control List
ASCII	American Standard Coding for Information Exchange
CCS7	Common Channel Signalling # 7
CDR	Call Detail Record
CLI	Command Line Interface/ Calling Line Identification
CMIP	Common Management Information Protocol
E1	2 Mbps Interface
EMC	Electro Magnetic Compatibility
EML	Element Management Layer
FCAPS	Fault, Configuration, Asset/ Accounting, Performance & Security Management
FTP	File Transfer Protocol
GUI	Graphical User Interface
IETF	Internet Engineering Task Force
IO	Input Output
IP	Internet Protocol
IPv6	IP version 6
ISM	Industrial, Scientific and Medical
ITU-T	ITU Telecommunication Sector
KPI	Key Performance Indicators
KQI	Key Quality Indicators
LAN	Local Area Network
MMC	Man Machine Command
MML	Man Machine Language
MPLS	Multi Protocol Label Switching
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NE	Network Elements
NIDS	Network Intrusion Detection System
NML	Network Management Layer
NMS	Network Management System

NOC	Network Operating Centre
NSM	Network Surveillance Management
NTP	Network Time Protocol
OSS	Operational Support System
PAM	Pluggable Authentication Module
PSU	Power Supply Unit
QoS	Quality of Service
RAID	Redundant Array of Indispensable Disks
RISC	Reduced Instruction Set Code
RMON	Remote Monitoring
RTB	Route Busy
SAN	Storage Area Network
SCSI	Small Computer System Interface
SGW	Signalling Gateway
SML	Service Management Layer
SNMP	Simple Network Management Protocol
SP	Service Provider
SS7	Signalling System # 7
SSH	Secure Shell Access
SSW	Soft Switch
STM	Synchronous Transport Module
TCP	Transmission Control Protocol
TEC	Telecommunication Engineering Centre
TMGW	Trunk Media Gateway
TMN	Telecomm. Management Network
UDR	Usage Data Record
VoIP	Voice Over Internet Protocol
VPN	Virtual Private Network
xDR	Any kind of data record, e.g. IPDR, CDR, UDR, etc.
XML	Extensible Markup Language
KPI	Key Performance Indicator
KQI	Key Quality Indicator

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