Comments on Revision of Test Guide Titled "eMS for NGN"

(Draft Test Guide Standard No. TEC 49111:2025)

Name of Manufacturer/Stakeholder:

Organization:

Contact details:

Clause No.	Clause	Comments	Other Remarks, if any

Note: The comments on the revision of Test Guide titled "eMS for NGN" may be provided in the above format vide Email to adic1.tec@gov.in and diri.tec@nic.in

अनंतिम टेस्ट गाइड

टीईसी ४९१११:२०२५

(पूर्व सं: टीईसी/जीआर/आईटी/एनएमएस-००१/०२/अगस्त-१६)

PROVISIONAL TEST GUIDE

TEC 49111:2025

(Earlier No. TEC/GR/IT/NMS-001/02/Aug-16)

for

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

Element Management System (eMS) for

Next Generation Network (NGN)

ISO 9001:2015

दूरसंचार अभियांत्रिकी केंद्र

खुर्शीदलाल भवन, जनपथ, नई दिल्ली–110001, भारत

TELECOMMUNICATION ENGINEERING CENTRE

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Release 02: Jun 2025

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

This Standard document pertains to Test Schedule and Procedure of Element Management System (eMS) for Next Generation Networks.

CONTENTS

दूरसंचार अभियांत्रिकी केंद्र / Telecommunication Engineering Centre
(दूरसंचार विभाग) / (Department of Telecommunications)
खुर्शीद लाल भवन, जनपथ, नई दिल्ली-११०००१ / Khurshid Lal Bhawan, Janpath, New Delhi-110001.

File No. 7-3/2024-IT/TEC/GR-R3 Date: 21-05-2025

Information Sheet

S.No.	Item	Comments/Remarks by Division
1	Standard Document No. (Erstwhile GR/IR/SR)	*TEC 49110:2025*
2	Name of Product/Equipment/Service	*Element Management System (eMS) for Next Generation Networks (NGN)*
3	Approval (Type/Interface/CoA/Others)	*Type Approval*
4	Group/Division	*Information Technology (IT)*
5	Test Guide (Erstwhile TSTP) Status (Available-AV, Not Available-N/AV, Not Required-NR)	*AV*
6	If Available Test Guide No.	*TEC 49111:2025*
7	Man - Hours	*651 Hrs*
8	Category (I to X)	*Cat V*
9	If Standard document supersedes an old Standard (Change in Issue) i. Old document No. ii. Old document ceases to exist on iii. Incremental test schedule /procedure iv. Incremental Man – Hours v. Incremental Category (mention if different from sl.no.7)	*Yes* *TEC/GR/IT/NMS-001/02/Aug-16* *01.03.2025* *revised Test Guide* *N/A* *N/A*
10	Amendment/Errata/Addendum issued if any with date i. Incremental Testing ii. Incremental Man Hours iii. Incremental Category	*N/A*
11	Decentralization Status (Yes/No)	*Centralized*
12	Availability of document in soft copy (Yes/No) Soft Copy Status for i. Standard Document	*Yes (available on TEC website tec.gov.in/standards-specifications)*

	i. Test Guide(erstwhile TSTP)	*Yes (available on TEC website tec.gov.in/standards-specifications)*
	iii. Field Trial Observation Schedule	*Not Available*
	iv. Incremental Testing	*N/A*
	v. Amendment/Errata/Addendum (Soft copy to be sent to RC Division)	*N/A*
13	. Field Trial Required (Yes/No), if yes then a) Field Trial observation schedule status (AV, N/AV, NR) b) Field Trial Period	*No*
14	Whether trader is eligible for approval certification sought (Yes/No)	*Yes*
15	Special Remarks, if any	

Signature----------
Name & Designation----------

Copy to:
1. DDG (RC), TEC
2. ADG (Doc.), TEC for circulation to all RTECs

A. Introduction

This GR pertains to Element Management System (eMS) for Next Generation Network (NGN) for telecommunications network.

B. History Sheet

Sl.No.	TSTP No.	Title	Remarks
1.	TEC/GR/IT/NMS-001/02/Aug-16	Element Management System (eMS) for Next Generation Network (NGN)	First
2.	**TEC 49111:2025**	Element Management System (eMS) for Next Generation Network (NGN)	Second

C. General information:

	Information	**Details** *(to be filled by testing team)*	
	Name and Add ress of the		
	GR/IR/Applicant's Spec. against which the approval sought		
	Any other relevant *Information*:-		

D. Testing team: *(to be filled by testing team)*

E. List of the Test Instruments:

	Name of the test instrument	**Make /Model** *(to be filled by testing*	**Validity of calibration** *(to be filled by testing team)*

F. Equipment Configuration Offered: *(to be filled by testing team)*

a. <Equipment/product name> Configuration:

	Item	Details	

Relevant information like No. of cards, ports, slots, interfaces, size etc. may be filled as applicable for the product

b. <Other equipment name> Configuration:

	Item	Details	

Relevant information like No. of cards, ports, slots, interfaces, size etc. may be filled as applicable for the product

G. Equipment/System Manuals: *(to be filled by testing team)*

Availability of Maintenance manuals, Installation manual, Repair manual & User Manual etc. **(Y/N)**

H. Clause-wise Test Type and Test No.:

Functional Test – Any test or inspection performed to showcase the functionality mentioned in the clause. Functional Test may be performed to test the feature / functionality mentioned in the clause. For some clauses specific methodology is mentioned and for other clauses testing can be done as per original manufacturer suggested procedures for proving the functionality / feature mentioned. For all the functional tests, Figure-1 of section I may be referred to.

Physical Verification – Any test where functionality / feature is proven by physically inspecting the equipment / device / GUI.

Documentation – Original equipment manufacturer's publically available documentation verifying or proving the feature / functionality / parameter mentioned in the clause.

Clause No.	Clause	Functional Test/ Physical Verification, etc	Remarks
Part I	**Test as per GR No. TEC 49110:2025**	Information	
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	Information	
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	Physical verification of the latest issue/release of the documents.	
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.	Information	

1.4	The interpretation of the clauses of the RFC's shall be as per RFC 2119.	Information	
2.0	**DESCRIPTION**	Information	
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.	Information	
2.1.1	The eMS architecture shall be as per TEC standard on eMS as per latest TEC standard 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:	Information	
2.1.1.1	**Soft Switch (SSW):** The soft switch provides the call control functionalities. The soft switch shall be as per latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)	Information	
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 per per latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications).	Information	
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 per latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)	Information	
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 latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)	Information	
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 latest TEC GR available on TEC website (https://tec.gov.in/standards-specifications)	Information	

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).	Information	
2.1.1.7	Any other components which are part of the NGN implementation.	Information	
2.2	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)	Information	
3.0	This chapter describes the functional requirements for the eMS System for NGN.	Information	
3.1	**Element Management:**	Information	
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	Information	
3.2	**Functional and Technical Requirements for eMS:**	Information	
	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.	Refer to **Part–II** of this TSTP for the test procedures for verifying the functional and Techinical Requirements as per latest TEC standard on eMS	
3.2.1	The network 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	Functional test	
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	Information	

3.2.3	**Configuration Management:**	Information	
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.	Functional test	
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	Functional test	
	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.	Undertaking	
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.	Functional test for 2 to 3 users and undertaking for the specified users.	
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.	Functional test	
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	Functional test	
3.2.3.7	It shall be possible to read or modify the data related to a group of trunks by a single command.	Functional test	
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.	Functional test	

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.	Undertaking	
3.2.4	**Performance Management:**	Information	
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.	Functional test	
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	Functional test	
	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:**	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 likeSoftswitch, Signalling Gateway, Trunk Media Gateway etc. available on TEC website (https://tec.gov.in/standards-specifications) , etc.	Functional test	
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.	Functional test	
c.	The traffic measurement shall include the performance of the core network with statistical information like packets sent, packets received, packets rejected due to an error, time delay for a packet to be sent across the network, jitter, delay experienced by RTP streams etc.	Functional test	

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.	Functional test	
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.	Functional test and undertaking w.r.t. MPLS network	
f.	eMS should have layered performance monitoring for fault isolation. The layers shall have the following :	Information	
	i. **Point:** Monitors key performance indicators (KPI) for all interfaces in the network	Functional test	
	ii. **Point to Point :** Gathering performance information between points and across layers on the network.	Feature varification in the GUI	
	iii. **Network Performance :** Latency, jitter, and packet loss are measured across the network.	Feature varification in the GUI	
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.	Feature varification in the GUI and undertaking	
3.2.4.5	The eMS shall receive and report different conditions including the following:	Information	
i	Congestion on the incoming route, the final backbone route, the signaling devices and control units.	Functional test	
ii	Alarms of power supply units (PSU).	Functional test	
iii	Degradation of tones for levels, etc.	Functional test	
iv	Any abnormalities in processing.	Functional test	
v	Detection of trunks that are incapacitated for accepting traffic.	Functional test	
vi	Automatically blocked devices to ensure that conditions leading to traffic overload are not created.	Functional test	
3.2.5	**Fault Management:**	Information	
3.2.5.1	The eMS shall be able to diagnose its own faults by running diagnostic software	Functional test	
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.	Functional test	
3.2.5.3	Diagnostics: eMS shall support the following functionalities:	Functional test	

I	Diagnostics shall be possible to run on all the cards/subsystem/system after taking it out of service.	Functional test	
ii	Diagnostics shall be possible on all the common control elements active or standby after taking it out of service.	Functional test	
iii	It shall preferably be possible to diagnose to single PCB level in at least 95% of the type of PCBs.	Functional test	
iv	Detailed diagnostics report shall be stored, displayed & printed. The detail shall contain date, time, card no & nature of fault.	Functional test	
v	Port loop testing shall be possible through command.	Functional test	
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.	Feature verification in the GUI and undertaking	
3.2.5.5	The eMS shall generate visual/audible alarms to assist in efficient administration some of which are given below as example:	Information	
i	Audible and visual alarm on failure of any power supply unit(PSU), ethernet interface, eMS connectivity.	Feature verification in the GUI and undertaking	
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.	Feature verification in the GUI and undertaking	
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.	Functional test	
iv	Present status of the system or designated equipment such as trunks free, busy or blocked, input/output device in use or blocked, etc.	Functional test	
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.	Feature verification in the GUI and undertaking	
vi	Alarm report in case of failure of CCS7 signaling link.	Feature verification in the GUI and undertaking	
3.2.5.6	**Alarm Indications:**	Information	
i.	Alarm shall be detected and displayed in case of any failure/malfunction/abnormality of any network element including the eMS components, links etc.	Functional test	

ii.	Facility shall exist for audio/visual alarm indication of `Route Busy' on any group or circuits to enable initiation of suitable remedial action.	Functional test	
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.	Functional test	
3.2.5.7	**Discovery**: eMS should discover NGN infrastructure and how they are connected and contained.	Functional test	
3.2.5.8	**Service Quality Management:**	Information	
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.	Feature verification in the GUI and undertaking	
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.	Feature verification in the GUI and undertaking	
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.	Feature verification in the GUI and undertaking	
iv	The eMS shall support the derivation of KPI and KQI metrics from performance statistics, fault management data and xDR data.	Feature verification in the GUI and undertaking	
v	The eMS shall support the population of resource	Feature verification in the	
	models using inventory data.	GUI and undertaking	
vi	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.	Feature verification in the GUI and undertaking	
vii	The eMS shall be able to provide indication of the impact on QoS of network faults.	Feature verification in the GUI and undertaking	
viii	The eMS shall support the assessment of relative impact or prioritization of service-affecting faults.	Feature verification in the GUI and undertaking	
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.	Feature verification in the GUI and undertaking	
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.	Feature verification in the GUI and undertaking	
xi	The eMS shall support historical reporting of KQI and KPI metric data.	Feature verification in the GUI and undertaking	

xii	The eMS shall support the analysis of QoS for specific type/class of service.	Feature verification in the GUI and undertaking	
xiii	The eMS shall provide service KPI and KQI metric data to NMS.	Feature verification in the GUI and undertaking	
xiv	The eMS shall support monitoring of service availability and QoS through near real time dynamically updated dashboard views.	Feature verification in the GUI and undertaking	
xv	The eMS shall support configurable modeling and representation of service availability relationships and dependencies between service delivery elements.	Feature verification in the GUI and undertaking	
4.0	**INTERCONNECTIVITY & INTEROPERABILITY REQUIREMENTS**	Information	
4.1	eMS applications shall be IPv6 compliant:	Information	
4.1.1	The IP address input fields in the GUI application as well as databases shall support IPv4 and IPv6	Functional test	
4.1.3	The eMS application interfacing with various NEs over packet based communication shall support IPv4 and IPv6	Functional test	
4.2	The eMS shall support the following north bound interfaces to the NMS	Functional test	
i.	SNMP v2/v3 for alarms	Functional test	
ii.	ASCII over TCP/IP	Functional test	
iii.	XML/Web Services [WSDL]	Functional test	
iv.	CSV/FTP/FTAM over TCP/IP (for passing the CDR's or bulk performance management information)	Declaration	
5.0	**5.1 QUALITATIVE REQUIREMENTS (QR):** The systemshall 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	Declaration	

	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**	Information	
	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:-** 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:- **a)** Contact discharge level 2 {± 4 kV} or higher voltage; **b)** Air discharge level 3 {± 8 kV} or higher voltage;	Test certificate from accredited lab	

	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:-** b) 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		

	c) 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:**	Information	

	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	Test certificate from accredited lab	
	.	Information	
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)	Refer Part-II of this TSTP	
9.0	**OTHER MANDATORY REQUIREMENTS**	Information	
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.	Declaration and document verification	
9.1.2	The MMC shall be GUI based, easy to learn and use, easy to input the commands and to interpret the outputs.	Functional test	
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.	Declaration	
9.1.4	The MMC shall provide facilities for editing, cancelling and stopping, the completion of commands.	Declaration	
9.1.5	The MMC shall have facility for restricting the use of certain commands or procedures to certain staff/terminals.	Functional test	
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.	Declaration	
9.1.7	The execution of any command shall not result in malfunctioning or/and over loading of the network.	Declaration	
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.	Declaration	
9.1.9	Command errors detected by the network shall be indicated by the output of error messages.	Declaration	

9.1.10	The eMS shall support priority messages to interrupt input or output message of lower priority.	Declaration	
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.	Declaration	
9.2	**Engineering Requirements:** The system shall meet the following engineering requirements:	Information	
9.2.1	The equipment shall adopt state of the art technology.	Declaration	
9.2.2	The actual dimensions and weight of the equipment shall be furnished by the manufacturers.	Physical Verification	
9.2.3	All connectors shall be reliable, low loss and standard type so as to ensure failure free operations over long operations.	Physical Verification	
9.2.4	All LAN cabling shall be of gigabit Ethernet ready standards.	Physical Verification	
9.2.5	The DC operated fans used shall be available in redundant configuration.	Physical Verification	
9.3	**Operational Requirement (OR):** The system shall meet the following maintenance & operational requirements:	Information	
9.3.1	The equipment shall be designed for continuous operation.	Declaration	
9.3.2	The equipment shall be able to perform satisfactorily without any degradation at an altitude upto 3000 meters above mean sea level.	Declaration	
9.3.3	Suitable visual indication shall be provided for displaying healthy, unhealthy conditions.	Functional Verification	
9.3.4	The design of the equipment shall not allow plugging of a module in the wrong slot or upside down.	Declaration	
9.3.5	The removal or addition of any interface cards shall not disrupt traffic on other cards.	Declaration	
9.3.6	All critical modules shall be identified and shall be provided in full redundant configuration.	Declaration	
9.3.7	A single point failure on the equipment shall not result in network or network management system downtime.	Declaration	
9.3.8	Special tools required for wiring shall be provided along with the equipment.	Declaration	
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.	Declaration	
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.	Declaration	
9.3.11	A power down condition shall not cause loss of connection configuration data storage.	Declaration	

9.3.12	Live insertion and hot swap of modules shall be possible to ensure maximum network availability and easy maintainability.	Declaration	
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.	Declaration	
9.4	**Other Requirements:**	Information	
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.	Declaration	
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.	Declaration	
10.0	**Desirable/Tendering Requirements**	Information	
10.1	**Documentation**	Information	
10.1.1	Introduction: This clause describes the general requirements for documentation, installation and software maintenance to be provided. All technical documents shall be in English language and shall be provided on CD-ROMs and hard copy	Information	
10.1.2	The documents shall comprise of:	Information	
a	eMS description documents	Information	
b	Installation, Operation and Maintenance documents	Information	
c	Training documents	Information	
10.1.3	**eMS Description Documents:** The following eMS description documents shall be supplied along with the system:	Information	
a	Over-all eMS specification and description of hardware and software.	Document verification	
b	Detailed specification and description of all input/output devices	Document verification	
c	Adjustment procedures, if there are any field adjustable units.	Document verification	
d	Spare parts catalogue including information on individual component values, tolerances, etc. enabling procurement from alternative sources.	Document verification	
e	Detailed description of software describing the principles, functions, and interactions with hardware, structure of the program and data.	Document verification	
f	Detailed description of each individual software package indicating its functions and its linkage with the other packages, hardware, and data.	Document verification	

g	Graphical description of the system. In addition to the narrative description a functional description of the NGN Network using the functional specification.	Document verification	
10.1.4	**eMS Operation Documents:** The following NMS operation documents shall be available	Information	
a	Installation manuals and testing procedures.	Document verification	
b	Precautions for installation, operations and maintenance.	Document verification	
c	Operating and maintenance manual of the system.	Document verification	
d	Safety measures to be observed in handling the equipment.	Document verification	
e	Man-machine language manual.	Document verification	
f	Fault location and trouble shooting instructions including fault dictionary.	Document verification	
g	Emergency action procedures and alarm dictionary.	Document verification	
10.1.5	**Training Documents:**	Information	
a	Training manuals and documents necessary for organising training in installation, operation and maintenance and repair of the system shall be made available	Document verification	
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.	Document verification	
c	The structure and scope of each document shall be clearly described.	Document verification	
d	The documents shall be well structured with detailed	Document verification	
	cross-referencing and indexing enabling easy identification of necessary information.		
e	All diagrams illustrations and tables shall be consistent with the relevant text.	Document verification	
10.2	**Installation:**	Information	
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.	Document verification	
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.	Document verification	
c	All installation materials, consumables and spare parts to be supplied.	Document verification	
d	All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language.	Document verification	

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.	Document verification	
Part-II Test as per Functional Requirements of the Standard on eMS No. TEC 52006:2016			
3.0	**FUNCTIONAL REQUIREMENTS** The eMS shall support following general functions i. Fault Management ii. Configuration Management iii. Performance Management iv. Security Management v. Software Management vi. Inventory Management. vii. Viewing and reporting functions	Information	
3.1	**Fault Management**	Information	
3.1.1	The eMS shall support Fault and troubleshooting capabilities which include Fault aggregation/consolidation, fault-severity indications, extensive list of fault filters, fault-forwarding, fault event-driven actions such as email, SMS, scripts, forwarding etc.	Functional Verification	
3.1.2	The eMS shall support generation and recording of alarm notification which shall include: type, occurrence, severity, probable cause and clearing.	Functional Verification	
3.1.3	The eMS shall support topological view of the alarm notifications	Functional Verification	
3.1.4	The eMS shall support to send critical alarm alerts through SMS or e-mail and the criticality and contacts shall be configurable	Functional Verification	
3.1.5	The eMS shall provide total alarm visibility of all NEs under its management which shall include:	Functional Verification	
	• Real time alarm monitoring and collection	Functional Verification	
	• Alarm display with audible and visual alert signal	Functional Verification	
	• Alarm graphical representation on network map	Functional Verification	
	• Alarm storage	Functional Verification	
	• Alarm reports	Functional Verification	
	• Alarm attributes and colour coded	Functional Verification	
	• Archiving and exporting	Functional Verification	
	• Alarm acknowledgement and alarm clear	Functional Verification	
	• Alarm filtering	Functional Verification	
3.1.6	The eMS shall support alarm reduction through correlation & suppression based on object modelling, severity and type	Functional Verification	
3.1.7	The eMS shall support the following functions:	Functional Verification	

	• Network Element fault alarms with severity level indicators.	Functional Verification	
	• Archive log for historical alarms and events.	Functional Verification	
	• Threshold alarms.	Functional Verification	
	• End-to-end logical connection view of service components within the eMS domain like ports etc.	Functional Verification	
3.1.8	The eMS shall provide root cause analysis and correlate the alarms with physical network infrastructure.	Functional Verification	
3.1.9	The eMS shall store fault history of 30 days of the network under its domain.	Functional Verification	
3.1.10	eMS shall support viewing of fault history using the filtering criteria in graphical form.	Functional Verification	
3.1.11	The following Network device/Element related fault and alarm condition shall be reported by eMS	Functional Verification	
3.2	**Configuration Management**	Information	
3.2.1	The eMS shall create, update, delete and retrieve the managed network topology data	Functional Verification	
3.2.2	The eMS shall assist to perform the configuration changes for network devices from a central location	Functional Verification	
3.2.3	The eMS shall capture and keep record of any configuration change happening on a network device	Functional Verification	
3.2.4	The eMS shall provide capability to follow an approval workflow before some or all changes can be implemented	Functional Verification	
3.2.5	The eMS shall administer configuration changes to network elements by providing toolkits to automate the following administrative tasks as applicable	Functional Verification	
	which effects configuration changes to network elements:		
	• Capture running configuration.	Functional Verification	
	• Capture startup configuration.	Functional Verification	
	• Compare configurations.	Functional Verification	
	• Upload configuration.	Functional Verification	
	• Write startup configuration.	Functional Verification	
	• Upload firmware.	Functional Verification	
3.2.6	EMS of the system shall have the capability of assigning IPv4/IPv6 addressing, for internal communication with the equipment. The NE/eMS shall automatically assign internal IP addresses as applicable for each equipment with in its domain via DHCP protocol or any other suitable mechanism well standardized.	Functional Verification	

3.2.7	The following Network device/Element related configurations shall be possible to be performed from the eMS: < The Network element specific configurations to be performed by the eMS shall be specified in the respective Generic Requirements (GR) of the product. >	Information	
3.3	**Inventory Management**	Information	
3.3.1	The eMS shall indicate the absence or presence of any physical module in hardware elements. It shall also indicate the usage of module i.e. how many ports are in use, which interface is in use and which are free to be used etc.	Functional Verification	
3.3.2	The eMS shall be able to discover and keep the device information	Functional Verification	
3.3.3	The eMS shall be able to keep track on any change in the network inventory reported chronologically	Functional Verification	
3.3.4	The eMS shall provide the inventory information to the Network Management layer (NML)/Service Management Layer (SML) so that SML is able to create and activate a service to the customer automatically. This shall also assist SML in providing the network inventory to which the SML shall add the customer identification and maintain this information in its database.	Functional Verification	
3.3.5	The eMS shall be able to show inventory based on the available device inventory in terms of circuits' utilization and in a visualization form.	Functional Verification	
3.3.6	The eMS shall provide the complete view of the network elements and the interconnecting links	Functional Verification	
3.4	**Software Management**	Information	
3.4.1	The eMS shall support to carry out the following tasks wherever applicable under the software management function:	Information	
	• Loading of new system software	Declaration	
	• Manage different versions of software	Declaration	
	• Manage multiple versions of software for individual elements. In this case, one software version shall remain active and other versions shall be passive.	Declaration	
	• Installation of software patches.	Declaration	

3.4.2	The eMS shall, at the time of downloading the software, shall be display the information that the software has been downloaded successfully or failed and at what stage.	Declaration	
3.4.3	The eMS shall support FTP/TFTP for downloading of Software, configuration, patches etc., to the Network Element.	Functional Verification	
3.4.4	The eMS shall not allow (access control) the operator terminals (local & remote) from loading of any software without the system administrator's authorization.	Functional Verification	
3.4.5	The eMS shall enable operations like changing the system configuration, reconfiguration of input and output devices, loading a new software package, etc.	Functional Verification	
	Both automatic and manual reconfiguration capabilities shall be available.	Functional Verification	
3.4.6	Software download: Local & remote software download via management system to NEs and LCT shall be possible, including the means of identification of software module versions.	Functional Verification	
	No loss of data/traffic & connection-map shall take place during the software down-loading process	Functional Verification	
3.5	**Performance Management**	Information	
3.5.1	The eMS shall have ability to generate reports based on performance parameters of the NEs. It also shall support threshold violation alarms.	Functional Verification	
3.5.2	The eMS shall be able to retrieve, generate and print reports and graphs on Performance Management data	Functional Verification	
	based on real time, time intervals, daily, weekly, monthly, annually or specific period, for all NEs and its resources by using the built-in report capabilities of the System.		
3.5.3	The eMS shall support provision of performance measurements as applicable (e.g. QoS/CoS) for the following:	Information	
	• Interface/ Port level	Functional Verification	
	• Logical interface level	Functional Verification	
	• Service type	Functional Verification	

3.5.4	The eMS shall provide detail and summary information for the following based on the type of NE being managed:	Information	
	• Bandwidth Utilization and subscription (Total, New Subscription, Upgrade, etc)	Functional Verification	
	• Traffic originating and terminating points	Functional Verification	
	• Traffic Statistics	Functional Verification	
	• Connectivity Time (Average, Total, Peak, etc)	Functional Verification	
3.5.5	The eMS shall provide network performance reports (including latency, threshold violations, packet errors, availability, bandwidth utilization, etc. based on the type of NE's being managed) for network infrastructure.	Functional Verification based on the type of NE	
3.5.6	The eMS shall provide Latency as applicable (both one way and round trip times) report for critical devices and links.	Functional Verification based on the type of NE	
3.5.7	The following network device/element related performance management functions shall be performed by eMS	Information	
3.6	**Security Management**	Information	
3.6.1	The eMS shall provide adequate security to the data and for the access to the system.	Functional Verification	
3.6.2	The eMS shall have the capability of supporting the management of NE's through local and remote operators.	Functional Verification	
	The authorizations and the privileges of the operators (remote and local) shall depend upon the Login and Password	Functional Verification	
3.6.3	The eMS shall support operator authentication, command, menu restriction and operator privileges.	Functional Verification	
3.6.3.1	The eMS shall allow the System Administrator to define the level of access to the network capabilities or feature for each assigned user.	Functional Verification	
3.6..4	The eMS shall support the following levels of password protected users with different privileges.	Information	
	• Low-level privilege for read only access to faults and performance information.	Functional Verification	
	• Medium-level privilege for access to configuration status and features.	Functional Verification	

	• High-level privilege for control of access to change in the configuration and control parameters.	Functional Verification	
3.6.4.1	It shall be configurable for the eMS to entry into the eMS / block the access to the operator in case of unauthorized commands being tried for certain consecutive times which shall be configurable.	Functional Verification	
3.6.4.2	The system administrator shall be able to monitor and log all operator activities in the eMS.	Functional Verification	
3.6.4.3	The dynamic password facility shall be provided in which the operator may change his password at any time.	Functional Verification	
3.6.5	All log-in and log-out attempts shall be logged in the security log file of the eMS system.	Functional Verification	
3.6.6	The eMS system shall be protected against intentional or accidental abuse, unauthorized access and loss of communication.	Functional Verification	
3.6.7	Log transaction between Client/Agent & eMS Server shall support SSL/encryption.	Functional Verification	
3.6.8	The eMS shall support capability to create and assign role-based views.	Functional Verification	
3.7	**Viewing and reporting Requirements**	Information	
3.7.1	The eMS shall support full view of events that have occurred to ensure comprehensive trend and historical analysis and reporting.	Functional Verification	
3.7.2	The eMS shall support email alerts and support integration capabilities to third party systems and forward alerts via Syslog or SNMP	Functional Verification	
3.7.3	The eMS shall categorize all event collected by device into event taxonomies for easier classification and management	Functional Verification	
3.7.4	The eMS shall support Distributed viewing and delegation of user rights across devices and access to individual components of the application	Functional Verification	
3.7.5	The eMS shall support provision of view filter when	Functional Verification	
	displaying the logs related to specific IP address, specific service or specific time duration based on the NE being managed.		
3.7.6	The eMS shall support web based (both http and https) user interface for device performance monitoring and analysis with SSL connectivity to backend appliances	Functional Verification	

3.7.7	The eMS shall support capability to schedule reports. All raw log format fields shall be available for query	Functional Verification	
3.8	**Architecture specification**	Information	
3.8.1	**Types of eMS configurations:** The eMS shall support the following architectures depending upon the type and number of NE's being managed.	Information	
a	A PC acting as the eMS	Functional varification based on the offered configuration. The offered configuration shall be recorded in the Type Approval certificate.	
b	A Server only acting as the eMS in 1+0, 1+1, N+1, 1:1 or N:1 configuration.		
c	Server in 1+1, N+1, 1:1 or N:1 configuration along with the associated Network		
d	Server along with the associated Network as above and Disaster Recovery System		
3.8.2	**A PC acting as eMS**	Information	
3.8.2.1	For few number of devices to be managed, a PC can very well act as the eMS.	Functional Verification based on the offered configuration.	
3.8.2.2	The hardware specifications of the PC acting as the eMS is as per clause 3.8.7.3	Functional Verification based on the offered configuration.	
3.8.3	**Server acting as eMS**	Information	
3.8.3.1	Suitable Server specifications for the eMS Server may be selected from the Server Specifications TEC GR available on TEC website (https://tec.gov.in/standards-specifications). .	Information	
3.8.3.2	The category of Server, storage requirements etc., shall be specified by the purchaser.	Information	
3.8.3.3	The server can be in 1+0, 1+1, N+1, 1:1 or N:1 configuration. This may be specified by the purchaser	Functional Verification based on the offered configuration.	
3.8.4	**Server and Network** A typical eMS network architecture for large networks is given in Figure-4.	Information	
3.8.4.1	The Firewall shall be as per TEC GR GR/FWS-01. The	Information	
	type of firewall required shall be specified by the purchaser.		
3.8.4.2	The Load Balancer shall be as per TEC GR available on TEC website (https://tec.gov.in/standards-specifications. The Category of Load Balancer required shall be specified by the purchaser.	Information	

3.8.4.3	The Ethernet Switch shall be as per TEC GR available on TEC website (https://tec.gov.in/standards-specifications. The Category of Switch required shall be specified by the purchaser.	Information	
3.8.4.4	The NMS Server hardware dimensioning and configurations can be referred from TEC GR available on TEC website (https://tec.gov.in/standards-specifications. The Category of Server required shall be specified by the purchaser.	Information	
3.8.4.5	The eMS may or may not have a separate storage infrastructure based on the capacity of the system. The requirement of the storage may be specified by the purchaser. In case separate storage is required, the Storage hardware shall be as per TEC GR available on TEC website (https://tec.gov.in/standards-specifications. The type of Storage hardware required shall be specified by the purchaser.	Information	
3.8.4.6	The component such as router, firewall, Load balancer, Ethernet Switch etc., are optional for the purchaser.	Information	
3.8.4.7	The type of redundancy required for the servers shall be specified by the purchaser. The redundancy options are 1:1, 1+1, N:1 or N+1.	Information	
3.8.5	**Server, Network and Disaster Recovery**	Information	
3.8.5.1	Typical eMS architecture with DR is shown in Figure-5.	Information	
3.8.5.2	The DR site shall be geographically separated.	Information	
3.8.5.3	The Main and Disaster recovery eMS which shall be connected on normal & standby link with IP network, dark fiber or on single lambda of DWDM system.	Declaration based on the offered configuration.	
3.8.5.4	The connectivity of operator terminals at main site and terminals at remote sites shall be provided in such a way that during failure of main site connectivity of the terminals is automatically transferred to the Disaster recovery (DR) site & vice versa.	Declaration based on the offered configuration.	
3.8.6	**Hardware Sizing Guidelines:**	Information	
3.8.6.1	Hardware sizing is based on the following CPU utilization metric (CPU Utilization = 100 – CPU Idle)%. Peak CPU Utilization shall not exceed 75% at any	Declaration	

	time, on 24x7 basis. Average CPU Utilization over any hour, measured at 5 minute intervals, shall not exceed 60%. The hardware sizing indicated is minimum and indicative.		
3.8.6.2	The eMS solution may have an Application Server and database server which can be on single or separate servers. Single/separate platform shall be decided by purchaser or can be based on sizing requirement.	Declaration	
3.8.6.3	The number of NE's to be managed shall be specified by the purchaser.	Declaration	
3.8.6.4	Database hard-disk memory shall be sufficient to store all the information as indicated in the document and any other necessary system for at least one month duration.	Declaration	
3.8.7	**LCT and Specifications for Local Crafts Terminal/Client Terminal/Work Station**	Information	
3.8.7.1	LCT is based on browser/server architecture and performs two types of functions in a network at NE level: (i) Configuration (ii) Fault Management.	Functional Verification	
3.8.7.2	The LCT shall perform all operations of NE-level configuration and maintenance. LCT can be installed on a small client PC or LAPTOP. LCT shall access a local NE through a LAN or a serial port, and the remote NE through data communications channel (DCC) of the system. For fault management it support only basic Alarm functions like Alarm Monitoring Policy Settings and Alarm Viewing etc.	Functional Verification	
3.8.7.3	The minimum configuration for PC or Laptop shall be at least as follows for the LCT or Client Terminal or Work Station: ▪ Core I7, 2.2 GHz ▪ 17" Colour Monitor (for PC) / 15" LCD/TFT display (for Laptop) ▪ 1 TB HDD/8GB RAM ▪ DVDRW ODD ▪ LAN port ▪ 4 Nos. USB Ports ▪ Printer port ▪ USB Wired Keyboard and Optical Mouse ▪ Window based operating software	Physical Verification	

3.8.7.4	The purchaser shall decide to purchase desktop or laptop as per preference	Information	
4.0	**INTERFACE REQUIREMENTS**	Information	
4.1	The northbound interface of the eMS towards NMS layer shall be either SNMPv2, SNMPv3 CORBA, TL-1, or XML complaint	Functional Verification	
4.2	The southbound interface towards NEs can be SNMPv2 [or later interface]. This is optional for the Equipment OEM	Functional Verification	

I. TEST SETUP & PROCEDURES:

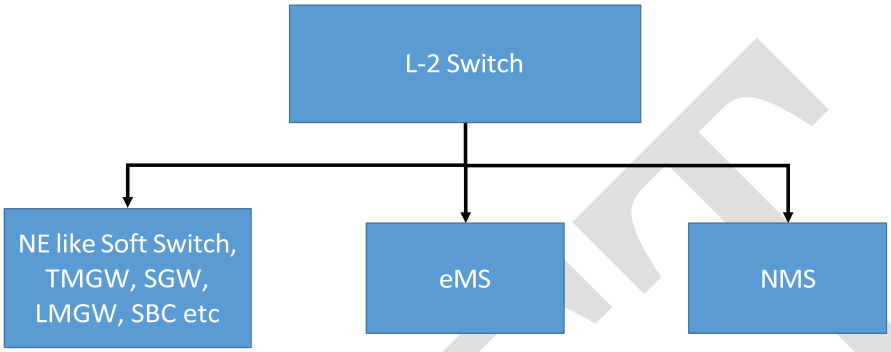

Fig1 : Test set up for eMS on NGN

Test Procedure:

1. Connect the test setup as shown in the above figure.
2. Verify the various functionalities of the eMS using eMS GUI.
3. Wherever the data for an eMS function is not possible to be generated using the above step, availability of the feature may be verified and recorded.

J. SUMMARY OF TEST RESULTS

GR/IR No.: TEC/GR/IT/NMS-001/01/OCT 2015

TSTP No. : TSTP/ GR/IT/NMS-001/01/OCT 2015

Equipment name & Model No._____

ClauseNo.	***Compliance*** *(Complied/Not Complied/ Submitted/Not Submitted/Not Applicable)*	***Remarks / Test Report Annexure No.***

Date:

Place: ***Signature & Name of TEC testing Officer /***

**** Signature of Applicant / Authorized Signatory***

**** Section J as given above is also to be submitted by the Applicant/Authorised signatory as part of in-house test results alongwith Form-A. The Authorised signatory shall be the same as the one for Form 'A'.***