वर्गीय आवश्यकताओं के लिए मानक

टी.ई.सी XXXX: २०२५

STANDARD FOR GENERIC REQUIREMENTS

TEC XXXX: 2025

5जी डुअल कोर

5G Dual Core

ISO 9001:2015

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FOREWORD

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

- Issue of Standards for Generic Requirements (GR), Interface Requirements (IR) and Service Requirements (SR) as well as Test guides for Telecom Products and Services;
- Issue of Technical regulations in the form of essential Requirements (ER);
- Field evaluation of products and Systems;
- National Fundamental Plans;
- Support to DOT on technology issues;
- Testing & Certification of Telecom products; and
- Designation of Conformance Assessment Bodies (CABs) for testing.

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 for Generic Requirements (GR) for 5G Dual Core outlines the functional, technical and operational requirements for the implementation of Dual Core architecture in Indian telecom Networks. This document defines key network functions, interfaces supporting interoperability, network slicing, QoS assurance, mobility management and legacy system support. This standard aligns with international standards (i.e., 3GPP), while addressing specific needs of Indian telecom networks.

CONVENTIONS

In this document, requirements are classified as follows:

- The keywords "shall" or “is/are required to” indicate a requirement or requirements, which must be mandatorily complied and from which no deviation is permitted, if conformance to this document is to be claimed; and

- The keywords “optional” or “may” indicate an optional requirement, which is permissible for exclusion from mandatory compliance, unless the said requirement is claimed to be complied by the vendor. These terms are not intended to imply that the vendor's implementation must provide the option; it means the vendor may optionally provide the feature and still claim conformance with this document.

Table of Contents

HISTORY SHEET

S.No.	GR No.	Title	Remarks
1.	TEC XXXX:2025	5G Dual Core	New Standard

REFERENCES

S. NO.	Document No.	Title/ Document Name
1.	3GPP TS 23.501	5G; System architecture for the 5G System (5GS)
2.	3GPP TS 23.502	5G; Procedures for the 5G System (5GS)
3.	3GPP TS 33.501	5G; Security architecture and procedures for 5G System
4.	3GPP TS 29.502	5G; 5G System; Session Management Services; Stage 3
5.	3GPP TS 32.255	5G; Telecommunication management; Charging management; 5G data connectivity domain charging; Stage 2
6.	3GPP TS 23.503	5G; Policy and charging control framework for the 5G System (5GS); Stage 2
7.	3GPP TS 29.244	LTE; 5G; Interface between the Control Plane and the User Plane nodes
8.	3GPP TS 23.632	LTE; 5G; User data interworking, coexistence and migration; Stage 2
9.	3GPP TS 29.510	5G; 5G System; Network function repository services; Stage 3
10.	3GPP TS 29.513	5G; 5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3
11.	3GPP TS 29.521	5G; 5G System; Binding Support Management Service; Stage 3
12.	3GPP TS 32.290	5G; Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)
13.	3GPP TS 29.504	5G; 5G System; Unified Data Repository Services; Stage 3
14.	3GPP TS 29.520	5G; 5G System; Network Data Analytics Services; Stage 3
15.	3GPP TS 32.240	LTE; Telecommunication management; Charging management; Charging architecture and principles
16.	3GPP TS 23.041	Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; Technical realization of Cell Broadcast Service (CBS)
17.	3GPP TS 22.278	Service requirements for the Evolved Packet System (EPS)

18.	3GPP TS 36.411	S1 Layer 1
19.	3GPP TS 36.413	S1Application protocol (S1AP).
20.	3GPP TS 22.115	Service aspects; Charging and billing
21.	3GPP TS 23.122	Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode
22.	3GPP TS 23.203	Policy and charging control architecture
23.	3GPP TS 32.240	Telecommunication management; Charging management; Charging architecture and principles
24.	3GPP TS 33.106	Lawful interception requirements.
25.	3GPP TS 33.107	3G security; Lawful interception architecture and functions
26.	3GPP TS 33.108	3G security; Handover interface for Lawful Interception (LI)
27.	3GPP TS 33.210	3G security; Network Domain Security (NDS); IP network layer security
28.	3GPP TS 33.401	3GPP System Architecture Evolution (SAE); Security Architecture
29.	3GPP TS 33.402	"3GPP System Architecture Evolution (SAE); Security Aspects of Non-3GPP Accesses
30.	3GPP TS 24.301	"Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3"
31.	ETSI GS NFV 002	Network Functions Virtualisation (NFV); Architectural Framework
32.	ETSI GS MEC 003	Multi-access Edge Computing (MEC); Framework and Reference Architecture

CHAPTER 1

1 Introduction

1.1 Overview

The 5G Dual Core system provides a unified platform that seamlessly integrates support for both the Evolved Packet Core (EPC) for LTE and the 5G Core (5GC), ensuring full interoperability across these network generations. It will enable smooth interworking between LTE and 5G networks via standardized interfaces, including N26, facilitating efficient core-node integration between EPC and 5GC. The system must support both Non-Standalone (NSA) and Standalone (SA) 5G deployment modes, offering flexibility to accommodate diverse network scenarios. With a modular and scalable design, the platform supports network expansion and manages varying traffic demands effectively.

This Generic Requirement (GR) document specifies the key technical, functional, and operational requirements for the deployment of 5G Dual Core systems in India, with an emphasis on ensuring service continuity and harmonization with global standards and best practices. It sets out standardized requirements in line with international specifications, while also addressing the specific needs of Indian telecom networks.

1.2 Architecture

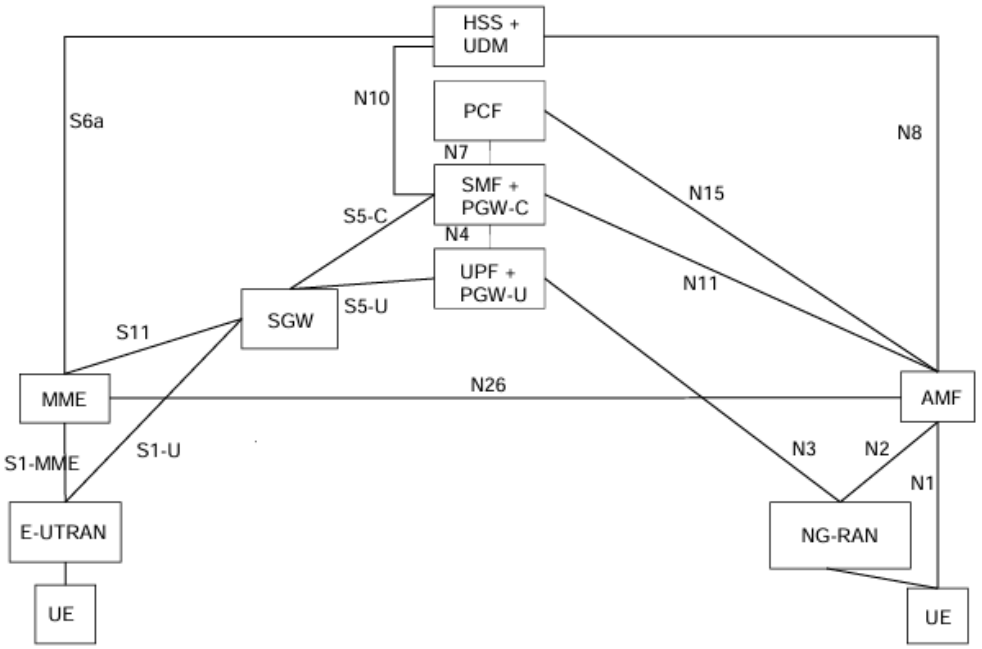

Figure1: Architecture for interworking between 5GS and EPC/E-UTRAN [1]

The Figure 1 above, illustrates the integration and interworking between the EPC and the 5GC network elements, highlighting the dual-core architecture.

1.2.1 **Network Elements**

The network elements Involved in the interworking of 5GC and EPC for providing 5G Dual Core services are given below:

1.2.1.1 **Converged Control Plane function:** The 5G SMF (Session Management Function) and LTE PGW-C (Packet Gateway Control Plane) shall be converged. This convergence is essential for maintaining session continuity when a UE moves between LTE and 5G, ensuring uninterrupted service by retaining the user's IP address and other session parameters during handover. Optionally, the LTE SGW-C (Serving Gateway Control Plane) may also be combined in the converged control plane function.

1.2.1.2 **Converged Mobility function:** The LTE MME (Mobility Management Function) and the 5G AMF (Access and Mobility Management Function) shall

[1] 3GPP TS 23.501 - System architecture for the 5G System

support the N26 interface for interworking. The N26 interface enable seamless mobility and session continuity for UE during inter-system handovers between LTE and 5G networks. It allows the network to maintain a single valid Mobility Management (MM) state for the UE, either in the AMF or the MME, during the handovers. Optionally, the 4G MME and 5G AMF may be converged into a single mobility function.

1.2.1.3 **Converged User Plane Function:** The 4G PGW-U (Packet Gateway User Plane) and 5G UPF (User Plane Function) shall be converged. This convergence allows efficient resource utilization and smooth interoperability between the two technologies, ensuring seamless user experience during handover from EPC to 5GC and vice-versa. Optionally, the LTE SGW-U (Serving Gateway User Plane) may also be combined in the converged user plane function.

1.2.1.4 **Converged Subscriber Database:** The HSS and UDM functionalities may be consolidated into a unified node, referred to as UDM+HSS.

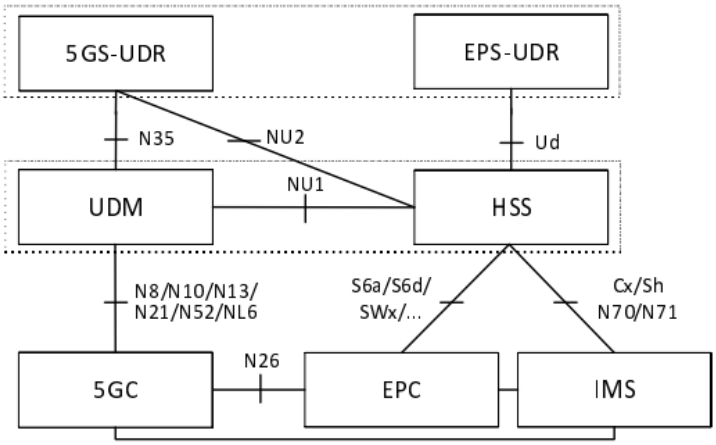

Figure 2 - Architecture for Direct UDM-HSS interworking in reference point representation[2]

This integration may be achieved through one of the following approaches:

[2] 3GPP TS 23.632: User data interworking, coexistence and migration; Stage 2

A. **Interface-Based Integration:** 4G-HSS and 5G-UDM communicating over **NU1** interface. These core nodes/NFs communicate via the NU1 interface, maintaining separate functional entities while enabling interoperability.

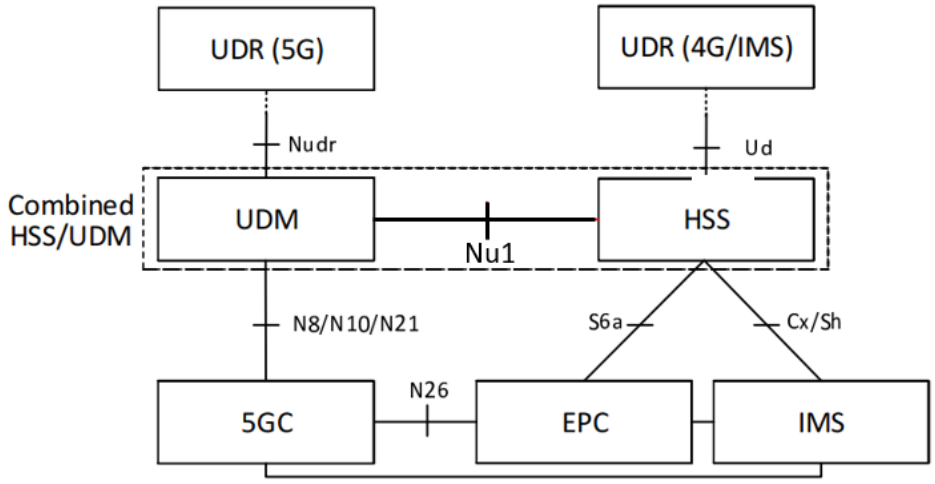

Figure 3: Architecture for Direct UDM-HSS Interworking with independent UDRs

B. **Database-Centric Integration:** A common database supporting both 4G-HSS and 5G-UDM functions is implemented to enable 5G Dual Core functions, allowing seamless access and management of subscriber data across these technologies.

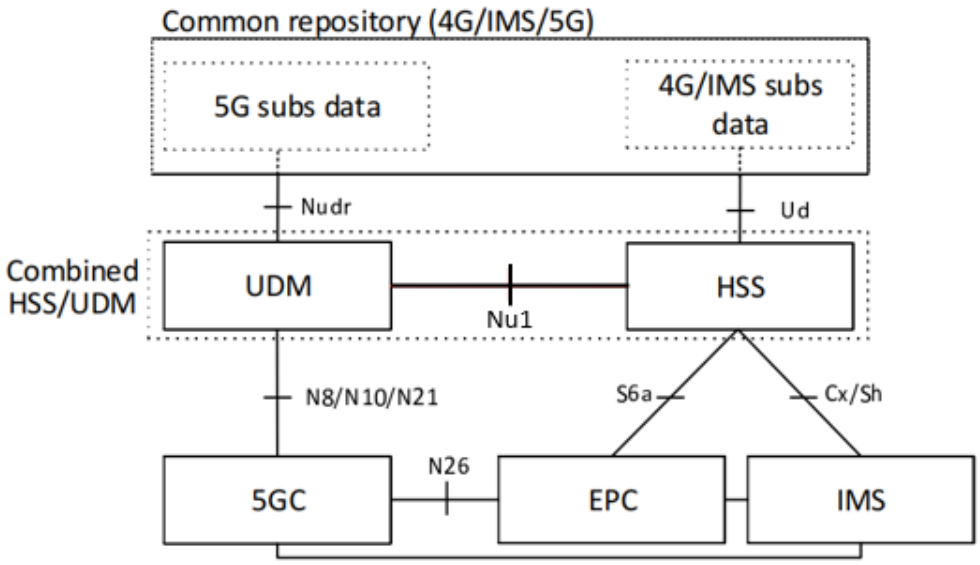

Figure 4: Architecture for Direct UDM-HSS Interworking with a common repository

1.2.1.5 **Converged Policy function:** The 5G entity (PCF) responsible for policy enforcement and quality of service (QoS) control, catering to both 4G and 5G services. Optionally, the PCF and PCRF may be converged into a single node.

1.2.1.6 **E-UTRAN (Evolved Universal Terrestrial Radio Access Network):** The LTE radio access network responsible for connecting the UE to the EPC

1.2.1.7 **NG-RAN (Next Generation Radio Access Network):** The 5G radio access network connecting the UE to the 5G Core.

1.2.2 Interfaces and Reference Points

This section describes the interfaces of this architecture.

a. **N1-** Interface between the User Equipment (UE) and the Access and Mobility Management Function (AMF) in the 5G core. It is used for signalling and mobility management.
b. **N2-** Interface between the Next-Generation Radio Access Network (NG-RAN) and the AMF in the 5G core. It handles control-plane signalling for mobility and session management.
c. **N3**- Interface between the NG-RAN and the User Plane Function (UPF) in the 5G core. It transports user-plane traffic.
d. **N4**- Interface between the Session Management Function (SMF) and the UPF in the 5G core. It is used for session and user-plane resource management.
e. **N7-** Interface between the SMF and the Policy Control Function (PCF). It is used for exchanging policy-related information to enforce Quality of Service (QoS).
f. **N8-** Interface between UDM and AMF for subscriber data.
g. **N10**- Interface between the Unified Data Management (UDM) and the SMF in the 5G core. It is used to retrieve subscriber information and authentication data.
h. **N11**-Interface between the AMF and the SMF. It facilitates session management and mobility signalling.
i. **N15-** Interface between the AMF and PCF.

j. **S5-C**- Interface between the SGW-C (control plane of SGW) and the Packet Data Network Gateway Control (PGW-C) in LTE. It handles control-plane signalling for bearer management.

k. **S5-U**- Interface between the Serving Gateway User Plane (SGW-U) and the Packet Gateway User Plane (PGW-U). It carries user-plane data in LTE.

l. **S6-a**- Interface between the MME and the Home Subscriber Server (HSS) in LTE. It provides authentication, authorization, and subscriber profile information.

m. **S11**- Interface between the MME and the SGW in LTE. It is used for control-plane signalling.

n. **S1-U**- Interface between the E-UTRAN and the Serving Gateway (SGW) in LTE. It is used for user-plane traffic.

o. **S1-MME**- Interface between the Evolved Universal Terrestrial Radio Access Network (E-UTRAN) and the Mobility Management Entity (MME) in LTE. It carries signalling for control-plane operations.

p. **N26**- Interface between the MME in LTE and the AMF in the 5G core. It enables interworking between LTE and 5G systems for mobility management and session continuity.

q. **NU1:** Reference point between the HSS in LTE and the UDM in 5GC.

r. **NU2:** Reference point between the HSS in LTE and the 5GS-UDR

s. **Ud:** Interface between HSS and LTE UDR.

t. **N12**: Interface between AMF and Authentication Server Function (AUSF) . Used for authentication procedures in the 5G core, especially during UE registration.

u. **N13:** Interface between AUSF and UDM Supports authentication credential retrieval and verification

v. **N14:** Interface between AMF nodes Facilitates AMF-to-AMF communication for UE mobility and context transfer.

w. **N16:** Interface between PCF and UDR . Used for accessing policy-related data stored in the Unified Data Repository

x. **N22**: Interface between PCF and CHF (Charging Function) Supports charging policy enforcement and reporting.

y. **N21:** Interface between SMF and CHF Used for session-related charging data exchange.

z. **NL6:** Interface between NWDAF (Network Data Analytics Function) and UDM to enable the NWDAF to access subscriber session information from UDM

aa. **Gx:** Interface between PGW-C and PCRF (Policy and Charging Rules Function) in LTE. Used for policy control in the 4G EPC

bb. **Gy:** Interface between PGW and Online Charging System (OCS). Handles real-time charging in LTE

1.2.3 **Service-based interfaces**

The 5G System Architecture contains the following service-based interfaces:

a. **Namf:** Service-based interface exhibited by AMF.

b. **Nsmf:** Service-based interface exhibited by SMF.

c. **Nnef:** Service-based interface exhibited by NEF.

d. **Npcf:** Service-based interface exhibited by PCF.

e. **Nudm:** Service-based interface exhibited by UDM.

f. **Naf:** Service-based interface exhibited by AF.

g. **Nnrf:** Service-based interface exhibited by NRF.

h. **Nnssaaf:** Service-based interface exhibited by NSSAAF.

i. **Nnssf:** Service-based interface exhibited by NSSF.

j. **Nausf:** Service-based interface exhibited by AUSF.

k. **Nudr:** Service-based interface exhibited by UDR.

l. **Nudsf:** Service-based interface exhibited by UDSF.

m. **N5g-eir:** Service-based interface exhibited by 5G-EIR.

n. **Nnwdaf:** Service-based interface exhibited by NWDAF.

o. **Nchf:** Service-based interface exhibited by CHF.

p. **Nucmf:** Service-based interface exhibited by UCMF.

q. **Nhss:** Service-based interface exhibited by HSS.

CHAPTER 2

2 Functional Requirements

2.1 General Requirements

In order to allow Inter-RAT (IRAT) handover between 4G and 5G networks and to enable service and session continuity and mobility outside of the technology coverage, at least the following nodes shall be converged:

2.1.1

(i) SMF & PGW-C

(ii) UPF & PGW-U

(iii) Between MME and AMF, N26 interface shall be established

In addition, the following nodes may be converged together to achieve

2.1.2 interworking between EPC and 5GC:

(i) UDM & HSS

(ii) PCF & PCRF

2.1.3 UEs that are subject to 5GC and EPC interworking shall be served by converged nodes.

2.1.4

The converged core shall support:

2.1.4.1 Dual registration for UEs operating across both 5GC and EPC domains, ensuring simultaneous connectivity and session management in both networks

2.1.4.2 Interoperability with legacy network elements, including support for S1 and Gn interfaces, to maintain backward compatibility during phased migration.

2.1.4.3 Dynamic session anchoring and relocation between UPF and PGW-U based on UE mobility and service continuity requirements.

2.1.4.4 Support common policy control across 4G and 5G networks, enabling unified QoS enforcement and traffic steering through integrated PCF/PCRF functionality

2.1.4.5 VoLTE and VoNR interworking, ensuring seamless voice continuity during handovers between 4G and 5G networks.

2.1.4.6 Lawful interception and regulatory compliance across both RATs, ensuring that all security obligations are met in a converged environment.

2.1.4.7 Fallback mechanisms to EPC in case of 5GC unavailability, ensuring uninterrupted service delivery.

2.1.4.8 Inter-PLMN mobility and roaming scenarios, including seamless transitions between home and visited networks across 4G and 5G.

2.1.5 The converged nodes shall be designed to support network slicing, allowing differentiated services and resource allocation across both 5G and 4G domains.

2.1.6 The architecture shall include redundancy and high availability mechanisms across converged nodes to ensure carrier-grade reliability and fault tolerance.

2.1.7 The architecture shall enable centralized analytics and monitoring for both EPC and 5GC domains, allowing real-time visibility into session performance, mobility events, and resource utilization.

2.1.8 The converged core may:

2.1.8.1 Enable common subscriber data management across 5G and 4G networks through a unified UDM/HSS and PCF/PCRF architecture, ensuring consistent policy enforcement and seamless mobility.

2.1.8.2 Support common charging functions, integrating CHF (Charging Function) and OCS/OFCS to provide unified charging records and real-time credit control across RATs.

2.1.8.3 Support integration with standards-based MEC platforms (as per ETSI GS MEC 003), enabling local breakout and low-latency service delivery for both 4G and 5G UEs, with appropriate traffic steering and session management

2.1.8.4 Support containerized and cloud-native architectures, supporting orchestration (e.g., Kubernetes), and resource optimization in cloud environments. Compliance to ETSI GS NFV reference architecture is preferable.

2.2 Converged Nodes Requirements

SMF & PGW-C

2.2.1.1 PGW-C and SMF shall be integrated into a single node SMF+PGW-C,
2.2.1 Optionally, SGW-C may also be integrated into the same node, resulting in a unified control function as SMF+PGW-C+SGW-C.

2.2.1.2 This converged node shall:

2.2.1.2.1 Enable IP address preservation and session continuity during mobility between 4G and 5G networks.

2.2.1.2.2 Support S5-C interface towards LTE SGW and N11 towards 5G AMF

2.2.1.2.3 Support N7 interface towards converged PCF

2.2.1.3 If the node is selected for a PDN connection, policy interactions between PGW and PCRF shall be replaced by equivalent interactions between the converged node and PCRF

2.2.1.4 If both PGW-C and the converged node are available, then MME shall select SMF+PGW-C when UE's subscription from HSS indicates support for interworking with 5GS for the APN.

2.2.1.5 In order to support the interworking with EPC, the SMF+PGW-C shall
2.2.2 provide information over N4 to the UPF+PGW-U related to the handling of traffic over S5-U

UPF & PGW-U

2.2.2.1 UPF and PGW-U shall be converged into a single node UPF+PGW-U. Optionally, SGW-U can also be integrated into the UPF, resulting in a unified user plane node functioning as UPF+PGW-U+SGW-U.

2.2.2.2 There may be another UPF between the NG-RAN and the converged node (UPF+PGW-U), then, the UPF + PGW-U shall support N9 towards an additional UPF, if needed.

2.2.2.3 The integration of these nodes shall enable session anchoring and maintain continuity during mobility between 4G and 5G networks.

UDM & HSS

HSS and UDM may be converged into a single node and shall support the following functions:

2.2.3

2.2.3.1 The node shall subscribe data for both 4G and 5G subscriptions in a unified manner. This includes permanent subscriber data, which can only be change administratively and temporary subscriber data may change due to normal system operation.

2.2.3.2 The node shall have S6a reference point to provide services towards the Mobility Management Entity (MME) and N2 reference point to provide services towards the Access and Mobility Management Function (AMF).

2.2.3.3 The node shall provide the following 3GPP reference points:

2.2.3.3.1 N8, N10, N13, N35, NL6 and NU1 corresponding to the 3GPP UDM network function (including ARPF).

2.2.3.4 For interworking with the EPC, the SUPI allocated to the 3GPP UE shall always be based on an IMSI to enable the UE to present an IMSI to the EPC

2.2.3.5 In Nhss services, the subscription identifier shall be an IMSI. The UDM shall extract the IMSI from the user's SUPI for interactions with the HSS.

2.2.3.6 The HSS+UDM shall support CN Type Change Event subscription with an optional Duration of Reporting parameter. Upon expiry of the specified duration, the HSS+UDM shall locally unsubscribe the CN Type Change Event without requiring explicit signaling interaction from the subscribing network function.

2.2.3.7 Either all other interfaces for interfacing with 4G and 5G nodes shall be available to the converged node or there shall be an interface between HSS and UDM for 4G and 5G interworking scenarios.

PCF & PCRF

PCF and PCRF may be integrated into a single node and shall support following functions:

2.2.4

2.2.4.1 Policy related data for 4G and 5G subscribers shall be unified and shall be accessible to the converged node.

2.2.4.2 This converged node shall support hybrid access wherein N7 can support Gx traffic based on the availability of SMF+PGW-C for 4G & 5G services.

2.2.4.3 It shall have N15 interface towards AMF.

2.2.4.4 It shall have N28 interface towards CHF.

2.2.5 **Common Charging Function**

The charging functionality may be converged for online and offline charging into a converged charging node CHF.

2.2.6

AMF & MME through N26 interface

2.2.6.1 AMF and MME shall be integrated into a single node through N26 interface.

2.2.6.2 The convergence of these nodes shall enable seamless mobility management and signaling continuity between 4G EPC and 5G Core networks.

2.2.6.3 It shall support the S1-MME interface towards eNodeB (4G) and the N2 interface towards gNodeB (5G).

2.2.6.4 It shall support the N11 interface towards SMF and the S11 interface towards SGW-C for session management.

2.2.6.5 This convergence shall enable unified handling of UE registration, authentication, and mobility procedures across both 4G and 5G access networks.

2.2.6.6 It shall support interaction with UDM and HSS for unified subscriber data access and authentication.

2.3 Other Requirements

2.3.1 All the other functional requirements for EPC nodes and for 5G Network Functions in addition to the above requirements shall be as per Standard for Generic Requirements for Evolved Packet Core (EPC) (TEC 22150:2019) and Standard for Generic Requirements for 5G Core (TEC 22160:2023)

CHAPTER 3

3 OMC/ EMS requirements

The OMC allows centralized operation of the various units in the system and functions needed to maintain the sub-systems. The OMC provides the dynamic monitoring and controlling of the network management functions.

3.1 Management Functions

The following management functions shall be carried out through the corresponding OMCs:

a. Configuration management
b. Fault report and alarm handling
c. Performance supervision/management
d. Storage of system software and data
e. Security management

3.2 OMC database

a. The OMC shall use the relational/object-oriented database to store and hold the necessary information for the parameters used in the OMC.
b. The OMC database shall include configuration data, maintenance data, fault data and performance / QoS data. It shall also include the alarms and notifications instances of the NEs to be consumed by various services in OMC.
c. The database in the OMC shall reside in a disk with mirroring capability.
d. The OMC shall be capable of storage of the generated performance data. The methods and capacity of storage provided with the system shall be stated.
e. OMC shall supports upto 3 days of storage for PM Data.
f. Provision shall be available for collection of statistical information relating to events in the network. Collection frequency shall be configurable

g. The OMC database shall contain the fault history of the whole network under its command. As a minimum, it shall be possible to search and display data according to the following criteria:

(i) Network elements

(ii) Severity class

(iii) Event type.

3.3 OMC Generic Features

a. OMC software – UNIX/LINUX/Windows System Platform

b. It shall optionally support interface like CORBA / TCP / IP / CMIP / SNMP/ REST / HTTP etc., to enable it to work with a remote NMS

c. Support Ethernet connectivity with remote network elements.

d. Graphical User Interface (GUI). Alternate text: Management

e. through Element Management System

f. On-Line Help.

g. Consistency Checks (Optional).

h. Configuration Change/Event Log.

i. Object Alarm Status Management / Display.

j. Collection of PM counters.

k. Limited Access Restriction by User.

l. Access Restriction by Function and by Operation.

CHAPTER 4

4 Non-functional Requirements

4.1 The Network functions shall support:

a. Command Line Interface (CLI).

b. Secure File Transfer Protocol like SFTP and SSH for login

c. Micro service-based architecture.

d. Different redundancy model (i.e. Active-Active, Active-Standby, N-Way Active) for each type of microservices

e. Capability to store and retrieve all security related information. Information shall range from security access levels to login times by user id, to password aging data.

f. Having their own self-diagnostic functionality to provide their health information.

g. Modularity and have a distributed architecture.

h. Implementation on carrier class server/cloud.

i. Software executable (patch) upgrade with / without configuration migration.

j. Virtualised solution on generic COTS hardware or shall support Cloud Integration.

4.2 The Network functions shall allow the independent scaling of the microservices.

4.3 Dual Core shall guarantee carrier-grade 99.999% system availability and avoid any Single Point of Failure.

4.4 Applications shall support different deployment options e.g. Metal server or container infrastructure.

4.5 No single failure of any module within the System, Network Element, shall lead to total disruption of service of that NE. Such failure shall also lead to minimum possible degradation of performance.

4.6 The Network function may have the capability of scale in/ scale out when certain KPI thresholds are reached such as CPU, Average Memory, and Load etc. Also, may support life cycle management procedures such as VNF/CNF instantiation & VNF/CNF termination manually and automatically

4.7 The System shall be able to create, modify and delete commands from command classes. Also, System shall support definition of access privileges like read-only/write/import/export for groups or roles.

4.8 VNF/CNF shall maintain the feature parity with native solution.

4.9 VNF/CNF shall include application level fault tolerance on compute, storage and network.

4.10 VNF/CNF shall provide and maintain Telecom Grade KPI.

4.11 VNF/CNF shall be agnostic to all 3GPP access types.

4.12 For security purpose, all components of Virtualized System, e.g. MANO, VNF/CNF depository etc. shall be hosted in India only.

4.13 VNF/CNF shall meet availability requirements as envisaged in this GR.

CHAPTER 5

5 Generic Requirements

5.1 Operation and Maintenance

This section identifies generic O&M requirements to be implemented by the network functions.

a. The NFs shall provide a flexible & secure management interface for configuration, fault management and performance management.
b. The NFs shall include an O&M interface for debugging and troubleshooting.
c. NFs shall support at least one of the following interfaces towards EMS
    i). SNMP
    ii). REST
    iii). HTTPS
d. For performance management, the node shall generate various performance counters and provide mechanism to transfer the same to external entity for further analysis.
e. Fault Report and Alarm Handling
    i). For fault management, the NFs shall support Event Based Monitoring where all events will be streamed out of the NF and available for external processing.
    ii). Fault Management system shall have the ability to detect and mitigate or recover from faults.
f. Alarm Surveillance

    Alarms shall be raised for adverse events in the network. The information included in the alarms shall be detailed enough to identify which system component is experiencing the failure condition. The detail shall include
    i). Alarm type
    ii). The probable cause
    iii). The specific problem
    iv). The perceived severity
    v). Network Element ID
    vi). Network Element Type

g. The alarms shall be automatically cleared when the failure condition is resolved. It shall not record or forward duplicate alarms for detection of the same failure condition.
h. The NF shall support software upgrade.
i. The NF shall support Software resiliency in disaster and temporary deployment for enabling automatic recovery with minimal human intervention using stateless micro services and redundant storage.
j. The system shall support scalability features to accommodate varying demands in disaster and temporary deployments efficiently.
k. The control software shall be responsible for logging and sending the log file on the network to a designated syslog server.
l. The system may maintain a system log and core dump logs.
m. The NF shall support alarms, events to OMC for visual indicators of status and fault.
n. The NF shall have reboot and shut-down capability.
o. The NF may be capable of providing the system configuration data to the Management Information Base (MIB) of the system (applicable with SNMP based management only).

CHAPTER 6

6 General Requirements

6.1 Software Requirements

a. Modular, structured software written in High-Level Language
b. Software easy to handle during installation and normal operations as well as during extensions
c. Introduction of changes in software, wherever necessary, with least impact on other modules
d. Open-ended to allow addition of new features
e. Adequate flexibility to easily adopt changes in service features & facilities and technological evolution in hardware
f. Propagation of software faults is contained
g. Test programs to include fault tracing for detection and localization of system faults

6.2 Software Maintenance Requirements

a. Continuous supply of all software updates, for the period specified
b. Integration of software updates without posing any problem to the existing functionality

CHAPTER 6

7 Information for the Procurer of Product

Interfaces and features which are optional needs to be examined by the procurer and suitably specified in the tender conditions as per their requirement based on the deployment scenario specific to the procurer.

7.1 MME

S. No.	Parameter	Value
1.	Number of eNodeB Supported	
2.	Number of Attached Subscribers Supported	
3.	Number of Active Subscribers	
4.	Number of sessions	

7.2 P-GW-C + SMF / PGW-U+UPF/ S-GW

S. No.	Parameter	Value
1.	Number of IP Bearers	
2.	Packet Handling Capacity and Packet Size	
3.	Aggregate throughput	
4.	APN capacity	
5.	Number of Attached Subscribers	
6.	Number of Active Subscribers	
7.	Number of sessions	
8.	TPS per subscriber	

7.3 PCF

S. No.	Parameter	Option
1.	Subscriber Capacity	
2.	Number of PDP sessions	
3.	TPS per subscriber	

7.4 HSS+UDM

S. No.	Parameter	Option
1.	Number of Attached subscribers	
2.	TPS per subscriber	

ABBREVIATIONS

3GPP 3rd Generation Partnership Project

5GC 5G Core

5GS 5G System

AF Application Function

AMF Access and Mobility Management Function

APN Access Point Name

AUSF Authentication Server Function

CABs Conformance Assessment Bodies

CBS Cell Broadcast Service

CHF Charging Function

CN Core Network

EMS Element Management System

EPC Evolved Packet Core

EPS Evolved Packet System

ER Essential Requirements

E-UTRAN Evolved Universal Terrestrial Radio Access Network

GR Generic Requirements

GUI Graphical User Interface

HSS Home Subscriber Server

HTTP Hypertext Transfer Protocol

HTTPS Hypertext Transfer Protocol Secure

IMSI International Mobile Subscriber Identity

IR Interface Requirements

IRAT Inter-Radio Access Technology

ISO International Organization for Standardization

ITU International Telecommunication Union

LI Lawful Interception

LTE Long-Term Evolution

MBR Maximum Bit Rate

MEC Multi-access Edge Computing

MIB Management Information Base

MME Mobility Management Entity

MS Mobile Station

NAS Non-Access-Stratum

NEF Network Exposure Function

NF Network Function

NG-RAN Next Generation Radio Access Network

NRF Network Repository Function

NSSAAF Network Slice-Specific Authentication and Authorization Function

NSSF Network Slice Selection Function

NWDAF Network Data Analytics Function

OCS Online Charging System

OFCS Offline Charging System

OMC Operation and Maintenance Center

PCF Policy Control Function

PCRF Policy and Charging Rules Function

PDN Packet Data Network

PDU Protocol Data Unit

PGW-C Packet Data Network Gateway Control Plane Function

PGW-U Packet Data Network Gateway User Plane Function

PLMN Public Land Mobile Network

QoS Quality of Service

RATs Radio Access Technologies

REST Representational State Transfer

RTECs Regional Telecom Engineering Centers

S1AP S1 Application Protocol

SA	Standalone
SAE	System Architecture Evolution
SBI	Service Based Interface
SGW	Serving Gateway
SGW-C	Serving Gateway Control Plane Function
SGW-U	Serving Gateway User Plane Function
SMF	Session Management Function
SNMP	Simple Network Management Protocol
SR	Service Requirements
SUPI	Subscription Permanent Identifier
TCP/IP	Transmission Control Protocol/Internet Protocol
TPS	Transactions Per Second
UCMF	UE Radio Capability Management Function
UDM	Unified Data Management
UDR	Unified Data Repository
UDSF	Unstructured Data Storage Function
UE	User Equipment
UPF	User Plane Function
VoLTE	Voice over Long-Term Evolution

VoNR Voice over New Radio

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