



परीक्षण मार्गदर्शिका

टीईसी २११३१:२०२६

TEST GUIDE

TEC 21131:2026

---

5जी डुअल कोर

5G Dual Core

(जीआर सं: टीईसी २११३०:२०२६)

(GR No.: TEC 21130: 2025)



ISO 9001:2015

---

दूरसंचार अभियांत्रिकी केंद्र

खुर्शीदलाल भवन, जनपथ, नई दिल्ली - ११०००१, भारत

TELECOMMUNICATION ENGINEERING CENTRE

KHURSHIDLAL BHAWAN, JANPATH, NEW DELHI-110001, INDIA

[www.tec.gov.in](http://www.tec.gov.in)

टीईसी, २०२६

© TEC, 2026

इस सर्वाधिकार सुरक्षित प्रकाशन का कोई भी हिस्सा, दूरसंचार अभियांत्रिकी केंद्र, नई दिल्ली की लिखित स्वीकृति के बिना, किसी भी रूप में या किसी भी प्रकार से जैसे - इलेक्ट्रॉनिक, मैकेनिकल, फोटोकॉपी, रिकॉर्डिंग, स्कैनिंग आदि रूप में प्रेषित, संग्रहीत या पुनरुत्पादित न किया जाए ।

All rights reserved and no part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form and by any means - electronic, mechanical, photocopying, recording, scanning or otherwise, without written permission from the Telecommunication Engineering Centre, New Delhi.

---

**Release 1: XXXX, 2026**

## CONTENTS

<b><i>Section</i></b>	<b><i>Item</i></b>	<b><i>Page No.</i></b>
A	History Sheet	4
B	Introduction	5
C	General information	6
D	Testing team	7
E	List of the test instruments	7
F	Equipment Configuration offered	8
G	Equipment/System Manuals	8
H	Clause-wise Test Type and Test No.	9
I	Test Setup & Procedures	29
J	Summary of test results	159

**A. HISTORY SHEET**

<i><b>Sl. No.</b></i>	<i><b>TSTP No.</b></i>	<i><b>Title</b></i>	<i><b>Issue</b></i>
1.	TEC 21131:2026	Test Guide for 5G Dual Core	Release 01

## **B. INTRODUCTION**

This document enumerates detailed test schedule and procedure for evaluating conformance / functionality / requirements / performance of 5G Dual Core as per GR No TEC 211310:2025.

**C. General information:**

Sn.	General Information	Details <i>(to be filled by testing team)</i>	
1	Name and Address of the Applicant		
2	Date of Registration		
3	Name and No. of GR/IR/Applicant's Spec. against which the approval sought		
4	Details of Equipment		
	Type of Equipment	Model No.	Serial No.
(i)			
(ii)			
5	Any other relevant Information:-		

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

<b>Sno.</b>	<b>Name</b>	<b>Designation</b>	<b>Organization</b>	<b>Signature</b>
1.				
2.				

**E. List of the Test Instruments:**

<b>S.no.</b>	<b>Name of the test instrument</b>	<b>Make /Model</b> <i>(to be filled by testing team)</i>	<b>Validity of calibration</b> <i>(to be filled by testing team)</i>
1			dd/mm/yyyy
2			
3			
4			
5			
6			
7			
8			

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

**(a) <Equipment/product name> Configuration:**

S.No.	Item	Details	Remarks

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

**(b) <Other equipment name> Configuration:**

S.No.	Item	Details	Remarks

*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.:

<i>Clause No.</i>	<i>Clause Description</i>	<i>Type of Test / Test No. etc. *</i>
<b>1</b>	<b>Introduction</b>	
<b>1.1</b>	<p><b>Overview</b></p> <p>The 5G Dual Core system provides a unified platform that seamlessly converges the Evolved Packet Core (EPC) and the 5G Core (5GC), ensuring interoperability across these network generations. The system enables smooth interworking between Long Term Evolution (LTE) and 5G networks via standardized interfaces, such as N26, facilitating efficient EPC-5GC convergence. This system supports 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.</p> <p>This Generic Requirement (GR) document specifies the key functional, general and other technical requirements for the deployment of 5G Dual Core</p>	<p>1.Submit system datasheet and complete 5G Dual Core network architecture diagram indicating EPC-5GC converged functions and all supported interfaces</p>

	<p>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 (i.e., 3GPP), while also addressing the specific needs of Indian telecom networks.</p>	
<b>1.2</b>	<p><b>Architecture</b></p> <p>The Key Network Elements and Interfaces and Reference Points, Service-based interfaces are mentioned in GR document.</p>	
<b>2</b>	<b>Functional Requirements</b>	
<b>2.1</b>	<b>General Requirements</b>	
2.1.1	<p>In order to allow Inter-RAT (IRAT) handover between LTE 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:</p> <ul style="list-style-type: none"> <li>(i) SMF &amp; PGW-C</li> <li>(ii) UPF &amp; PGW-U</li> <li>(iii) Between MME and AMF, N26 interface shall be established</li> </ul>	GR_TSTP_2.1.1
2.1.2	<p>In addition, the following nodes may be converged together to achieve interworking between EPC and 5GC:</p> <ul style="list-style-type: none"> <li>(i) UDM &amp; HSS</li> <li>(ii) PCF &amp; PCRF</li> </ul>	GR_TSTP_2.1.2
2.1.3	<p>UEs that are subject to 5GC and EPC interworking shall be served by</p>	GR_TSTP_2.1.3

	converged nodes.	
2.1.4	The converged core shall support:	
2.1.4.1	The converged core shall support single registration for UE for inter working between EPC and 5GC via N26 interface	GR_TSTP_2.1.4.1
2.1.4.2	Interoperability with legacy LTE network elements, including support for S1 interface, to maintain backward compatibility during phased migration.	GR_TSTP_2.1.4.2
2.1.4.3	Dynamic session anchoring and relocation between UPF and PGW-U based on UE mobility and service continuity requirements	GR_TSTP_2.1.4.3
2.1.4.4	Support common policy control across LTE and 5G networks, enabling unified QoS enforcement and traffic steering (optionally) through integrated PCF/PCRF functionality	GR_TSTP_2.1.4.4
2.1.4.5	VoLTE and VoNR interworking, ensuring seamless voice continuity during handovers between LTE and 5G networks.	GR_TSTP_2.1.4.5
2.1.4.6	Lawful interception and regulatory compliance across both RATs, ensuring that all security obligations are met in a converged environment.	GR_TSTP_2.1.4.6
2.1.4.7	Fallback mechanisms to EPC in case of 5GC unavailability, ensuring uninterrupted service delivery.	GR_TSTP_2.1.4.7

2.1.4.8	Inter-PLMN mobility and roaming scenarios, including seamless transitions between home and visited networks across LTE and 5G.	GR_TSTP_2.1.4.8
2.1.5	The converged nodes shall be designed to support network slicing, allowing differentiated services and resource allocation for 5G services.	GR_TSTP_2.1.5
2.1.6.	The architecture shall include redundancy and high availability mechanisms across converged nodes to ensure carrier-grade reliability and fault tolerance.	GR_TSTP_2.1.6
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.	GR_TSTP_2.1.7
2.1.8	The converged core may:	
2.1.8.1	Enable common subscriber data management across 5G and LTE networks through a unified UDM+HSS and PCF+PCRF architecture, ensuring consistent policy enforcement and seamless mobility.	GR_TSTP_2.1.8.1

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.	GR_TSTP_2.1.8.2
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 LTE and 5G UEs, with appropriate traffic steering and session management.	GR_TSTP_2.1.8.3
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.	GR_TSTP_2.1.8.4
2.2	<b>Converged Nodes Requirements</b>	
2.2.1	<b>SMF + PGW-C</b>	
2.2.1.1	PGW-C and SMF shall be integrated into a single node SMF+PGW-C, Optionally, SGW-C may also be integrated into the same node, resulting in a unified control function as SMF+PGW-C+SGW-C	GR_TSTP_2.2.1.1
2.2.1.2	This converged node shall:	
2.2.1.2.1	Enable IP address preservation and session continuity during mobility between LTE and 5G networks.	GR_TSTP_2.2.1.2.1

2.2.1.2.2	Support of S5-C interface towards LTE SGW in case of monolithic SGW (not required for SMF+PGW-C+SGW-C) and N11 towards 5G AMF	GR_TSTP_2.2.1.2.2
2.2.1.2.3	Support N7 interface towards converged PCF	GR_TSTP_2.2.1.2.3
2.2.1.3	If the converged node is selected for a PDN connection, the policy interactions that normally occur between the PGW and the PCRF shall be replaced by the corresponding interactions between the converged node and the PCRF /converged (PCF+PCRF) node.	GR_TSTP_2.2.1.3
2.2.1.4	If both PGW-C and the converged node are available, then MME shall select the converged node when UE's subscription from HSS indicates support for interworking with 5GS for the APN.	GR_TSTP_2.2.1.4
2.2.1.5	In order to support the interworking with EPC, the converged node shall provide information over N4 to the UPF+PGW-U related to the handling of traffic over S5-U or S1-U in case of converged UPF+SGW-U+PGW-U node.	GR_TSTP_2.2.1.5
2.2.2	<b>UPF + PGW-U</b>	
2.2.2.1	UPF and PGW-U shall be converged into a single node UPF+PGW-U. Optionally, SGW-U may also be integrated into the UPF, resulting in a unified user plane node functioning as UPF+PGW-U+SGW-U	GR_TSTP_2.2.2.1

2.2.2.2	The converged node shall support S5-U interface towards LTE SGW and N3 towards NG-RAN, in case of monolithic SGW	GR_TSTP_2.2.2.2
2.2.2.3	The converged node shall support the N4 interface for receiving control information from the SMF+PGW-C	GR_TSTP_2.2.2.3
2.2.2.4	If there is another UPF between the NG-RAN and the converged node, then, the converged node shall support N9 towards the additional UPF, if needed	GR_TSTP_2.2.2.4
2.2.2.5	The convergence of UPF and PGW-U shall enable session anchoring and maintain continuity during mobility between LTE and 5G networks	GR_TSTP_2.2.2.5
2.2.2.6	The converged node may store the current Small Data Rate Control Status in case of Cellular IoT 5GS optimization for all active PDU Sessions when the UE moves to the EPC	GR_TSTP_2.2.2.6
2.2.3	<b>UDM + HSS</b>	
	HSS and UDM may be converged into a single node and shall support the following functions:	

2.2.3.1	The converged node shall support the subscriber data for both LTE and 5G subscriptions in a unified manner. This includes permanent subscriber data, which can only be changed administratively and temporary subscriber data may change due to normal system operation	GR_TSTP_2.2.3.1
2.2.3.2	The converged node shall have S6a reference point to provide services towards the MME and N8 reference point to provide services towards the AMF	GR_TSTP_2.2.3.2
2.2.3.3	The converged node shall provide the following 3GPP reference points: N8, N10, N13 and NL6 corresponding to the 3GPP UDM network function (including ARPF). N35 and NU1 may be optional reference points based on the Converged Database (UDM+HSS) solution offered by vendor	GR_TSTP_2.2.3.3
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	GR_TSTP_2.2.3.4
2.2.3.5	The subscription identifier shall be an IMSI for EPC based interactions. The UDM shall extract the IMSI from the user's SUPI for interactions with the HSS	GR_TSTP_2.2.3.5

2.2.3.6	The converged node may 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	GR_TSTP_2.2.3.6
2.2.3.7	Either the converged node shall continue to support all required interfaces with the respective nodes of both EPC and 5GC or for interface-based integration the Dual Core system shall support an interface between the HSS and the UDM	GR_TSTP_2.2.3.7
2.2.4	<b>PCF + PCRF</b> PCF and PCRF may be integrated into a single node and shall support following functions:	
2.2.4.1	Policy related data for LTE and 5G subscribers shall be unified and shall be accessible to the converged node.	GR_TSTP_2.2.4.1
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 LTE & 5G services.	GR_TSTP_2.2.4.2
2.2.4.3	It shall have N15 interface towards AMF	GR_TSTP_2.2.4.3
2.2.4.4	It shall have N28 interface towards CHF	GR_TSTP_2.2.4.4
2.2.5	<b>AMF &amp; MME convergence through N26 interface</b>	

2.2.5.1	AMF and MME shall be converged through N26 interface.	GR_TSTP_2.2.5.1
2.2.5.2	The convergence of these nodes shall enable seamless mobility management and signalling continuity between EPC and 5G Core networks	GR_TSTP_2.2.5.2
2.2.5.3	This convergence shall support the S1-MME interface towards eNodeB (LTE) and the N2 interface towards gNodeB (5G).	GR_TSTP_2.2.5.3
2.2.5.4	This convergence shall support the N11 interface towards SMF and the S11 interface towards SGW-C for session management	GR_TSTP_2.2.5.4
2.2.5.5	This convergence shall enable unified handling of UE registration, authentication, and mobility procedures across both LTE and 5G access networks.	GR_TSTP_2.2.5.5
2.2.5.6	This convergence shall support interaction with UDM and HSS for unified subscriber data access and authentication.	GR_TSTP_2.2.5.6
2.3	<b>Other Functional Requirements</b>	

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)	Refer Test Guide of Evolved Packet Core (EPC) (TEC 22151:2022) and 5G Core (TEC 22161:2024)
3.	<p><b>OMC/ EMS requirements</b></p> <p>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.</p>	Informational
3.1	<p><b>Management Functions</b></p> <p>The following management functions shall be carried out through the corresponding OMCs:</p> <ul style="list-style-type: none"> <li>a. Configuration management</li> <li>b. Fault report and alarm handling</li> <li>c. Performance supervision/management</li> <li>d. Storage of system software and data</li> <li>e. Security management</li> </ul>	GR_TSTP_3.1
3.2	<p><b>OMC database</b></p> <ul style="list-style-type: none"> <li>a. The OMC shall use the relational/object-oriented database to</li> </ul>	GR_TSTP_3.2

	<p>store and hold the necessary information for the parameters used in the OMC.</p> <p>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.</p> <p>c. The database in the OMC shall reside in a disk with mirroring capability.</p> <p>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.</p> <p>e. OMC shall supports upto 3 days of storage for PM (Performance Management) Data.</p> <p>f. Provision shall be available for collection of statistical information relating to events in the network. Collection frequency shall be configurable</p>	
--	--	--

	<p>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:</p> <ul style="list-style-type: none"> <li>(i) Network elements</li> <li>(ii) Severity class</li> <li>(iii) Event type.</li> </ul>	
<p><b>3.3</b></p>	<ul style="list-style-type: none"> <li>• <b>OMC Generic Features</b></li> <li>• OMC software – UNIX/LINUX/Windows System Platform</li> <li>• It shall optionally support interface like CORBA / TCP / IP / CMIP / SNMP/ REST / HTTP etc., to enable it to work with a remote NMS</li> <li>• Support Ethernet connectivity with remote network elements.</li> <li>• Graphical User Interface (GUI).</li> <li>• Management through Element Management System</li> <li>• On-Line Help.</li> <li>• Consistency Checks (Optional).</li> <li>• Configuration Change/Event Log.</li> <li>• Object Alarm Status Management / Display.</li> </ul>	<p>GR_TSTP_3.3</p>

	<ul style="list-style-type: none"> <li>• Collection of PM counters.</li> <li>• Limited Access Restriction by User.</li> <li>• Access Restriction by Function and by Operation.</li> </ul>	
<b>4</b>	<b>General Requirements</b>	
4.1	The network elements (NE) shall support:	
a	Command Line Interface (CLI)/ Restful/ Netconf/ SNMP for configuring.	GR_TSTP_4.1_A
b	Micro service-based architecture.	GR_TSTP_4.1_B
c	Different redundancy model (i.e. Active-Active, Active-Standby, N-Way Active) for each type of microservices	GR_TSTP_4.1_C
d	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	GR_TSTP_4.1_D
e	Modularity and have a distributed architecture	GR_TSTP_4.1_E
f	Implementation on carrier class server/cloud	GR_TSTP_4.1_F
g	Software executable (patch) upgrade with / without configuration migration	GR_TSTP_4.1_G
4.2	Virtualised solution on generic COTS hardware or shall support Cloud Integration.	GR_TSTP_4.2
4.3	The NEs shall allow the independent scaling of the microservices.	GR_TSTP_4.3

4.4	The Dual Core system shall guarantee carrier-grade 99.999% system availability and avoid any Single Point of Failure	GR_TSTP_4.4
4.5	The applications shall support different deployment options e.g. Metal server or container infrastructure	GR_TSTP_4.5
4.6	No single failure of any module within the NE, shall lead to total disruption of service of that NE. Such failure shall also lead to minimum possible degradation of performance	GR_TSTP_4.6
4.7	The network elements 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	GR_TSTP_4.7
4.8	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	GR_TSTP_4.8
4.9	VNF/CNF shall maintain the feature parity with native solution	GR_TSTP_4.9
4.10	VNF/CNF shall include application-level fault tolerance on compute, storage and network.	GR_TSTP_4.10

4.11	The NE may support Secure File Transfer Protocol like SFTP and SSH for login	GR_TSTP_4.11
4.12	The NE may have their own self-diagnostic functionality to provide their health information.	GR_TSTP_4.12
4.13	VNF/CNF shall provide and maintain Telecom Grade KPI.	GR_TSTP_4.13
4.14	VNF/CNF shall be agnostic to all 3GPP access types	GR_TSTP_4.14
4.15	For security purpose, all components of Virtualized System, e.g. MANO, VNF/CNF depository etc. shall be hosted in India only	GR_TSTP_4.15
4.16	VNF/CNF shall meet availability requirements as envisaged in this GR	GR_TSTP_4.16
4.17	The system shall support mechanisms for system recovery and disaster recovery.	GR_TSTP_4.17
4.18	The system shall support scalability features to accommodate varying demands in disaster and temporary deployments efficiently	GR_TSTP_4.18
4.19	The control software shall be responsible for logging and sending the log file on the network to a designated server (such as syslog or any other).	GR_TSTP_4.19
4.20	The NEs may be capable of providing the system configuration data to the Management Information Base (MIB)	GR_TSTP_4.20

	of the system (applicable with SNMP based management only)	
5	<b>Other Requirements</b>	
5.1	<b>Software Requirements</b>	Undertaking plus Supporting documentation
a	Modular, structured software written in High-Level Language	GR_TSTP_5.1 GR_TSTP_5.2 GR_TSTP_5.3
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	

5.2	<b>Software Maintenance Requirements</b>	
a	Continuous supply of all software updates, for the period specified	
b	Integration of software updates without posing any problem to the existing functionality	
5.3	<b>Documentation</b> Detailed documentation in English shall be provided, including:	
a	Self-explanatory user manual giving details of all functions, facilities and Procedures	
b	Set-up and configuration parameters and procedures	
c	Trouble shooting guide including fault dictionary	
	Additionally, a soft copy of the documentation shall also be provided both in Hindi and English.	
5.4	<b>Quality Requirements</b>	Undertaking plus Supporting documentation GR_TSTP_5.4
a	The manufacturer shall furnish the MTBF values. 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	

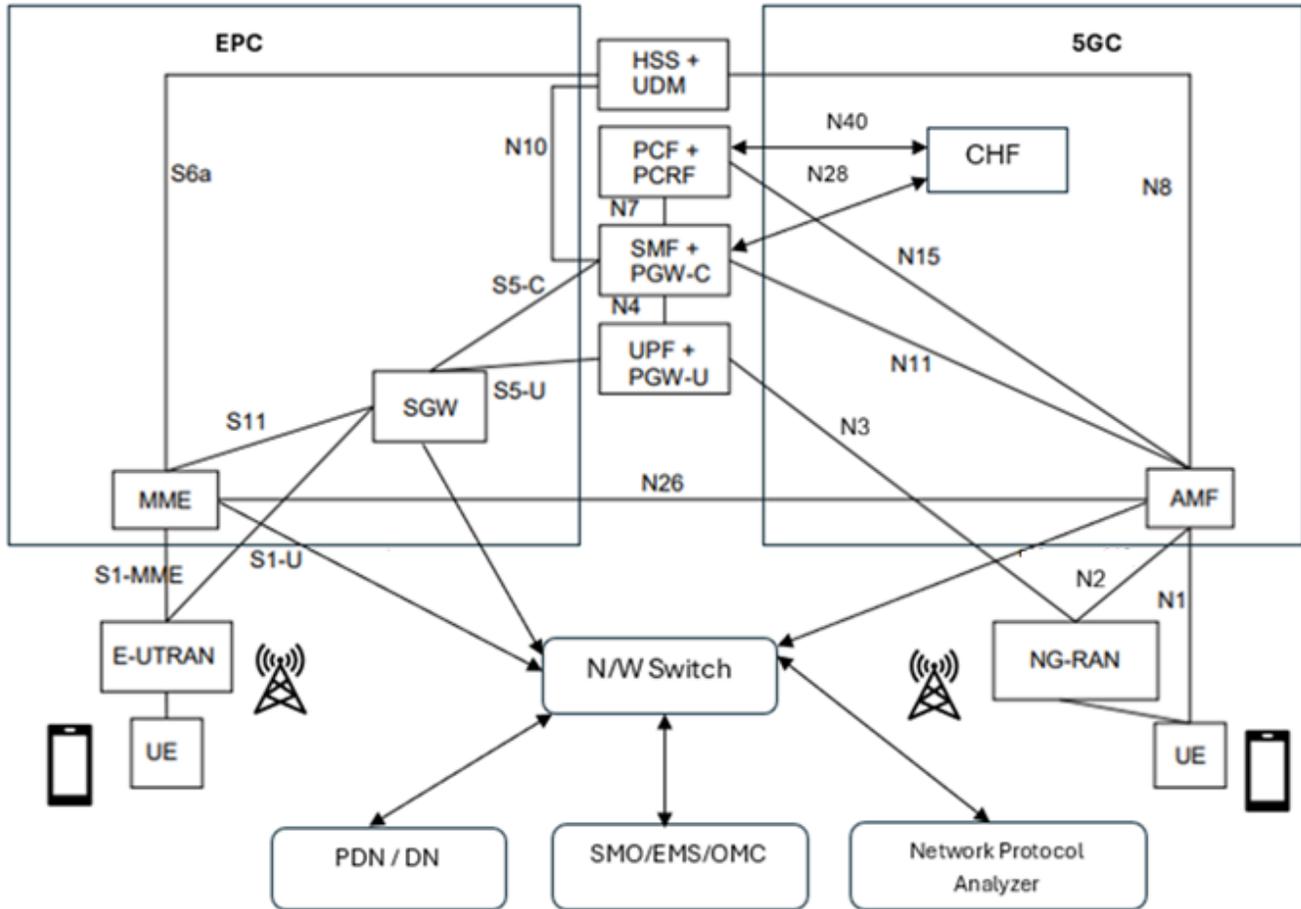
	1997} "Reliability Methods and Predictions" or any other international standards	
b	The equipment shall be manufactured in accordance with international quality management system ISO 9001:2015 or any other equivalent ISO certificate for which the manufacturer should be duly accredited. A quality plan describing the quality assurance system followed by the manufacturer would be required to be submitted	
c	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 Equipment" 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. (This requirement is applicable only for hardware-based solutions.)	
5.5	<b>Safety Requirements</b>	
	The equipment shall conform to relevant safety requirements as per IS/IEC 62368-1:2023 – "Audio/video, information and communication technology equipment - Part 1: Safety re-	Accredited lab report.

	<p>quirements” as prescribed under Table no. 1 of the TEC document ‘SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT’: TEC10009: 2024.</p> <p>The manufacturer/supplier shall submit a certificate in respect of compliance to these requirements (These requirements are applicable for purposely built hardware or a physical entity only).</p>	
5.6	<p><b>Security Requirements</b></p> <p>The network elements in this GR shall comply to the security requirements mentioned in the applicable Indian Telecommunication Security Assurance Requirements (ITSAR) as and when notified by National Centre for Communication Security (NCCS)</p>	TSTP will be updated once ITSAR is published.
5.7	<p><b>EMI/EMC Requirements</b></p> <p>These requirements are applicable for purposely built hardware or a physical entity only. These requirements shall be as per TEC Standard No. TEC11016:2016 as modified/amended from time to time.</p>	Accredited lab report.
6.	<p><b>Information for the Procurer of Product</b></p> <p>Interfaces and features which are optional needs to be examined by the procurer and suitably specified in the</p>	

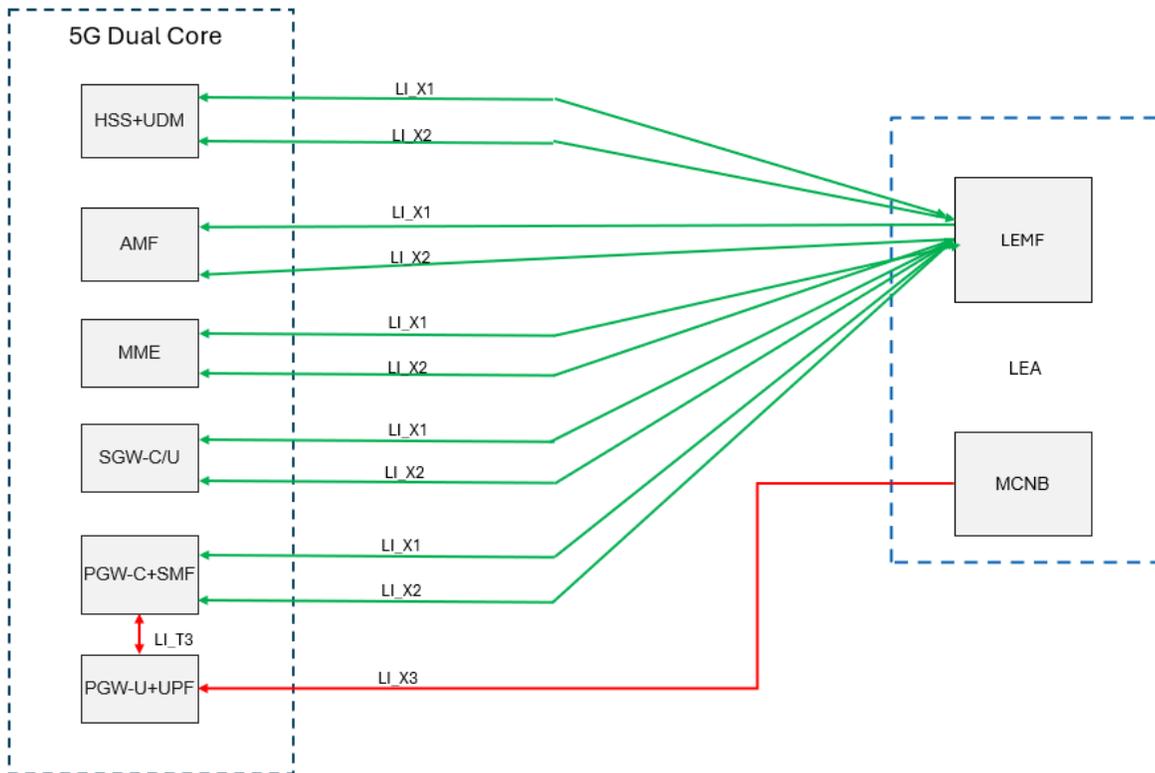
	tender conditions as per their requirement based on the deployment scenario specific to the procurer	
--	--	--

# I. TEST SETUP & PROCEDURES

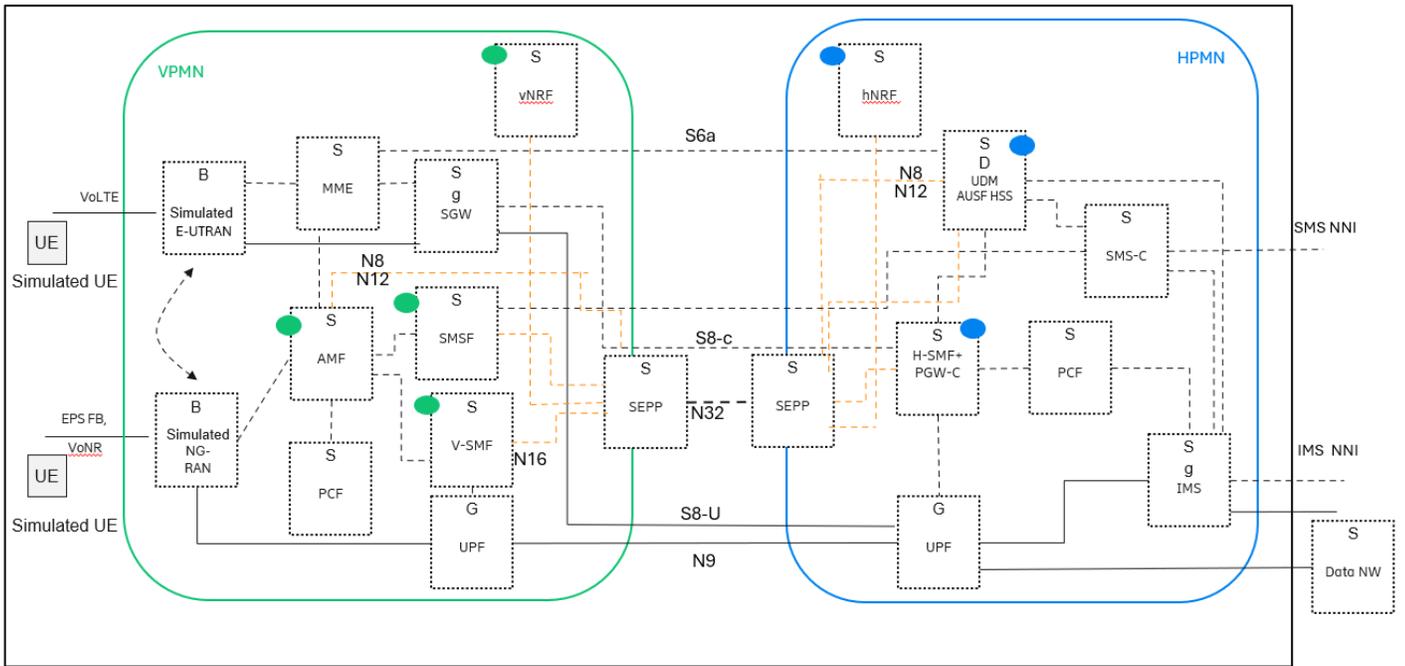
## TEST SETUP 1



## TEST SETUP 2



# TEST SETUP 3



## TEST SETUP & PROCEDURES:

1. Test No.	<b>GR_TSTP_2.1.1</b>
2. Test Details	To verify that in order to allow Inter-RAT (IRAT) handover between LTE 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: (i) SMF & PGW-C (ii) UPF & PGW-U (iii) Between MME and AMF, N26 interface shall be established
3. Test Instruments Required	PC/Laptop, LAN cables, gNB/DU Emulator / RAN Tester, eNB Emulator, UE/UE Simulator, 5G Core Emulator, EPC Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<b>1. Control Plane Convergence (SMF &amp; PGW-C)</b> a. Initialize EPC nodes and verify EPC control-plane readiness. b. Initialize 5GC functions and verify 5GC control-plane readiness. c. Attach 5G UE over LTE. d. UE is successfully attached and PDN connection is established. e. Verify that LTE session control is handled by the converged SMF & PGW-C. f. UE moved to the 5G network. g. Verify that PDU session is handled by the converged SMF & PGW-C.

	<p><b>2. User Plane Convergence (UPF &amp; PGW-U)</b></p> <ul style="list-style-type: none"> <li>a. Start continuous uplink and downlink data traffic after LTE attach.</li> <li>b. Verify LTE user-plane traffic anchoring at the converged UPF &amp; PGW-U.</li> <li>c. After LTE session establishment, verify that 4G traffic is anchored at the converged UPF &amp; PGW-U.</li> <li>d. After UE moved to 5G network, verify that 5G traffic is anchored at the same converged UPF &amp; PGW-U.</li> </ul> <p><b>3. N26 Interface Verification, IRAT Mobility and Session Continuity</b></p> <ul style="list-style-type: none"> <li>a. Configure the N26 interface between MME and AMF</li> <li>b. With active data traffic, trigger LTE → NR mobility.</li> <li>c. Verify service and session continuity.</li> <li>d. Trigger NR → LTE mobility. (5GS to EPS handover is performed when a UE in the CM-CONNECTED state (connected mode) moves from the 5GS to the EPS.)</li> <li>e. Verify service and session continuity in reverse direction.</li> </ul>
6. Test Limits	NA
7. Expected Results	<p>Successful IRAT mobility and session continuity with N26 interface established and functional convergence of SMF-PGW-C and UPF PGW-U.</p>

1. Test No.	<b>GR_TSTP_2.1.2</b>
2. Test Details	To Verify In addition, the following nodes may be converged together to achieve interworking between EPC and 5GC: (i) UDM & HSS (ii) PCF & PCRF
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1) UDM–HSS Convergence</b></p> <ul style="list-style-type: none"> <li>a. Initialize the EPC node HSS and verify readiness.</li> <li>b. Initialize the 5G network function UDM and verify readiness.</li> <li>c. Provision identical subscriber data in EPC and 5GC.</li> <li>d. Verify that subscriber authentication and subscription information are consistently accessible through the converged UDM/HSS for both EPC and 5GC operations.</li> </ul> <p><b>2) PCF–PCRF Convergence</b></p> <ul style="list-style-type: none"> <li>a. Initialize the EPC node PCRF and verify readiness.</li> <li>b. Initialize the 5G network function PCF and verify readiness.</li> <li>c. Configure common policy rules applicable to LTE and 5G sessions.</li> <li>d. Verify that policy decisions are consistently applied through the converged PCF/PCRF across EPC and 5GC.</li> </ul>
6. Test Limits	NA
7. Expected	1. Subscriber information is consistently managed by the

Results	converged UDM/HSS for EPC and 5GC. 2. Policy control is consistently enforced by the converged PCF/PCRF across LTE and 5G sessions.
---------	--

1. Test No.	<b>GR_TSTP_2.1.3</b>
2. Test Details	To Verify that UEs that are subject to 5GC and EPC interworking shall be served by converged nodes.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, gNB/eNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Attach the UE using an eNB emulator.</li> <li>c. Verify successful UE registration and session establishment in EPC.</li> <li>d. Initialize the 5G Core network functions AMF, SMF, UDM and UPF.</li> <li>e. Ensure that the converged nodes (e.g. SMF-PGW-C, UPF-PGW-U, UDM-HSS) are operational.</li> <li>f. Trigger EPC-5GC interworking for the UE using the UE simulator.</li> <li>g. Verify that the UE session and user traffic are handled by the converged EPC-5GC nodes.</li> <li>h. Confirm continuity of the UE services during EPC-5GC interworking.</li> <li>i. Verify that no session release or service interruption occurs during the interworking transition.</li> </ol>
6. Test Limits	NA
7. Expected Results	UEs subject to EPC and 5GC interworking are successfully served by converged core nodes with uninterrupted service continuity..

1. Test No.	<b>GR_TSTP_2.1.4.1</b>
2. Test Details	To Verify that the converged core shall support single registration for UE for inter working between EPC and 5GC via N26 interface.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, gNB/eNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UDM and UPF.</li> <li>c. Enable EPC–5GC interworking and convergence features in the core network.</li> <li>d. Configure and activate the N26 interface between MME and AMF.</li> <li>e. Verify that the N26 interface is operational and ready for EPC–5GC interworking.</li> <li>f. Attach the UE to EPC using an eNB emulator.</li> <li>g. Trigger UE access towards 5GC services.</li> <li>h. Verify that the UE is served using a single, unified registration context across EPC and 5GC.</li> <li>i. Confirm that UE context information is correctly shared between EPC and 5GC via the N26 interface.</li> <li>j. Verify that no duplicate or conflicting UE registration states are created.</li> </ol>
6. Test Limits	NA
7. Expected Results	Successful support of single registration for UE across EPC and 5GC using the N26 interface, ensuring seamless interworking.



1. Test No.	<b>GR_TSTP_2.1.4.2</b>
2. Test Details	To Verify that Interoperability with legacy LTE network elements, including support for S1 interface, to maintain backward compatibility during phased migration.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, eNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the legacy LTE eNB (emulator or physical node).</li> <li>c. Verify that S1-MME and S1-U interfaces between the eNB and EPC are operational.</li> <li>d. Initialize the 5G Core network functions AMF, SMF, UDM and UPF.</li> <li>e. Enable EPC–5GC interworking features in the core network.</li> <li>f. Ensure that backward-compatibility mechanisms for phased migration are enabled.</li> <li>g. Attach the UE to LTE through the legacy eNB using the S1 interface.</li> <li>h. Verify successful UE registration and session establishment in the EPC.</li> <li>i. Establish data services and verify service continuity over the S1 interface.</li> <li>j. Trigger EPC–5GC migration or interworking scenarios for the UE.</li> <li>k. Verify that interoperability with legacy LTE elements is maintained throughout the migration while ensuring service continuity.</li> </ol>
6. Test Limits	NA

7. Expected Results	<ol style="list-style-type: none"><li>1. Legacy LTE eNBs interoperate successfully with the EPC over the S1 interface.</li><li>2. Backward compatibility with LTE is maintained during phased migration to 5GC.</li><li>3. UE services remain continuous while interoperating with both EPC and 5GC.</li></ol>
---------------------	--

1. Test No.	<b>GR_TSTP_2.1.4.3</b>
2. Test Details	To Verify that Dynamic session anchoring and relocation between UPF and PGW-U based on UE mobility and service continuity requirements
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, gNB/eNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UDM and UPF.</li> <li>c. Configure UPF and PGW-U to support dynamic session anchoring and relocation based on mobility and service continuity requirements.</li> <li>d. Attach the UE using LTE or NR access.</li> <li>e. Establish a data session anchored at PGW-U or UPF, as per network configuration.</li> <li>f. Verify successful session establishment and active user-plane data flow.</li> <li>g. Trigger a UE mobility scenario (e.g. LTE ↔ NR or intra-/inter-cell movement).</li> <li>h. Verify that the network evaluates the need for session anchor relocation based on mobility and continuity criteria.</li> <li>i. Confirm relocation of the session anchor between UPF and PGW-U, as applicable.</li> <li>j. Verify that session continuity is maintained during and after relocation, with no session release.</li> <li>k. Confirm that user-plane traffic is routed through the new anchor node and data flow remains uninterrupted.</li> </ol>

6. Test Limits	NA
7. Expected Results	Successful dynamic session anchoring and relocation between UPF and PGW-U with uninterrupted service continuity during UE mobility.

1. Test No	<b>GR_TSTP_2.1.4.4</b>
2. Test Details	To Verify that the Support common policy control across LTE and 5G networks, enabling unified QoS enforcement and traffic steering (optionally) through integrated PCF/PCRF functionality.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C, PGW-U and PCRF.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM and PCF.</li> <li>c. Enable PCF-PCRF integration to support unified policy control across EPC and 5GC.</li> <li>d. Attach the UE via LTE using an eNB emulator.</li> <li>e. Verify that policy control and QoS enforcement are applied as per PCRF-defined rules.</li> <li>f. Attach the UE via NR using a gNB emulator.</li> <li>g. Verify that policy control and QoS enforcement are applied as per PCF-defined rules.</li> <li>h. Trigger UE mobility between LTE and 5G.</li> <li>i. Verify that policy rules and QoS parameters remain consistent across EPC and 5GC.</li> <li>j. Confirm continuity of QoS enforcement under integrated PCF and PCRF functionality.</li> <li>k. Optionally enable traffic steering policies and observe traffic handling behavior.</li> <li>l. Verify session integrity and correct application of unified policy during and after mobility.</li> </ol>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. Common policy control is successfully enforced across LTE and 5G networks.</li> <li>2. QoS parameters remain consistent during UE mobility and interworking.</li> </ol>

	3. UE sessions remain intact with no service disruption.
--	--

1. Test No	<b>GR_TSTP_2.1.4.5</b>
2. Test Details	To Verify that VoLTE and VoNR interworking, ensuring seamless voice continuity during handovers between LTE and 5G networks
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, IMS Core Emulator, eNB/gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF and UDM.</li> <li>c. Bring up the IMS core (P-CSCF, I-CSCF and S-CSCF).</li> <li>d. Ensure that VoLTE and VoNR subscriber profiles are provisioned and voice interworking features are enabled.</li> <li>e. Attach the UE to LTE using an eNB emulator.</li> <li>f. Establish a VoLTE call through the IMS core.</li> <li>g. Verify stable voice connectivity and media continuity.</li> <li>h. Attach the UE to 5G (NR) using a gNB emulator.</li> <li>i. Establish a VoNR call through the IMS core over 5GC.</li> <li>j. Verify successful call setup and stable voice quality.</li> <li>k. With an active VoLTE call, trigger LTE → NR handover.</li> <li>l. Verify seamless continuity of the voice session during transition to VoNR.</li> <li>m. With an active VoNR call, trigger NR → LTE handover.</li> <li>n. Verify seamless fallback to VoLTE without call drop or re-establishment.</li> <li>o. Confirm voice session integrity and uninterrupted media flow during both handovers.</li> </ol>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. VoLTE and VoNR interworking is successfully supported.</li> <li>2. Voice calls remain uninterrupted during LTE ↔ 5G handovers.</li> <li>3. Acceptable voice quality is maintained throughout inter-RAT mobility.</li> </ol>

1. Test No	<b>GR_TSTP_2.1.4.6</b>
2. Test Details	To Verify that Lawful interception and regulatory compliance across both RATs, ensuring that all security obligations are met in a converged environment.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, LI Server/LI Emulator, eNB/gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 2
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF and UDM.</li> <li>c. Enable Lawful Interception (LI) functionality and interfaces in both EPC and 5GC.</li> <li>d. Configure a target UE for lawful interception as per regulatory requirements.</li> <li>e. Provision LI rules and authorization for the target UE in EPC and 5GC.</li> <li>f. Verify that LI is successfully activated for the target UE across both RATs.</li> <li>g. Attach the UE via LTE using an eNB emulator.</li> <li>h. Establish user traffic or service session.</li> <li>i. Verify that lawful interception information is correctly delivered to the authorized LI monitoring system</li> <li>j. Attach the UE via 5G NR using a gNB emulator.</li> <li>k. Establish user traffic or service session.</li> <li>l. Verify that lawful interception information is correctly delivered from 5GC components to the authorized LI monitoring system.</li> <li>m. Trigger UE mobility from LTE to 5G NR.</li> <li>n. Verify uninterrupted delivery of lawful interception information during handover.</li> <li>o. Trigger UE mobility from 5G NR to LTE.</li> <li>p. Verify seamless continuity of lawful interception across both RATs.</li> </ol>

6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"><li>1. Lawful interception is correctly enforced for both LTE and 5G sessions.</li><li>2. LI data delivery remains uninterrupted during inter-RAT mobility.</li><li>3. Regulatory and security compliance requirements are met in a converged EPC-5GC environment.</li></ol>

1. Test No	<b>GR_TSTP_2.1.4.7</b>
2. Test Details	To Verify that Fallback mechanisms to EPC in case of 5GC unavailability, ensuring uninterrupted service delivery.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, eNB/gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UDM and UPF.</li> <li>c. Configure fallback policies and enable EPC–5GC interworking mechanisms.</li> <li>d. Attach the UE using NR access through a gNB emulator.</li> <li>e. Verify successful UE registration on the 5G Core.</li> <li>f. Establish a data session and verify active service through the UPF.</li> <li>g. Simulate 5GC unavailability by disabling or blocking access to critical 5GC functions.</li> <li>h. Observe UE behavior under 5GC failure conditions.</li> <li>i. Verify that the network triggers fallback towards the EPC.</li> <li>j. Verify that the UE is re-registered on the EPC using LTE access.</li> <li>k. Establish a data session on the EPC and verify service availability.</li> <li>l. Confirm continuity of essential services (data and IMS services, if applicable) without user-perceived interruption.</li> </ol>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. UE successfully falls back to the EPC when the 5GC becomes unavailable.</li> <li>2. Service continuity is maintained during and after fallback.</li> <li>3. No manual user intervention is required to restore basic services.</li> </ol>

1. Test No	<b>GR_TSTP_2.1.4.8</b>
2. Test Details	To Verify that Inter-PLMN mobility and roaming scenarios, including seamless transitions between home and visited networks across LTE and 5G
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Visited PLMN Core Emulator, eNB/gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 3
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the Home PLMN EPC nodes (MME, HSS, PGW-C and PGW-U).</li> <li>b. Initialize the Home PLMN 5G Core network functions (AMF, SMF, UPF and UDM).</li> <li>c. Initialize the Visited PLMN EPC and/or 5G Core as per the roaming scenario.</li> <li>d. Configure and enable inter-PLMN roaming and interworking connectivity between Home and Visited PLMNs.</li> <li>e. Attach the UE to the Visited PLMN LTE network using an eNB emulator.</li> <li>f. Verify successful roaming authentication and authorization using the Home PLMN subscriber data.</li> <li>g. Establish a data session and verify service availability in the roaming state.</li> <li>h. Trigger UE mobility back to the Home PLMN LTE network.</li> <li>i. Verify seamless service continuity during and after the transition.</li> <li>j. Attach the UE to the Visited PLMN 5G network using a gNB emulator.</li> <li>k. Verify successful roaming registration and session establishment.</li> <li>l. Establish a data session and verify service continuity in the roaming state.</li> <li>m. Verify that services continue without session interruption.</li> <li>n. While roaming, UE trigger connected mode mobility between the 5GS and the EPS..</li> </ol>

	<ul style="list-style-type: none"> <li>o. Verify continuity of the UE session across both RAT and PLMN boundaries.</li> <li>p. Trigger inter-RAT Idle mode mobility in the roaming state.</li> <li>q. Confirm stable service delivery and consistent policy enforcement throughout mobility.</li> </ul>
6. Test Limits	NA
7. Expected Results	<ul style="list-style-type: none"> <li>1. Inter-PLMN roaming is successfully supported for both LTE and 5G.</li> <li>2. UE sessions remain uninterrupted during transitions between Home and Visited networks.</li> <li>3. Seamless service continuity is maintained across RAT and PLMN boundaries.</li> </ul> <p><b>Note:</b> Seamless service continuity across PLMN is subjected to Regulatory approval.</p>

1. Test No.	<b>GR_TSTP_2.1.5</b>
2. Test Details	To Verify that the converged nodes shall be designed to support network slicing, allowing differentiated services and resource allocation for 5G services.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (for convergence validation), gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the 5G Core network functions AMF, SMF, UDM, UPF, PCF and NSSF.</li> <li>b. Initialize EPC nodes, if required, to validate converged core behavior.</li> <li>c. Configure multiple network slices (e.g. eMBB, URLLC and mMTC) with distinct service and resource profiles.</li> <li>d. Attach the UE to 5G NR using a gNB emulator.</li> <li>e. Trigger slice selection based on configured NSSAI.</li> <li>f. Verify that the UE is registered and assigned to the appropriate network slice.</li> <li>g. Establish PDU sessions for different network slice types.</li> <li>h. Verify that slice-specific resources are allocated by SMF and UPF.</li> <li>i. Confirm differentiated QoS behavior as per slice configuration (e.g. latency, priority, and bandwidth characteristics).</li> <li>j. Verify that converged core functions correctly maintain and apply slice context during session handling.</li> <li>k. Confirm that slice-specific routing and policy rules are enforced consistently.</li> <li>l. Trigger UE mobility scenarios and verify continuity of slice-specific services.</li> </ol>
6. Test Limits	NA

7. Expected Results	<ol style="list-style-type: none"><li>1. Converged core nodes support network slicing with differentiated services.</li><li>2. Slice selection, resource allocation, and QoS enforcement operate as configured.</li><li>3. Slice continuity is maintained during mobility and interworking scenarios.</li></ol>
---------------------	---

1. Test No.	<b>GR_TSTP_2.1.6</b>
2. Test Details	To Verify that the architecture shall include redundancy and high availability mechanisms across converged nodes to ensure carrier-grade reliability and fault tolerance.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, gNB/eNB Emulator, UE/UE Simulator, Failure Injection/Node Restart Tools (software-based)
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM and PCF.</li> <li>c. Enable redundancy mechanisms (e.g. active-active or active-standby) for converged core functions.</li> <li>d. Verify that converged nodes are deployed with redundant instances (e.g. SMF-PGW-C, UPF-PGW-U).</li> <li>e. Verify synchronization of session, subscriber, and policy context across redundant nodes.</li> <li>f. Establish a normal UE session and verify stable service operation.</li> <li>g. Simulate failure of an active converged node (e.g. SMF, UPF or PGW-U).</li> <li>h. Verify automatic switchover to the standby or peer node.</li> <li>i. Confirm that UE sessions are maintained with no service interruption or only minimal, acceptable disruption.</li> <li>j. Restore the failed node and verify its reintegration into the redundancy group or cluster.</li> <li>k. Verify context and state re-synchronization without impacting active UE sessions.</li> <li>l. Perform additional session establishment and mobility procedures to confirm system stability.</li> </ol>
6. Test Limits	NA

7. Expected Results	<ol style="list-style-type: none"><li>1. Redundancy and high-availability mechanisms operate correctly across converged nodes.</li><li>2. Failures are handled transparently with no session loss.</li><li>3. The converged core architecture meets carrier-grade reliability and fault-tolerance requirements.</li></ol>
---------------------	---

1. Test No.	<b>GR_TSTP_2.1.7</b>
2. Test Details	To Verify that 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.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Analytics/Monitoring Platform Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM and PCF.</li> <li>c. Bring up the centralized analytics and monitoring platform.</li> <li>d. Configure data collection interfaces between core network functions and the analytics platform.</li> <li>e. Attach the UE to LTE and establish a session.</li> <li>f. Verify that session and performance metrics from the EPC are collected by the analytics platform.</li> <li>g. Attach the UE to 5G NR and establish a session.</li> <li>h. Verify that session and performance metrics from the 5GC are collected by the analytics platform.</li> <li>i. Confirm that mobility-related events are correctly captured and reported.</li> <li>j. Generate UE traffic and verify real-time visibility of key performance indicators such as throughput and latency.</li> <li>k. Trigger UE mobility events between LTE and 5G NR and verify timely updates in the monitoring system.</li> <li>l. Verify collection and display of resource utilization metrics from converged core nodes.</li> <li>m. Confirm correlation and unified visualization of EPC and 5GC metrics in the centralized dashboard.</li> <li>n. Simulate service degradation or session disruption.</li> <li>o. Verify near real-time alerts and event reporting in the</li> </ol>

	<p>monitoring system.</p> <p>p. Confirm that fault indicators correctly identify the affected domain (EPC or 5GC) and impacted services.</p>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. Centralized analytics provide real-time visibility across EPC and 5GC domains.</li> <li>2. Session performance, mobility events, and resource utilization are accurately monitored.</li> <li>3. Faults and degradations are detected and reported promptly with correct domain identification.</li> </ol>

1. Test No.	<b>GR_TSTP_2.1.8.1</b>
2. Test Details	To Verify that the converged core may Enable common subscriber data management across 5G and LTE networks through a unified UDM+HSS and PCF+PCRF architecture, ensuring consistent policy enforcement and seamless mobility.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C, PGW-U and PCRF.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM and PCF.</li> <li>c. Enable UDM–HSS and PCF–PCRF integration to support unified subscriber data and policy management.</li> <li>d. Provision a test subscriber in the converged UDM–HSS database.</li> <li>e. Attach the UE to LTE and verify successful retrieval and use of subscriber profile information.</li> <li>f. Register the UE on 5G NR and verify consistent retrieval and use of the same subscriber profile information.</li> <li>g. Establish a UE session on LTE and verify policy enforcement as per configured rules.</li> <li>h. Establish a UE session on 5G NR and verify policy enforcement as per the same policy rules.</li> <li>i. Confirm that policy behavior and service treatment remain consistent across LTE and 5G.</li> <li>j. Trigger UE mobility from LTE to 5G NR and verify continuity of subscriber context and policies.</li> <li>k. Trigger UE mobility from 5G NR to LTE and verify absence of policy or authorization conflicts.</li> <li>l. Confirm that the subscriber context remains unified and</li> </ol>

	intact during inter-RAT mobility.
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. Subscriber data is centrally managed through a converged UDM-HSS architecture.</li> <li>2. Policy control is consistently enforced through integrated PCF-PCRF functionality.</li> <li>3. Seamless mobility between LTE and 5G is achieved without service disruption or policy inconsistency.</li> </ol>

1. Test No.	<b>GR_TSTP_2.1.8.2</b>
2. Test Details	To Verify that the Support common charging functions, integrating CHF (Charging Function) and OCS/OFCS to provide unified charging records and real-time credit control across RATs
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Charging System Emulator (CHF/OCS/OFCS), UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C, PGW-U and OCS/OFCS.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM, PCF and CHF.</li> <li>c. Configure integration between CHF and OCS/OFCS to enable unified charging and credit control.</li> <li>d. Attach the UE to LTE using an eNB emulator.</li> <li>e. Establish a data session and verify initiation of charging for the UE.</li> <li>f. Attach the UE to 5G NR using a gNB emulator.</li> <li>g. Establish a data session and verify initiation of charging through the CHF.</li> <li>h. Generate online charging events such as usage reporting and credit checks.</li> <li>i. Verify consistent credit control decisions for the same subscriber across EPC and 5GC.</li> <li>j. Confirm real-time quota enforcement across both LTE and 5G RATs.</li> <li>k. Generate traffic over LTE and verify creation of unified charging records.</li> <li>l. Generate traffic over 5G NR and verify creation of unified charging records.</li> <li>m. Confirm correct correlation and aggregation of charging</li> </ol>

	<p>information across RATs.</p> <p>n. Trigger UE mobility from LTE to 5G NR.</p> <p>o. Verify charging continuity without duplicate or missing charging records.</p> <p>p. Trigger UE mobility from 5G NR to LTE.</p> <p>q. Verify correct and unified charging record generation after mobility.</p>
6. Test Limits	NA
7. Expected Results	Unified and consistent charging behavior is maintained across LTE and 5G networks, with integrated CHF and OCS/OFCS providing accurate charging records and real-time credit control across RATs.

1. Test No.	<b>GR_TSTP_2.1.8.3</b>
2. Test Details	To Verify that the Support integration with standards-based MEC platforms (as per ETSI GS MEC 003), enabling local breakout and low-latency service delivery for both LTE and 5G UEs, with appropriate traffic steering and session management.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, MEC Platform Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize the EPC nodes MME, HSS, PGW-C and PGW-U.</li> <li>b. Initialize the 5G Core network functions AMF, SMF, UPF, UDM and PCF.</li> <li>c. Deploy MEC platform compliant with ETSI GS MEC 003</li> <li>d. Configure UPF/PGW-U for MEC-based local breakout</li> <li>e. Attach UE via LTE and establish a data session.</li> <li>f. Verify MEC traffic steering rules applied through PCRF/PCF</li> <li>g. Attach UE via NR and confirm MEC-enabled session routing</li> <li>h. Generate traffic from UE toward MEC-hosted services</li> <li>i. Verify path breaks out locally at UPF/PGW-U instead of central core</li> <li>j. Measure latency improvements indicating MEC routing</li> <li>k. Configure application-specific traffic steering policies</li> <li>l. Validate that UPF/PGW-U forwards MEC-eligible traffic and sends rest to core</li> <li>m. Trigger load scenarios and verify consistent policy enforcement</li> <li>n. Trigger LTE → NR mobility and confirm MEC session continuity</li> <li>o. Trigger NR → LTE mobility with uninterrupted MEC service delivery</li> <li>p. Validate UPF/PGW-U anchor relocation logic if configured</li> </ol>
6. Test Limits	NA

7. Expected Results	<ol style="list-style-type: none"><li>1. LTE and 5G UEs are successfully served through ETSI GS MEC 003-compliant MEC platforms.</li><li>2. Local breakout and traffic steering are correctly applied.</li><li>3. Low-latency service delivery and session continuity are maintained during mobility.</li></ol>
---------------------	---

1. Test No.	<b>GR_TSTP_2.1.8.4</b>
2. Test Details	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.
3. Test Instruments Required	PC/Laptop, LAN cables, Cloud/VM Infrastructure Emulator, Kubernetes Cluster (K8s), EPC Emulator, 5G Core Emulator (containerized), UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Deploy NFVI and/or cloud infrastructure with compute, storage, and networking resources and verify readiness.</li> <li>b. Deploy Kubernetes cluster for CNFs and virtualized platform (e.g., OpenStack/VMware) for VNFs.</li> <li>c. Integrate NFV-MANO components (NFVO, VNFM, VIM) and Kubernetes orchestration where applicable.</li> <li>d. Onboard CNF Helm charts/container images and VNF packages with valid descriptors (VNFD/CNFD).</li> <li>e. Verify descriptor compliance with ETSI GS NFV and cloud-native requirements.</li> <li>f. Instantiate EPC and 5GC functions as CNFs and/or VNFs.</li> <li>g. Verify all pods/VMs are running and resource allocation matches defined specifications.</li> <li>h. Configure scaling policies, CPU/memory thresholds, and minimum/maximum instance limits.</li> <li>i. Start base LTE and NR traffic with limited UE sessions.</li> <li>j. Increase traffic gradually to exceed scaling thresholds.</li> <li>k. Verify automatic scale-out and traffic redistribution across CNFs/VNFs.</li> <li>l. Reduce traffic and verify scale-in operations.</li> <li>m. Validate UE session stability during scaling events.</li> <li>n. Trigger lifecycle management operations (instantiate, scale, heal, terminate) and simulate node/pod/VM failure.</li> </ol>

	<p>o. Verify automatic recovery, alarms, KPI reporting, and optimized resource utilization after test completion</p> <p>.</p>
6. Test Limits	NA
7. Expected Results	The system shall support containerized and virtualized architectures. CNF pods/ VNF instances shall scale out when utilization exceeds thresholds and scale in when utilization drops. EPC and 5GC functions shall remain stable during scaling and failure scenarios, with alarms and KPIs correctly reported and resources optimized after test completion.

1. Test No.	<b>GR_TSTP_2.2.1.1</b>
2. Test Details	To Verify that the PGW-C and SMF shall be integrated into a single node SMF+PGW-C, Optionally, SGW-C may also be integrated into the same node, resulting in a unified control function as SMF+PGW-C+SGW-C
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>a. Initialize EPC control-plane components MME, HSS, PGW-C and SGW-C.</li> <li>b. Initialize 5G Core network functions AMF, SMF and UDM.</li> <li>c. Deploy and activate the integrated SMF + PGW-C control node.</li> <li>d. If applicable, deploy and activate the integrated SMF + PGW-C + SGW-C control node.</li> <li>e. Verify that PGW-C and SMF functionalities are combined and operational within the unified control node.</li> <li>f. If deployed, verify successful integration of SGW-C within the same node.</li> <li>g. Confirm that session and bearer control functions are handled centrally by the unified control node.</li> <li>h. Attach the UE via LTE using an eNB emulator.</li> <li>i. Establish a data session and verify that EPC control-plane procedures are handled by the unified SMF + PGW-C (or SMF + PGW-C + SGW-C) node.</li> <li>j. Attach the UE via 5G NR using a gNB emulator.</li> <li>k. Establish a PDU session and verify that 5G session control is handled by the same unified control node.</li> <li>l. Trigger session modification or bearer update procedures and verify handling by the unified control node.</li> <li>m. Trigger UE mobility between LTE and 5G NR and verify</li> </ol>

	<p>stable control-plane operation.</p> <p>n. Confirm correct routing, policy enforcement, and session continuity after control-function integration.</p>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. PGW-C and SMF are successfully integrated into a single unified control node.</li> <li>2. Optional SGW-C integration functions correctly without impacting service behavior.</li> <li>3. UE sessions and mobility procedures are handled consistently and reliably by the unified control function.</li> </ol>

1. Test No.	<b>GR_TSTP_2.2.1.2.1</b>
2. Test Details	To Verify that the Enable IP address preservation and session continuity during mobility between LTE and 5G networks
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, eNB/gNB Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Initial Session Establishment <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes (MME, HSS, PGW-C/PGW-U)</li> <li>b. Initialize the 5G Network Functions nodes (AMF, SMF, UPF, UDM)</li> <li>c. Attach UE via LTE using eNB emulator</li> <li>d. Establish a data session and record the allocated IP address</li> </ol> </li> <li>2. Mobility to 5G <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility using RAN tester or UE Simulator</li> <li>b. Verify that existing session is transferred to UPF without change in IP address</li> <li>c. Ensure no interruption in data flow</li> </ol> </li> <li>3. Mobility Back to LTE <ol style="list-style-type: none"> <li>a. Trigger NR → LTE mobility</li> <li>b. Validate that the original IP address is preserved</li> <li>c. Confirm EPC correctly reuses the preserved IP in session continuation</li> </ol> </li> <li>4. Continuity &amp; Integrity Checks <ol style="list-style-type: none"> <li>a. Generate continuous data traffic during all mobility events</li> <li>b. Ensure no session drop or IP reallocation</li> <li>c. Validate correct anchor relocation logic between PGW-U and UPF</li> </ol> </li> </ol>
6. Test Limits	NA

7. Expected Results	The system shall preserve UE IP address and maintain seamless session continuity during mobility transitions between LTE and 5G networks without service interruption.
---------------------	--

1. Test No.	<b>GR_TSTP_2.2.1.2.2</b>
2. Test Details	To verify that the Support of S5-C interface towards LTE SGW in case of monolithic SGW (not required for SMF+PGW-C+SGW-C) and N11 towards 5G AMF
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, SGW Emulator (monolithic), UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. EPC and 5GC Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes(MME, HSS, PGW-C/PGW-U, monolithic SGW)</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, UPF, UDM)</li> <li>c. Ensure S5-C configuration is enabled towards the SGW</li> <li>d. Ensure N11 interface is enabled towards the AMF</li> </ol> </li> <li>2. S5-C Interface Verification (LTE Path) <ol style="list-style-type: none"> <li>a. Attach UE via LTE using eNB emulator</li> <li>b. Verify session establishment signaling via S5-C between PGW-C and SGW</li> <li>c. Validate bearer setup and modify-bearer signaling correctness</li> <li>d. Confirm data session flows correctly through SGW</li> </ol> </li> <li>3. N11 Interface Verification (5G Path) <ol style="list-style-type: none"> <li>a. Attach UE via NR using gNB emulator</li> <li>b. Validate SMF-AMF signaling exchange over N11</li> <li>c. Confirm PDU session creation procedures are successful</li> <li>d. Validate proper SMF response handling from AMF</li> </ol> </li> <li>4. Interworking Validation <ol style="list-style-type: none"> <li>a. Trigger UE mobility between LTE ↔ NR</li> <li>b. Verify continuity of control-plane signaling using S5-C and N11</li> <li>c. Ensure no session failure during RAT transitions</li> </ol> </li> </ol>
6. Test Limits	NA

7. Expected Results	Successful operation of S5-C interface towards monolithic SGW and N11 interface towards AMF, ensuring proper signaling, bearer handling, and interworking between EPC and 5GC.
---------------------	--

1. Test No.	<b>GR_TSTP_2.2.1.2.3</b>
2. Test Details	To verify that the Support N7 interface towards converged PCF
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (if required), PCF Emulator, UE/UE Simulator, gNB/eNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core Initialization <ol style="list-style-type: none"> <li>a. Initialize the 5G Network Functions nodes (AMF, SMF, UPF, UDM, PCF)</li> <li>b. Ensure SMF is configured to communicate with the converged PCF via N7</li> <li>c. Initialize EPC components if interworking context is required</li> </ol> </li> <li>2. N7 Interface Configuration <ol style="list-style-type: none"> <li>a. Configure N7 reference points between SMF and PCF</li> <li>b. Verify capability exchange and readiness for policy control</li> <li>c. Check SMF → PCF connectivity via N7 diagnostic messages</li> </ol> </li> <li>3. Policy Control Verification <ol style="list-style-type: none"> <li>a. Attach UE via NR and establish a PDU session</li> <li>b. Ensure SMF sends policy requests (e.g., policy rules, QoS profiles) to PCF over N7</li> <li>c. Validate that PCF responds with correct policy decisions</li> <li>d. Confirm SMF enforces PCF policies for session management</li> </ol> </li> <li>4. Dynamic Policy Update <ol style="list-style-type: none"> <li>a. Trigger UE traffic requiring policy modification (QoS upgrade/downgrade)</li> <li>b. Verify SMF re-queries policy from PCF through N7</li> <li>c. Confirm updated rules are applied to the ongoing PDU session</li> </ol> </li> </ol>

	<p>5. Mobility Scenario Validation</p> <ul style="list-style-type: none"> <li>a. Trigger LTE ↔ NR mobility if converged PCF is supporting EPC policies</li> <li>b. Confirm N7-driven policies remain consistent and uninterrupted</li> <li>c. Verify no failure in SMF–PCF interaction during mobility</li> </ul>
6. Test Limits	NA
7. Expected Results	The N7 interface shall operate correctly with the converged PCF, allowing SMF to retrieve and apply policy rules seamlessly for session establishment, modification, and continuity.

1. Test No.	<b>GR_TSTP_2.2.1.3</b>
2. Test Details	To Verify that If the converged node is selected for a PDN connection, the policy interactions that normally occur between the PGW and the PCRF shall be replaced by the corresponding interactions between the converged node and the PCRF /converged (PCF+PCRF) node.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged PCF/PCRF Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li><b>1. Core Initialization</b> <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes (MME, HSS, PGW-U, PCRF)</li> <li>b. Initialize 5G Core network functions AMF, SMF, UPF, UDM, and PCF.</li> <li>c. Deploy converged control node (SMF+PGW-C or SMF+PGW-C+SGW-C)</li> <li>d. Enable integration of converged node with PCRF or converged PCF+PCRF</li> </ol> </li> <li><b>2. PDN Session Establishment via Converged Node</b> <ol style="list-style-type: none"> <li>a. Attach UE via LTE using eNB emulator</li> <li>b. Select converged node as PDN session anchor</li> <li>c. Verify that policy requests are sent from converged node → PCRF/PCF+PCRF</li> <li>d. Validate that PCRF/PCF responds with appropriate policy rules</li> </ol> </li> <li><b>3. Policy Interaction Validation</b> <ol style="list-style-type: none"> <li>a. Establish dedicated bearer or QoS flows</li> <li>b. Confirm correct policy enforcement by converged node</li> <li>c. Trigger policy updates (QoS change, throttling, service restrictions)</li> <li>d. Verify that converged node retrieves and applies updated policy rules</li> </ol> </li> <li><b>4. Comparison with Legacy Flow</b></li> </ol>

	<p>a. Disable the converged control node and establish a PDN session using the legacy PGW.</p> <p>b. Verify legacy PGW–PCRF policy interaction for reference.</p> <p>c. Compare policy behavior with the converged-node flow to confirm functional equivalence.</p>
6. Test Limits	NA
7. Expected Results	When a converged control node is selected for a PDN connection, policy interactions normally performed between the PGW and PCRF are successfully replaced by equivalent interactions between the converged node and the PCRF / PCF–PCRF, without impacting policy enforcement or service continuity.

1. Test No.	<b>GR_TSTP_2.2.1.4</b>
2. Test Details	To Verify that If both PGW-C and the converged node are available, then MME shall select the converged node when UE's subscription from HSS indicates support for interworking with 5GS for the APN.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, UE/UE Simulator, eNB Emulator, HSS/UDM Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes (MME, HSS, PGW-C, SGW-C/SGW-U)</li> <li>b. Initialize the 5G Network Functions nodes (AMF, SMF, UPF, UDM)</li> <li>c. Deploy converged node (SMF+PGW-C or SMF+PGW-C+SGW-C)</li> <li>d. Ensure APN subscription profile includes “interworking with 5GS” flag</li> </ol> </li> <li>2. UE Subscription Configuration <ol style="list-style-type: none"> <li>a. Configure HSS with APN profile supporting 5GS interworking</li> <li>b. Provision UE with this APN and subscription capability</li> <li>c. Validate HSS → MME subscription fetch through Update Location Request (ULR)</li> </ol> </li> <li>3. PGW-C vs Converged Node Selection <ol style="list-style-type: none"> <li>a. Attach UE via LTE using eNB emulator</li> <li>b. Observe MME PGW selection procedure</li> <li>c. Verify that despite PGW-C being available, MME selects the converged node</li> <li>d. Confirm that PDN session establishment uses the converged node (control-plane)</li> </ol> </li> <li>4. Session Establishment Validation <ol style="list-style-type: none"> <li>a. Validate bearer setup from converged node through SGW-</li> </ol> </li> </ol>

	<p>U → PGW-U or UPF</p> <p>b. Confirm correct policy/charging interaction when converged node is selected</p> <p>c. Ensure session context matches converged-core identifiers</p> <p>5. Negative &amp; Alternate Scenario</p> <p>a. Modify HSS subscription to remove “interworking with 5GS” capability</p> <p>b. Re-attach UE</p> <p>c. Verify MME now selects legacy PGW-C instead of converged node</p> <p>d. Compare behavior to validate correct selection logic</p>
6. Test Limits	NA
7. Expected Results	When both PGW-C and a converged node are available, MME shall select the converged node if the UE’s subscription indicates support for 5GS interworking for the APN. When subscription lacks this capability, MME shall fall back to selecting legacy PGW-C.

1. Test No.	<b>GR_TSTP_2.2.1.5</b>
2. Test Details	To verify that in order to support the interworking with EPC, the converged node shall provide information over N4 to the UPF+PGW-U related to the handling of traffic over S5-U or S1-U in case of converged UPF+SGW-U+PGW-U node.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UPF+SGW-U+PGW-U Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. Core Initialization</b></p> <ul style="list-style-type: none"> <li>a. Initialize the EPC nodes (MME, HSS, SGW-U, PGW-U)</li> <li>b. Initialize the 5G Network Function snodes (AMF, SMF, UPF, UDM)</li> <li>c. Deploy and initialize the converged UPF+SGW-U+PGW-U node.</li> <li>d. Ensure the N4 interface is enabled between the SMF (or converged control node) and the converged UPF+PGW-U.</li> </ul> <p><b>2. N4 Information Exchange</b></p> <ul style="list-style-type: none"> <li>a. Establish an N4 session between the SMF and the converged user-plane node</li> <li>b. Verify that the SMF provides forwarding rules, QoS parameters, and traffic handling information over N4</li> <li>c. Confirm N4 session monitoring and heartbeat mechanisms are operational</li> </ul> <p><b>3. Handling of S1-U / S5-U Traffic</b></p> <ul style="list-style-type: none"> <li>a. Attach the UE to LTE using an eNB emulator.</li> <li>b. Verify S1-U bearer establishment and its correct mapping within the converged UPF+SGW-U+PGW-U.</li> <li>c. Confirm that N4-provided rules are applied for correct S1-U traffic forwarding.</li> <li>d. Establish traffic via the S5-U path and verify correct provisioning and handling based on N4 information</li> </ul> <p><b>4. Session Modification</b></p>

	<p>a. Modify QoS or dedicated bearer parameters during an active session.</p> <p>b. Verify that an N4 session modification is initiated by the SMF.</p> <p>c. Confirm that the updated rules are correctly enforced by the converged UPF+PGW-U</p>
6. Test Limits	NA
7. Expected Results	The converged UPF+SGW-U+PGW-U correctly applies user-plane handling for S1-U and S5-U traffic based on information received over the N4 interface, enabling seamless EPC-5GC interworking with uninterrupted service continuity.

1. Test No.	<b>GR_TSTP_2.2.2.1</b>
2.. Test Details	To Verify that the UPF and PGW-U shall be converged into a single node UPF+PGW-U. Optionally, SGW-U may also be integrated into the UPF, resulting in a unified user plane node functioning as UPF+PGW-U+SGW-U
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UPF/PGW-U/SGW-U Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. User-Plane Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes (MME, HSS, SGW-U, PGW-U)</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, UPF, UDM)</li> <li>c. Deploy converged UPF+PGW-U node</li> <li>d. Optionally deploy converged UPF+PGW-U+SGW-U unified user-plane node</li> </ol> </li> <li>2. Convergence Verification <ol style="list-style-type: none"> <li>a. Validate merging of UPF and PGW-U functions into one integrated node</li> <li>b. If applicable, verify SGW-U integration inside the same user-plane node</li> <li>c. Confirm correct registration of unified user-plane node with SMF and MME</li> </ol> </li> <li>3. Session Establishment (LTE Path) <ol style="list-style-type: none"> <li>a. Attach UE via LTE using eNB emulator</li> <li>b. Verify S1-U/S5-U bearer setup via converged user-plane node</li> <li>c. Confirm correct forwarding behavior for EPC sessions</li> </ol> </li> <li>4. Session Establishment (5G Path) <ol style="list-style-type: none"> <li>a. Attach UE via NR through gNB emulator</li> <li>b. Establish PDU session and verify data routing via unified UPF+PGW-U</li> <li>c. Validate correct tunnel creation and GTP-U mapping</li> </ol> </li> </ol>

	<p>5. Interworking &amp; Mobility</p> <p>a. Trigger LTE → NR mobility and verify no change in user-plane anchor node</p> <p>b. Trigger NR → LTE mobility and confirm unified user-plane continuity</p> <p>c. Validate correct anchor relocation behavior if SGW-U is integrated</p>
6. Test Limits	NA
7. Expected Results	The system shall successfully operate with integrated UPF+PGW-U (and optionally UPF+PGW-U+SGW-U), providing unified user-plane handling for LTE and 5G traffic with correct forwarding, session anchoring, and mobility continuity.

1. Test No.	<b>GR_TSTP_2.2.2.2</b>
2. Test Details	To verify that the converged node shall support S5-U interface towards LTE SGW and N3 towards NG-RAN, in case of monolithic SGW
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Monolithic SGW Emulator, Converged UPF/PGW-U Emulator, UE/UE Simulator, eNB/gNB Emulator.
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. User-Plane Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes(MME, HSS, monolithic SGW, PGW-U if applicable)</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, UPF)</li> <li>c. Deploy converged UPF+PGW-U node</li> <li>d. Ensure S5-U configuration toward monolithic SGW and N3 configuration toward NG-RAN is enabled</li> </ol> </li> <li>2. S5-U Interface Verification (LTE Path) <ol style="list-style-type: none"> <li>a. Attach UE via LTE using eNB emulator</li> <li>b. Establish LTE bearer through SGW → S5-U → converged UPF/PGW-U</li> <li>c. Validate correct GTP-U tunnel creation for S5-U</li> <li>d. Verify user traffic flows correctly over S1-U → SGW → S5-U → converged node</li> </ol> </li> <li>3. N3 Interface Verification (5G Path) <ol style="list-style-type: none"> <li>a. Attach UE via NR using gNB emulator</li> <li>b. Establish PDU session with N3 tunnel between gNB and converged node</li> <li>c. Verify GTP-U tunnel creation and correctness of N3 forwarding</li> <li>d. Validate traffic flow from NR → N3 → converged UPF → data network</li> </ol> </li> <li>4. Interworking &amp; Mobility Verification <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>b. Verify transition from S5-U path to N3 path without session drop</li> <li>c. Trigger NR → LTE mobility</li> <li>d. Validate restoration of S5-U path and correct forwarding behavior</li> </ul> <p>5. Session Modification Checks</p> <ul style="list-style-type: none"> <li>a. Modify QoS or bearer parameters</li> <li>b. Validate S5-U and N3 tunnel adjustments as per new rules</li> <li>c. Confirm correct N4 updates from SMF to converged user-plane node</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged node shall successfully support the S5-U interface toward the LTE SGW and the N3 interface toward NG-RAN, ensuring proper GTP-U tunneling, traffic forwarding, and mobility continuity across LTE and 5G.

1. Test No.	<b>GR_TSTP_2.2.2.3</b>
2. Test Details	To verify that the converged node shall support the N4 interface for receiving control information from the SMF+PGW-C
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (for converged control verification), Converged UPF/PGW-U Emulator, SMF+PGW-C Emulator, UE/UE Simulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Control &amp; User Plane Initialization <ol style="list-style-type: none"> <li>a. Bring-up 5GC nodes (AMF, SMF, UPF, UDM)</li> <li>b. Deploy SMF+PGW-C converged control-plane node</li> <li>c. Deploy converged UPF/PGW-U node</li> <li>d. Ensure N4 configuration is enabled between SMF+PGW-C and converged UPF</li> </ol> </li> <li>2. N4 Interface Configuration <ol style="list-style-type: none"> <li>a. Establish N4 association between SMF+PGW-C and converged UPF</li> <li>b. Validate capability exchange and session-level readiness</li> <li>c. Verify heartbeat and monitoring messages to ensure link stability</li> </ol> </li> <li>3. N4 Session Establishment <ol style="list-style-type: none"> <li>a. Attach UE via NR or LTE (as per requirement)</li> <li>b. Trigger PDU session or bearer setup</li> <li>c. Verify SMF+PGW-C sends N4 Session Establishment messages to converged UPF</li> <li>d. Validate creation of forwarding rules, QoS rules, and tunnel mappings</li> </ol> </li> <li>4. Traffic Forwarding Validation <ol style="list-style-type: none"> <li>a. Generate uplink/downlink user traffic</li> <li>b. Confirm UPF forwards traffic according to N4 rules from SMF+PGW-C</li> <li>c. Validate correct application of QoS parameters and policy behavior</li> </ol> </li> <li>5. N4 Modification &amp; Release</li> </ol>

	<ul style="list-style-type: none"> <li>a. Trigger QoS or policy change requiring N4 Session Modification</li> <li>b. Verify converged UPF updates forwarding behavior accordingly</li> <li>c. Trigger session release and confirm N4 Session Release procedures</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged node shall fully support the N4 interface, correctly receiving and applying control information from the SMF+PGW-C for session establishment, modification, and release.

1. Test No.	<b>GR_TSTP_2.2.2.4</b>
2. Test Details	To verify that if there is another UPF between the NG-RAN and the converged node, then, the converged node shall support N9 towards the additional UPF, if needed
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (if required), Converged UPF/PGW-U Emulator, Additional UPF Emulator, UE/UE Simulator, gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. User-Plane Initialization</b></p> <ul style="list-style-type: none"> <li>a. Initialize the 5G Core network functions AMF, SMF, UPF, and UDM.</li> <li>b. Deploy and initialize the converged UPF-PGW-U (or UPF-PGW-U-SGW-U) node</li> <li>c. Deploy an additional UPF between the NG-RAN and the converged node</li> <li>d. Configure the N9 interface between the additional UPF and the converged node</li> </ul> <p><b>2. N9 Interface Configuration and Readiness</b></p> <ul style="list-style-type: none"> <li>a. Establish N9 connectivity between the additional UPF and the converged UPF.</li> <li>b. Verify interface readiness and session association capability.</li> <li>c. Confirm GTP-U tunnel establishment and endpoint availability over N9</li> </ul> <p><b>3. PDU Session Establishment Through Hierarchical UPFs</b></p> <ul style="list-style-type: none"> <li>a. Attach the UE over NR using a gNB emulator.</li> <li>b. Trigger PDU session establishment.</li> <li>c. Verify that the SMF selects the additional UPF as the intermediate UPF and the converged UPF-PGW-U as the anchor</li> <li>d. Confirm successful setup of the user-plane path via the additional UPF and the N9 interface toward the converged node.</li> </ul>

	<p><b>4. Traffic Flow Validation</b></p> <ul style="list-style-type: none"> <li>a. Generate uplink and downlink user traffic.</li> <li>b. Verify that traffic is forwarded through the additional UPF and the N9 interface to the converged node.</li> <li>c. Confirm correct forwarding behavior and QoS enforcement.</li> </ul> <p><b>5. Mobility &amp; Session Update Validation</b></p> <ul style="list-style-type: none"> <li>a. Trigger intra-NR and inter-NR mobility scenarios.</li> <li>b. Verify correct update of forwarding rules across the N9 interface.</li> <li>c. Trigger QoS modification and confirm appropriate N9 tunnel updates</li> </ul> <p><b>6. Session Release</b></p> <ul style="list-style-type: none"> <li>a. Trigger PDU session release</li> <li>b. Verify teardown of N9 tunnels and cleanup of user-plane resources at both UPFs.</li> </ul>
6. Test Limits	NA
7. Expected Results	When an additional UPF is present between NG-RAN and the converged node, the converged UPF-PGW-U supports the N9 interface as required, enabling correct session anchoring, traffic forwarding, mobility handling, and resource cleanup.

1. Test No.	<b>GR_TSTP_2.2.2.5</b>
2. Test Details	To verify that the convergence of UPF and PGW-U shall enable session anchoring and maintain continuity during mobility between LTE and 5G networks
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UPF/PGW-U Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. User-Plane Initialization</b></p> <ul style="list-style-type: none"> <li>a. Initialize the EPC Nodes(MME, HSS, SGW-U, PGW-U)</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, UPF)</li> <li>c. Deploy converged UPF+PGW-U node</li> <li>d. Configure converged node as session anchor for both LTE and 5G access</li> </ul> <p><b>2. Initial Session Establishment (LTE)</b></p> <ul style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Establish a data session anchored at converged UPF+PGW-U</li> <li>c. Record the UE's IP address and session parameters</li> </ul> <p><b>3. Mobility to 5G</b></p> <ul style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> <li>b. Verify that the session remains anchored at the same converged UPF-PGW-U.</li> <li>c. Confirm that the UE IP address remains unchanged and the session is not interrupted</li> <li>d. Validate successful user-plane path establishment toward the 5G access</li> </ul> <p><b>4. Mobility Back to LTE</b></p> <ul style="list-style-type: none"> <li>a. Trigger NR → LTE mobility</li> <li>b. Ensure session remains anchored at the same converged UPF+PGW-U</li> <li>c. Confirm that S1-U path is restored correctly</li> <li>d. Validate uninterrupted traffic flow during mobility</li> </ul>

	<p><b>5. Continuity Validation</b></p> <ul style="list-style-type: none"> <li>a. Generate continuous data traffic during mobility events</li> <li>b. Validate throughput consistency and absence of packet drops</li> <li>c. Confirm anchor stability during repeated mobility cycles</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged UPF+PGW-U shall successfully act as a common session anchor, maintaining session continuity and preserving UE IP address during mobility transitions between LTE and 5G networks.

1. Test No.	<b>GR_TSTP_2.2.2.6</b>
2. Test Details	To verify that the converged node may store the current Small Data Rate Control Status in case of Cellular IoT 5GS optimization for all active PDU Sessions when the UE moves to the EPC
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator, Converged UPF/PGW-U Emulator, UE/UE Simulator (Cellular IoT capable), gNB/eNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. IoT-Optimized 5GS Initialization</b></p> <ul style="list-style-type: none"> <li>a. Initialize the 5G Network Functions (AMF, SMF, UPF, UDM) with IoT 5GS optimization enabled</li> <li>b. Deploy converged UPF+PGW-U node supporting Small Data Rate Control Status (SDRCS)</li> <li>c. Configure IoT UE profile with small data optimization capability</li> </ul> <p><b>2. PDU Session Establishment in 5GS</b></p> <ul style="list-style-type: none"> <li>a. Attach IoT UE via NR or LTE-NR dual connectivity</li> <li>b. Establish active PDU session(s) with small data optimization enabled</li> <li>c. Record the Small Data Rate Control Status applied to each active PDU session</li> </ul> <p><b>3. Mobility from 5GS to EPC</b></p> <ul style="list-style-type: none"> <li>a. Trigger UE movement from NR → LTE (handover or fallback)</li> <li>b. Ensure UE re-registers with EPC</li> <li>c. Verify converged node stores the SDRCS for all active PDU sessions prior to transition</li> </ul> <p><b>4. EPC Session Handling</b></p> <ul style="list-style-type: none"> <li>a. Establish EPC bearer/session via PGW-U function inside converged node</li> <li>b. Confirm SDRCS information is retained internally for each session</li> <li>c. Validate that traffic handling decisions (rate limits, small</li> </ul>

	<p>data support) remain consistent</p> <p><b>5. Continuity &amp; Data Handling</b></p> <p>a. Generate small uplink/downlink data packets</p> <p>b. Validate no loss of SDRCS logic after UE transitions to EPC</p> <p>c. Ensure correct session continuity and handling for IoT traffic</p>
6. Test Limits	NA
7. Expected Results	The converged node shall correctly store the Small Data Rate Control Status for all active PDU sessions during UE movement from 5GS to EPC, ensuring continuity of IoT-specific optimizations and consistent data handling.

1. Test No.	<b>GR_TSTP_2.2.3.1</b>
2. Test Details	To Verify that the HSS and UDM may be converged into a single node and shall support the subscriber data for both LTE and 5G subscriptions in a unified manner. This includes permanent subscriber data, which can only be changed administratively and temporary subscriber data may change due to normal system operation
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. Converged HSS+UDM Initialization</b></p> <ul style="list-style-type: none"> <li>a. Deploy converged HSS+UDM node</li> <li>b. Initialize the EPC Nodes(MME, PGW-C/SGW-C)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF, UPF, PCF)</li> <li>d. Configure unified subscriber database accessible by both EPC and 5GC</li> </ul> <p><b>2. Permanent Subscriber Data Verification</b></p> <ul style="list-style-type: none"> <li>a. Provision permanent subscriber attributes (IMSI, security keys, APNs, NSSAI, etc.)</li> <li>b. Attach UE via LTE using eNB emulator</li> <li>c. Verify permanent subscriber data retrieval by MME from converged HSS+UDM</li> <li>d. Attach UE via NR using gNB emulator</li> <li>e. Verify permanent subscriber data retrieval by AMF from converged HSS+UDM</li> </ul> <p><b>3. Temporary Subscriber Data Handling</b></p> <ul style="list-style-type: none"> <li>a. Trigger LTE attach, session establishment, and mobility events</li> <li>b. Confirm temporary data (e.g., TAI list, EPS bearer contexts) are updated in converged HSS+UDM</li> <li>c. Trigger NR registration and PDU session creation</li> </ul>

	<p>d. Verify 5G-related temporary data (e.g., registration state, mobility restrictions, slice info) is updated correctly</p> <p><b>4. Unified Data Consistency Check</b></p> <p>a. Trigger LTE → NR mobility and verify subscriber data consistency</p> <p>b. Trigger NR → LTE mobility and confirm temporary data transitions smoothly</p> <p>c. Modify subscriber policies or slices and confirm updates in unified database</p> <p><b>5. Administrative vs. Dynamic Data Validation</b></p> <p>a. Attempt modification of permanent data via system signaling (should be rejected)</p> <p>b. Modify permanent data administratively and verify correct propagation to EPC and 5GC</p> <p>c. Validate that dynamic data updates occur automatically during normal operations</p>
6. Test Limits	NA
7. Expected Results	The converged HSS+UDM shall successfully support unified subscriber data for LTE and 5G, maintaining consistency across permanent and temporary subscriber information, and ensuring correct functionality during registration, mobility, and session management.

1. Test No.	<b>GR_TSTP_2.2.3.2</b>
2. Test Details	To verify that the converged node shall have S6a reference point to provide services towards the MME and N8 reference point to provide services towards the AMF
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. Converged Node Initialization</b></p> <ul style="list-style-type: none"> <li>a. Deploy converged HSS+UDM node</li> <li>b. Initialize the EPC Nodes(MME, SGW-C/PGW-C if needed)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF, UPF, PCF)</li> <li>d. Ensure S6a and N8 interfaces are configured on the converged HSS+UDM</li> </ul> <p><b>2. S6a Interface Verification (towards MME)</b></p> <ul style="list-style-type: none"> <li>a. Initiate LTE attach using eNB emulator</li> <li>b. Verify Update Location Request (ULR) is sent from MME to converged node over S6a</li> <li>c. Validate Update Location Answer (ULA) response from converged node</li> <li>d. Confirm Authentication Information Request / Answer (AIR/AIA) exchanges function correctly</li> <li>e. Validate subscriber profile retrieval and temporary data updates</li> </ul> <p><b>3. N8 Interface Verification (towards AMF)</b></p> <ul style="list-style-type: none"> <li>a. Initiate NR registration using gNB emulator</li> <li>b. Verify Nudm_UEAuthentication and Nudm_UEContextManagement procedures</li> <li>c. Confirm AMF retrieves subscriber profile over N8 from converged node</li> <li>d. Validate Authentication Server Function (AUSF)/UDM interaction consistency</li> </ul>

	<p>e. Ensure correct handling of temporary and permanent subscriber data</p> <p><b>4. Dual-RAT Interworking Validation</b></p> <p>a. Trigger LTE → NR mobility</p> <p>b. Verify that AMF retrieves updated subscriber data via N8</p> <p>c. Trigger NR → LTE mobility</p> <p>d. Confirm MME retrieves updated subscriber data via S6a</p> <p>e. Validate consistency of subscriber profile across both interfaces</p> <p><b>5. Failure &amp; Recovery Testing</b></p> <p>a. Simulate N8 interface failure and verify retry/recovery behavior</p> <p>b. Simulate S6a failure and confirm MME fallback behavior</p> <p>c. Restore interfaces and ensure resynchronization of subscriber data</p>
6. Test Limits	NA
7. Expected Results	The converged HSS+UDM node shall successfully support the S6a interface toward the MME and the N8 interface toward the AMF, enabling correct subscriber authentication, profile retrieval, and mobility support across LTE and 5G networks.

1. Test No.	<b>GR_TSTP_2.2.3.3</b>
2. Test Details	To verify that the converged node shall provide the following 3GPP reference points: N8, N10, N13 and NL6 corresponding to the 3GPP UDM network function (including ARPF). N35 and NU1 may be optional reference points based on the Converged Database (UDM+HSS) solution offered by vendor
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UDM+HSS Emulator (including ARPF), UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li><b>1. Converged UDM Initialization</b> <ol style="list-style-type: none"> <li>a. Deploy converged UDM+HSS node with ARPF functionality</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, PCF, AUSF, NEF if applicable)</li> <li>c. Initialize the EPC Nodes(MME) if required for interworking</li> <li>d. Configure N8, N10, N13, and NL6 interfaces on converged node</li> </ol> </li> <li><b>2. N8 Interface Verification</b> <ol style="list-style-type: none"> <li>a. Initiate NR registration using gNB emulator</li> <li>b. Verify AMF interaction with converged UDM over N8</li> <li>c. Validate subscriber data retrieval and registration context handling</li> </ol> </li> <li><b>3. N10 Interface Verification</b> <ol style="list-style-type: none"> <li>a. Trigger authentication procedures requiring AUSF interaction</li> <li>b. Verify N10 signaling between AUSF and converged UDM/ARPF</li> <li>c. Validate authentication vectors and security context generation</li> </ol> </li> <li><b>4. N13 Interface Verification</b> <ol style="list-style-type: none"> <li>a. Trigger UE policy or subscription data request from PCF</li> <li>b. Verify N13 communication between PCF and converged</li> </ol> </li> </ol>

	<p>UDM</p> <p>c. Confirm correct policy-related data delivery</p> <p><b>5. NL6 Interface Verification</b></p> <p>a. Initiate lawful or external data access scenario (if applicable)</p> <p>b. Verify NL6 communication for exposure of subscriber-related data</p> <p>c. Validate access control and data integrity</p> <p><b>6. Interface Validation (N35 / NU1 – if supported)</b></p> <p>a. Enable optional N35 and/or NU1 interfaces as per vendor implementation</p> <p>b. Verify correct signaling and data exchange over optional interfaces</p> <p>c. Confirm no impact on mandatory interface operations</p> <p><b>7. Interworking &amp; Consistency Checks</b></p> <p>a. Trigger LTE ↔ NR mobility</p> <p>b. Verify subscriber data consistency across all supported interfaces</p> <p>c. Ensure no loss or mismatch of authentication or subscription data</p>
6. Test Limits	NA
7. Expected Results	The converged UDM+HSS node shall successfully support mandatory 3GPP reference points (N8, N10, N13, NL6) and optional reference points (N35, NU1 if implemented), ensuring correct subscriber data management, authentication, and interworking across LTE and 5G networks.

1. Test No.	<b>GR_TSTP_2.2.3.4</b>
2. Test Details	To verify that the 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
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UDM+HSS Emulator, UE/UE Simulator (IMSI/SUPI capable), eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li><b>1. Subscriber Provisioning</b> <ol style="list-style-type: none"> <li>a. Provision UE subscriber in converged UDM+HSS with IMSI-based SUPI</li> <li>b. Verify mapping of SUPI to IMSI in subscriber database</li> <li>c. Ensure subscription is enabled for both LTE and 5G access</li> </ol> </li> <li><b>2. LTE Access Verification (EPC Interworking)</b> <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify UE presents IMSI during LTE attach procedure</li> <li>c. Confirm MME successfully authenticates UE using IMSI via S6a</li> </ol> </li> <li><b>3. 5G Access Verification</b> <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Verify SUPI/SUCI handling by AMF and converged UDM+HSS</li> <li>c. Confirm SUPI is derived from IMSI and processed correctly</li> </ol> </li> <li><b>4. Interworking Mobility Validation</b> <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> <li>b. Verify continuity of identity handling without reallocation of SUPI/IMSI</li> <li>c. Trigger NR → LTE mobility</li> <li>d. Confirm UE continues to present IMSI to EPC</li> </ol> </li> <li><b>5. Negative Scenario Validation</b> <ol style="list-style-type: none"> <li>a. Attempt provisioning of non-IMSI-based SUPI for EPC interworking</li> </ol> </li> </ol>

	<p>b. Verify EPC rejects or fails interworking as per specification</p> <p>c. Restore IMSI-based SUPI configuration</p>
6. Test Limits	NA
7. Expected Results	For EPC interworking, the UE shall always be assigned an IMSI-based SUPI, enabling correct IMSI presentation to the EPC and ensuring seamless identity handling across LTE and 5G networks.

1. Test No.	<b>GR_TSTP_2.2.3.5</b>
2. Test Details	To verify that the subscription identifier is an IMSI for EPC based interactions. The UDM extracts the IMSI from the user's SUPI for interactions with the HSS
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged UDM+HSS Emulator, UE/UE Simulator (IMSI/SUPI capable), eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li><b>1. Subscriber Provisioning</b> <ol style="list-style-type: none"> <li>a. Provision UE subscriber in converged UDM+HSS with IMSI-based SUPI</li> <li>b. Verify SUPI-IMSI mapping is correctly stored in the converged database</li> <li>c. Enable subscription for both EPC and 5GC access</li> </ol> </li> <li><b>2. EPC-Based Interaction Verification</b> <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify that EPC interactions use IMSI as the subscription identifier</li> <li>c. Confirm MME communicates with HSS using IMSI over S6a</li> <li>d. Validate successful authentication and subscription retrieval</li> </ol> </li> <li><b>3. UDM IMSI Extraction Validation</b> <ol style="list-style-type: none"> <li>a. Initiate 5G registration using gNB emulator</li> <li>b. Verify AMF forwards SUPI/SUCI to UDM</li> <li>c. Confirm UDM extracts IMSI from SUPI for EPC-related interactions</li> <li>d. Validate correct IMSI usage in UDM-HSS signaling</li> </ol> </li> <li><b>4. Interworking &amp; Mobility Validation</b> <ol style="list-style-type: none"> <li>a. Trigger NR → LTE mobility</li> <li>b. Verify IMSI continuity and correct identification in EPC</li> <li>c. Trigger LTE → NR mobility</li> <li>d. Confirm SUPI handling resumes correctly in 5GC</li> </ol> </li> </ol>

	<p><b>5. Negative Scenario Validation</b></p> <ul style="list-style-type: none"> <li>a. Configure test subscriber with incorrect SUPI-IMSI mapping</li> <li>b. Attempt EPC-based interaction</li> <li>c. Verify failure or rejection as per specification</li> <li>d. Restore correct IMSI-based SUPI configuration</li> </ul>
6. Test Limits	NA
7. Expected Results	For EPC-based interactions, the IMSI shall be used as the subscription identifier. The UDM shall correctly extract the IMSI from the user's SUPI for interactions with the HSS, ensuring seamless interworking between EPC and 5GC.

1. Test No.	<b>GR_TSTP_2.2.3.6</b>
2. Test Details	To verify that the converged node supports CN Type Change Event subscription with an optional Duration of Reporting parameter. Upon expiry of the specified duration, the HSS+UDM locally unsubscribes the CN Type Change Event without requiring explicit signaling interaction from the subscribing network function
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. Converged HSS+UDM Initialization</b></p> <ul style="list-style-type: none"> <li>a. Deploy converged HSS+UDM node</li> <li>b. Initialize the EPC Nodes(MME)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF)</li> <li>d. Enable CN Type Change Event subscription capability on converged node</li> </ul> <p><b>2. CN Type Change Event Subscription</b></p> <ul style="list-style-type: none"> <li>a. Configure a network function (e.g., AMF or MME) to subscribe for CN Type Change Events</li> <li>b. Include optional Duration of Reporting parameter in the subscription request</li> <li>c. Verify successful acceptance of the subscription by the converged HSS–UDM.</li> </ul> <p><b>3. Event Reporting Validation</b></p> <ul style="list-style-type: none"> <li>a. Trigger CN Type change (e.g., UE moves from EPC to 5GC or vice versa)</li> <li>b. Verify that the converged HSS–UDM generates a CN Type Change Event.</li> <li>c. Confirm that the event notification is delivered to the subscribing network function.</li> </ul> <p><b>4. Duration Expiry Handling</b></p> <ul style="list-style-type: none"> <li>a. Allow the configured Duration of Reporting to expire.</li> </ul>

	<p>b. Verify that the converged HSS–UDM locally unsubscribes the CN Type Change Event.</p> <p>c. Confirm that no explicit unsubscribe signaling is required from the subscribing network function.</p> <p><b>5. Post-Expiry Verification</b></p> <p>a. Trigger a CN Type Change Event after expiry of the reporting duration.</p> <p>b. Verify that no further event notifications are sent to the previously subscribed network function.</p> <p>c. Confirm correct cleanup of subscription state and stable system operation.</p>
6. Test Limits	NA
7. Expected Results	The converged HSS+UDM shall support CN Type Change Event subscription with an optional reporting duration and shall automatically unsubscribe the event upon expiry of the duration without requiring explicit unsubscribe signaling from the subscribing network function.

1. Test No.	<b>GR_TSTP_2.2.3.7</b>
2. Test Details	To Verify that either the converged node continue to support all required interfaces with the respective nodes of both EPC and 5GC or for interface-based integration the Dual Core system supports an interface between the HSS and the UDM
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<p><b>1. Converged Node Interface Validation</b></p> <ul style="list-style-type: none"> <li>a. Deploy converged HSS+UDM node</li> <li>b. Initialize the EPC Nodes (MME)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF)</li> <li>d. Verify support of all required EPC and 5GC interfaces on the converged node</li> </ul> <p><b>2. EPC Interface Verification</b></p> <ul style="list-style-type: none"> <li>a. Validate S6a interface connectivity between converged node and MME</li> <li>b. Verify authentication, subscription data retrieval, and mobility signaling</li> <li>c. Confirm normal LTE attach and session establishment</li> </ul> <p><b>3. 5GC Interface Verification</b></p> <ul style="list-style-type: none"> <li>a. Validate N8 (and related) interface connectivity between converged node and AMF</li> <li>b. Verify 5G registration, authentication, and subscription handling</li> <li>c. Confirm correct handling of 5GC-specific subscriber data</li> </ul> <p><b>4. Interface-Based Integration Scenario (Alternative)</b></p> <ul style="list-style-type: none"> <li>a. Disable direct convergence mode</li> <li>b. Enable interface-based integration between HSS and UDM</li> <li>c. Verify signaling exchange and synchronization of subscriber data</li> <li>d. Validate consistency of subscriber profiles across both</li> </ul>

	<p>nodes</p> <p><b>5. Interworking &amp; Mobility Validation</b></p> <p>a. Trigger LTE ↔ NR mobility</p> <p>b. Verify uninterrupted subscriber data access via either converged or interface-based integration</p> <p>c. Confirm no loss or mismatch of subscription or authentication data</p>
6. Test Limits	NA
7. Expected Results	The system shall successfully support either full convergence with all required EPC and 5GC interfaces on the converged node, or interface-based integration between HSS and UDM, ensuring seamless interworking and consistent subscriber data handling across LTE and 5G.

1. Test No.	<b>GR_TSTP_2.2.4.1</b>
2. Test Details	To verify that the PCF and PCRF may be integrated into a single node and shall support unified policy-related data for LTE and 5G subscribers, which shall be accessible to the converged node.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged PCF+PCRF Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Converged PCF+PCRF Initialization <ol style="list-style-type: none"> <li>a. Deploy converged PCF+PCRF node</li> <li>b. Initialize the EPC Nodes(MME, PGW-C/SGW-C)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF, UPF)</li> <li>d. Configure unified policy database accessible to both EPC and 5GC</li> </ol> </li> <li>2. LTE Policy Verification <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Establish data session and trigger policy control via PCRF functionality</li> <li>c. Verify retrieval and enforcement of LTE policy rules from converged PCF+PCRF</li> <li>d. Validate QoS, charging triggers, and traffic control policies</li> </ol> </li> <li>3. 5G Policy Verification <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Establish PDU session and trigger policy control via PCF functionality</li> <li>c. Verify retrieval and enforcement of 5G policy rules from converged PCF+PCRF</li> <li>d. Validate QoS flows and policy decisions</li> </ol> </li> <li>4. Unified Policy Data Consistency <ol style="list-style-type: none"> <li>a. Compare policy rules applied in LTE and 5G sessions for the same subscriber</li> <li>b. Modify subscriber policy administratively</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>c. Verify updated policy is consistently applied across both RATs</li> </ul> <p>5. Interworking &amp; Mobility Validation</p> <ul style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> <li>b. Verify continuity of policy enforcement without reauthorization issues</li> <li>c. Trigger NR → LTE mobility</li> <li>d. Confirm policy data remains unified and correctly applied</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged PCF+PCRF node shall successfully provide unified policy-related data for both LTE and 5G subscribers, ensuring consistent policy enforcement and accessibility to converged core nodes across interworking scenarios.

1. Test No.	<b>GR_TSTP_2.2.4.2</b>
2. Test Details	To verify that converged node shall support hybrid access wherein N7 can support Gx traffic based on the availability of SMF+PGW-C for LTE & 5G services.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged PCF+PCRF Emulator, SMF+PGW-C Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Policy Node Initialization <ol style="list-style-type: none"> <li>a. Deploy converged PCF+PCRF node</li> <li>b. Initialize the EPC Nodes(MME, PGW-C)</li> <li>c. Initialize the 5G Network Functions (AMF, SMF)</li> <li>d. Deploy converged SMF+PGW-C node</li> <li>e. Enable N7 and Gx interfaces on converged policy node</li> </ol> </li> <li>2. LTE Hybrid Access Verification <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Establish data session via PGW-C</li> <li>c. Verify policy control signaling over Gx interface</li> <li>d. Validate that N7 supports Gx-equivalent policy handling when using converged PCF+PCRF</li> </ol> </li> <li>3. 5G Hybrid Access Verification <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Establish PDU session via SMF</li> <li>c. Verify policy control signaling over N7 interface</li> <li>d. Confirm converged policy node handles both LTE (Gx) and 5G (N7) policy requests</li> </ol> </li> <li>4. Availability-Based Switching <ol style="list-style-type: none"> <li>a. Simulate unavailability of SMF+PGW-C</li> <li>b. Verify fallback or alternate handling of policy signaling via available interface</li> <li>c. Restore SMF+PGW-C and confirm normal hybrid access operation</li> </ol> </li> <li>5. Interworking &amp; Mobility Validation</li> </ol>

	<ul style="list-style-type: none"> <li>a. Trigger LTE ↔ NR mobility</li> <li>b. Verify policy continuity across hybrid access</li> <li>c. Confirm no policy enforcement inconsistency during access switching</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged node shall successfully support hybrid access, enabling N7 to support Gx-based policy control depending on the availability of SMF+PGW-C, ensuring consistent policy enforcement for LTE and 5G services.

1. Test No.	<b>GR_TSTP_2.2.4.3</b>
2. Test Details	To verify that the converged node shall have the N15 interface towards the AMF.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (if applicable), Converged PCF+PCRF Emulator, AMF Emulator, UE/UE Simulator, gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Policy Node Initialization <ol style="list-style-type: none"> <li>a. Deploy converged PCF+PCRF node</li> <li>b. Initialize the 5G Network Functions nodes (AMF, SMF, UPF)</li> <li>c. Configure N15 interface between converged PCF+PCRF and AMF</li> </ol> </li> <li>2. N15 Interface Configuration <ol style="list-style-type: none"> <li>a. Establish N15 connectivity between AMF and converged node</li> <li>b. Verify capability exchange and interface readiness</li> <li>c. Confirm successful registration of PCF services with AMF</li> </ol> </li> <li>3. Policy Interaction via N15 <ol style="list-style-type: none"> <li>a. Initiate UE registration via gNB emulator</li> <li>b. Verify AMF triggers policy-related interactions over N15</li> <li>c. Confirm converged PCF+PCRF responds correctly to AMF requests</li> </ol> </li> <li>4. Failure &amp; Recovery Scenario <ol style="list-style-type: none"> <li>a. Simulate temporary N15 interface failure</li> <li>b. Verify retry and recovery mechanisms</li> <li>c. Restore N15 interface and confirm normal operation</li> </ol> </li> </ol>
6. Test Limits	NA
7. Expected Results	The converged node successfully support the N15 interface towards the AMF, enabling correct policy-related signaling and interaction during UE registration, mobility, and service continuity.



1. Test No.	<b>GR_TSTP_2.2.4.4</b>
2. Test Details	To verify that the converged node shall have the N28 interface towards the CHF.
3. Test Instruments Required	PC/Laptop, LAN cables, 5G Core Emulator, EPC Emulator (if applicable), Converged PCF+PCRF Emulator, CHF Emulator, UE/UE Simulator, gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core, Policy and Charging Initialization <ol style="list-style-type: none"> <li>a. Deploy converged PCF+PCRF node</li> <li>b. Initialize the 5G Network Functions (AMF, SMF, UPF)</li> <li>c. Deploy and configure CHF</li> <li>d. Configure N28 interface between converged PCF+PCRF and CHF</li> </ol> </li> <li>2. N28 Interface Configuration <ol style="list-style-type: none"> <li>a. Establish N28 connectivity between converged node and CHF</li> <li>b. Verify capability exchange and interface readiness</li> <li>c. Confirm that charging and policy interaction over N28 is supported and operational.</li> </ol> </li> <li>3. Charging Interaction Verification <ol style="list-style-type: none"> <li>a. Attach the UE over NR using a gNB emulator.</li> <li>b. Establish a PDU session</li> <li>c. Verify charging-related policy information exchange over N28</li> <li>d. Confirm CHF receives required charging triggers and information</li> </ol> </li> <li>4. Policy and Charging Consistency <ol style="list-style-type: none"> <li>a. Trigger service usage events generating charging records</li> <li>b. Verify consistency between policy enforcement and charging information</li> <li>c. Validate correct reporting to CHF via N28</li> </ol> </li> <li>5. Failure &amp; Recovery Validation <ol style="list-style-type: none"> <li>a. Simulate temporary N28 interface failure</li> </ol> </li> </ol>

	<p>b. Verify retry, buffering, or fallback behavior as per configuration</p> <p>c. Restore N28 interface and confirm normal operation</p>
6. Test Limits	NA
7. Expected Results	The converged node shall successfully support the N28 interface towards the CHF, enabling correct charging-related interactions and ensuring accurate and consistent charging for 5G services.

1. Test No.	<b>GR_TSTP_2.2.5.1</b>
2. Test Details	To verify that the AMF and MME shall be converged through N26 interface.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with N26 support), UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME</li> <li>b. Initialize the 5G Network Functions including AMF</li> <li>c. Configure and enable N26 interface between MME and AMF</li> </ol> </li> <li>2. N26 Interface Establishment <ol style="list-style-type: none"> <li>a. Establish SCTP association over N26</li> <li>b. Verify exchange of N26 messages between AMF and MME</li> <li>c. Confirm N26 interface readiness for mobility and context transfer</li> </ol> </li> <li>3. UE Registration and Context Transfer <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify UE context is stored and available at MME</li> <li>c. Trigger LTE → NR mobility or registration update</li> <li>d. Verify UE context transfer from MME to AMF via N26</li> </ol> </li> <li>4. Reverse Interworking Validation <ol style="list-style-type: none"> <li>a. Attach UE to NR using gNB emulator</li> <li>b. Trigger NR → LTE mobility</li> <li>c. Verify UE context transfer from AMF to MME via N26</li> </ol> </li> <li>5. Continuity and Stability Checks <ol style="list-style-type: none"> <li>a. Establish active session during mobility</li> <li>b. Verify session continuity and no loss of context</li> <li>c. Monitor N26 stability during repeated mobility cycles</li> </ol> </li> </ol>
6. Test Limits	NA

7. Expected Results	The AMF and MME shall be successfully converged via the N26 interface, enabling seamless context transfer and interworking between LTE and 5G networks with uninterrupted service continuity.
---------------------	---

1. Test No.	<b>GR_TSTP_2.2.5.2</b>
2. Test Details	To verify that the convergence of these nodes shall enable seamless mobility management and signalling continuity between EPC and 5G Core networks
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with N26 support), UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Mobility Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME</li> <li>b. Initialize the 5G Network Functions including AMF</li> <li>c. Enable convergence between AMF and MME using N26</li> </ol> </li> <li>2. Initial Registration <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify mobility context creation at MME</li> <li>c. Attach UE to 5G using gNB emulator</li> <li>d. Verify mobility context creation at AMF</li> </ol> </li> <li>3. Inter-RAT Mobility (LTE ↔ 5G) <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> <li>b. Verify signalling continuity through N26 interface</li> <li>c. Confirm seamless mobility management without re-registration</li> <li>d. Validate ongoing session continuity</li> </ol> </li> <li>4. Reverse Mobility (NR → LTE) <ol style="list-style-type: none"> <li>a. Trigger NR → LTE mobility</li> <li>b. Verify context transfer and signalling continuity</li> <li>c. Ensure no session interruption</li> </ol> </li> <li>5. Stress and Stability Validation <ol style="list-style-type: none"> <li>a. Perform repeated LTE ↔ NR mobility cycles</li> <li>b. Monitor signalling messages and latency</li> <li>c. Confirm stability of mobility management functions</li> </ol> </li> </ol>
6. Test Limits	NA

7. Expected Results	The convergence of AMF and MME shall enable seamless mobility management and uninterrupted signalling continuity between EPC and 5G Core networks during inter-RAT mobility.
---------------------	--

1. Test No.	<b>GR_TSTP_2.2.5.3</b>
2. Test Details	To verify that the convergence shall support the S1-MME interface towards eNodeB (LTE) and the N2 interface towards gNodeB (5G).
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with convergence), UE/UE Simulator, eNB Emulator, gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Interface Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME</li> <li>b. Initialize the 5G Network Functions nodes including AMF</li> <li>c. Deploy converged AMF+MME node or enable convergence between AMF and MME</li> <li>d. Configure S1-MME interface towards eNodeB</li> <li>e. Configure N2 interface towards gNodeB</li> </ol> </li> <li>2. S1-MME Interface Verification (LTE) <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify S1-AP signaling between eNodeB and converged AMF+MME/MME</li> <li>c. Confirm successful UE attach and context establishment</li> <li>d. Validate mobility-related signaling over S1-MME</li> </ol> </li> <li>3. N2 Interface Verification (5G) <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Verify NG-AP signaling over N2 between gNodeB and converged AMF+MME/AMF</li> <li>c. Confirm successful 5G registration and context establishment</li> <li>d. Validate mobility and session management signaling over N2</li> </ol> </li> <li>4. Inter-RAT Interworking Validation <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>b. Verify continued support of S1-MME and N2 signaling during mobility</li> <li>c. Trigger NR → LTE mobility</li> <li>d. Confirm correct signaling handling on respective interfaces</li> </ul> <p>5. Stability and Continuity Checks</p> <ul style="list-style-type: none"> <li>a. Perform repeated LTE and 5G attach/detach cycles</li> <li>b. Monitor S1-MME and N2 signaling stability</li> <li>c. Ensure no signaling failure or degradation</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged AMF/MME shall successfully support the S1-MME interface towards the eNodeB and the N2 interface towards the gNodeB, ensuring correct signaling, mobility handling, and seamless interworking between LTE and 5G networks.

1. Test No.	<b>GR_TSTP_2.2.5.4</b>
2. Test Details	To verify that the convergence shall support the N11 interface towards SMF and the S11 interface towards SGW-C for session management
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with convergence), SMF Emulator, SGW-C Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Control-Plane Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME and SGW-C</li> <li>b. Initialize the 5G Network Functions nodes including AMF and SMF</li> <li>c. Deploy converged AMF+MME node or enable AMF–MME convergence</li> <li>d. Configure S11 interface between MME and SGW-C</li> <li>e. Configure N11 interface between AMF and SMF</li> </ol> </li> <li>2. S11 Interface Verification (LTE Session Management) <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Establish EPS bearer and verify S11 signaling between MME and SGW-C</li> <li>c. Validate Create/Modify/Delete Session procedures over S11</li> <li>d. Confirm successful LTE session establishment</li> </ol> </li> <li>3. N11 Interface Verification (5G Session Management) <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Establish PDU session and verify N11 signaling between AMF and SMF</li> <li>c. Validate session establishment, modification, and release procedures</li> <li>d. Confirm successful PDU session setup</li> </ol> </li> <li>4. Interworking &amp; Mobility Validation <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>b. Verify session continuity with signaling over S11 and N11 as applicable</li> <li>c. Trigger NR → LTE mobility</li> <li>d. Confirm correct session handling without re-establishment failures</li> </ul> <p>5. Stability and Consistency Checks</p> <ul style="list-style-type: none"> <li>a. Perform repeated session create/modify/release operations</li> <li>b. Monitor S11 and N11 signaling stability</li> <li>c. Ensure no signaling errors or session inconsistencies</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged AMF/MME shall successfully support the N11 interface towards the SMF and the S11 interface towards the SGW-C, enabling correct and seamless session management across LTE and 5G Core networks.

1. Test No.	<b>GR_TSTP_2.2.5.5</b>
2. Test Details	To verify that the convergence shall enable unified handling of UE registration, authentication, and mobility procedures across both LTE and 5G access networks.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with convergence), Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Subscriber Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME and HSS</li> <li>b. Initialize the 5G Network Functions nodes including AMF and UDM</li> <li>c. Deploy converged AMF+MME and converged HSS+UDM nodes</li> <li>d. Configure unified subscriber profiles for LTE and 5G</li> </ol> </li> <li>2. Unified Registration Verification <ol style="list-style-type: none"> <li>a. Attach UE to LTE using eNB emulator</li> <li>b. Verify registration handled by converged AMF+MME</li> <li>c. Validate authentication via converged HSS+UDM</li> <li>d. Attach UE to 5G using gNB emulator</li> <li>e. Verify unified registration handling by converged AMF+MME</li> </ol> </li> <li>3. Authentication Consistency Validation <ol style="list-style-type: none"> <li>a. Verify authentication vectors are generated and consumed consistently</li> <li>b. Confirm security context reuse across LTE and 5G</li> <li>c. Validate successful authentication without duplicate procedures</li> </ol> </li> <li>4. Unified Mobility Handling <ol style="list-style-type: none"> <li>a. Trigger LTE → NR mobility</li> <li>b. Verify seamless context transfer and mobility management</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>c. Confirm no re-authentication is required unnecessarily</li> <li>d. Trigger NR → LTE mobility</li> <li>e. Validate continuity of registration and security context</li> </ul> <p>5. Stress and Stability Testing</p> <ul style="list-style-type: none"> <li>a. Perform repeated registration, authentication, and mobility cycles</li> <li>b. Monitor signaling load and response times</li> <li>c. Ensure no registration failures or context inconsistencies</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged system shall enable unified handling of UE registration, authentication, and mobility across LTE and 5G access networks, ensuring seamless interworking and consistent subscriber experience.

1. Test No.	<b>GR_TSTP_2.2.5.6</b>
2. Test Details	To verify that the convergence shall support interaction with UDM and HSS for unified subscriber data access and authentication.
3. Test Instruments Required	PC/Laptop, LAN cables, EPC Emulator, 5G Core Emulator, Converged AMF+MME Emulator (or AMF & MME with convergence), Converged HSS+UDM Emulator, UE/UE Simulator, eNB/gNB Emulator
4. Test Setup	TEST SETUP 1
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Core and Subscriber Data Initialization <ol style="list-style-type: none"> <li>a. Initialize the EPC Nodes including MME and HSS</li> <li>b. Initialize the 5G Network Functions nodes including AMF and UDM</li> <li>c. Deploy converged AMF+MME and converged HSS+UDM nodes</li> <li>d. Configure unified subscriber database accessible to both EPC and 5GC</li> </ol> </li> <li>2. LTE Authentication and Data Access <ol style="list-style-type: none"> <li>a. Attach the UE to LTE using an eNB emulator.</li> <li>b. Verify that the UE is authenticated using subscriber data from the converged HSS/UDM.</li> <li>c. Confirm successful LTE registration using the unified subscriber profile.</li> </ol> </li> <li>3. 5G Authentication and Data Access <ol style="list-style-type: none"> <li>a. Attach UE to 5G using gNB emulator</li> <li>b. Verify authentication and subscription data retrieval from UDM by AMF</li> <li>c. Confirm correct handling of SUPI/SUCI and security context</li> <li>d. Validate successful 5G registration</li> </ol> </li> <li>4. Unified Subscriber Data Consistency <ol style="list-style-type: none"> <li>a. Compare subscriber data used during LTE and 5G registrations.</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>b. Verify consistency of permanent and temporary subscriber information across both domains.</li> <li>c. Modify subscriber data administratively and confirm that the updates are reflected for both EPC and 5GC access.</li> </ul> <p>5. Mobility and Interworking Validation</p> <ul style="list-style-type: none"> <li>a. Trigger LTE → NR mobility for the UE.</li> <li>b. Verify continuity of subscriber data access without authentication failure.</li> <li>c. Trigger NR → LTE mobility.</li> <li>d. Confirm unified subscriber data access is maintained during mobility.</li> </ul>
6. Test Limits	NA
7. Expected Results	The converged system shall successfully interact with both UDM and HSS to provide unified subscriber data access and authentication, ensuring consistent and seamless operation across LTE and 5G networks.

1. Test No.	<b>GR_TSTP_3.1</b>
2. Test Details	To verify that the following management functions shall be carried out through the corresponding OMCs: .Configuration management Fault report and alarm handling Performance supervision/management Storage of system software and data Security management
3. Test Instruments Required	OMC/EMS and all applicable network nodes (EPC / 5GC / Converged Core nodes)
4. Test Setup	OMC/EMS and all applicable network nodes
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	OMC/EMS should be operational
7. Expected Results	PASS

1. Test No.	<b>GR_TSTP_3.2</b>
2. Test Details	OMC Database
3. Test Instruments Required	OMC/EMS and all applicable network nodes
4. Test Setup	OMC/EMS and all applicable network nodes
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	OMC/EMS should be operational
7. Expected Results	PASS

1. Test No.	<b>GR_TSTP_3.3</b>
2. Test Details	OMC Generic Features
3. Test Instruments Required	OMC/EMS and all applicable network elements
4. Test Setup	OMC/EMS and all applicable network elements
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	OMC/EMS should be operational
7. Expected Results	PASS

1. Test No.	<b>GR_TSTP_4.1_A</b>
2. Test Details	To verify that the network elements (NE) shall support command Line Interface (CLI)/ Restful/ Netconf/ SNMP for configuring
3. Test Instruments Required	Network Elements (NE), OMC/EMS
4. Test Setup	Network Elements connected to OMC/EMS
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for CLI, RESTful, NETCONF and SNMP based configuration and management is available.

1. Test No.	<b>GR_TSTP_4.1_B</b>
2. Test Details	To verify that the network elements (NE) shall support Micro service-based architecture. Micro service-based architecture.
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE)
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for microservice-based architecture is available.

1. Test No.	<b>GR_TSTP_4.1_C</b>
2. Test Details	To verify that the network elements (NE) shall support Different redundancy model (i.e. Active-Active, Active-Standby, N-Way Active) for each type of microservices
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE)
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for different redundancy models (Active-Active, Active-Standby, and N-Way Active) for microservices is available.

1. Test No.	<b>GR_TSTP_4.1_D</b>
2. Test Details	To verify that the 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
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE)
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Capability to store and retrieve security-related information (including access levels, login details, and password aging data) is available.

1. Test No.	<b>GR_TSTP_4.1_E</b>
2. Test Details	To verify that the network elements (NE) shall support Modularity and have a distributed architecture
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE)
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for modular design and distributed architecture is available

1. Test No.	<b>GR_TSTP_4.1_F</b>
2. Test Details	To verify that the Network Elements (NE) shall support implementation on carrier-class servers and/or cloud environments.
3. Test Instruments Required	Network Elements (NE), Carrier-class server / Cloud platform (as applicable), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE) deployed on carrier-class server and/or cloud environment
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for implementation on carrier-class server and/or cloud environment is available.

1. Test No.	<b>GR_TSTP_4.1_G</b>
2. Test Details	To verify that the Network Elements (NE) Software executable (patch) upgrade with / without configuration migration
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements (NE)
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for software executable (patch) upgrade with and without configuration migration is available.

1. Test No.	<b>GR_TSTP_4.2</b>
2. Test Details	To verify that the Virtualised solution on generic COTS hardware or shall support Cloud Integration.
3. Test Instruments Required	Network Elements (NE), Generic COTS hardware / Cloud platform (as applicable), OMC/EMS (if applicable)
4. Test Setup	Virtualised Network Elements deployed on generic COTS hardware and/or cloud environment
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for virtualised deployment on generic COTS hardware with cloud integration is available.

1. Test No.	<b>GR_TSTP_4.3</b>
2. Test Details	To verify that the NEs shall allow the independent scaling of the microservices.
3. Test Instruments Required	Network Elements (NE), OMC/EMS or orchestration platform (if applicable)
4. Test Setup	Network Elements deployed in virtualised / cloud environment
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Support for independent scaling of microservices is available.

1. Test No.	<b>GR_TSTP_4.4</b>
2. Test Details	To verify that the Dual Core system shall guarantee carrier-grade 99.999% system availability and avoid any Single Point of Failure
3. Test Instruments Required	Dual Core system components (EPC / 5GC / Converged nodes), OMC/EMS (if applicable)
4. Test Setup	Dual Core system deployed with redundancy and high-availability configuration
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Dual Core system should be operational
7. Expected Results	Carrier-grade availability (99.999%) and absence of Single Point of Failure are supported in the Dual Core system architecture.

1. Test No.	<b>GR_TSTP_4.5</b>
2. Test Details	To verify that the applications shall support different deployment options e.g. Metal server or container infrastructure
3. Test Instruments Required	Applications under test, Bare-metal server and/or container infrastructure (as applicable), OMC/EMS (if applicable)
4. Test Setup	Applications deployed on bare-metal server and/or container infrastructure
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Applications should be operational
7. Expected Results	Support for multiple deployment options, including bare-metal servers and container-based infrastructure, is available.

1. Test No.	<b>GR_TSTP_4.6</b>
2. Test Details	To verify that no single failure of any module within the NE, shall lead to total disruption of service of that NE. Such failure shall also lead to minimum possible degradation of performance
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements deployed with redundancy and high-availability configuration
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Single module failure does not cause total service disruption of the Network Element, and only minimal performance degradation is observed as per the supported architecture.

1. Test No.	<b>GR_TSTP_4.7</b>
2. Test Details	To verify that the network elements 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
3. Test Instruments Required	Network Elements (NE), OMC/EMS or orchestration platform (if applicable)
4. Test Setup	Network Elements deployed in a virtualized / cloud-native environment with orchestration support
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	Capability for scale-in and scale-out based on KPI thresholds and support for VNF/CNF lifecycle management (instantiation and termination, manual and automatic) is available.

1. Test No.	<b>GR_TSTP_4.8</b>
2. Test Details	To verify that 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
3. Test Instruments Required	Network Elements (NE), OMC/EMS (if applicable)
4. Test Setup	Network Elements connected to OMC/EMS
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	Network Elements should be operational
7. Expected Results	The system supports creation, modification, and deletion of command classes and provides role-based access privileges (read-only, write, import, export) for users or groups.

1. Test No.	<b>GR_TSTP_4.9</b>
2. Test Details	To verify that the VNF/CNF shall maintain the feature parity with native solution
3. Test Instruments Required	VNF/CNF solution, Native solution (as applicable), OMC/EMS, Supporting technical documentation
4. Test Setup	VNF/CNF and native solutions deployed in their respective supported environments
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	VNF/CNF and native solutions should be operational
7. Expected Results	The VNF/CNF solution demonstrates feature parity with the native solution, with no loss of mandatory functionality as per supported specifications and vendor documentation.

1. Test No.	<b>GR_TSTP_4.10</b>
2. Test Details	To verify that the VNF/CNF shall include application-level fault tolerance on compute, storage and network.
3. Test Instruments Required	VNF/CNF under test, Virtualised / Cloud infrastructure, OMC/EMS or Orchestration platform (if applicable)
4. Test Setup	VNF/CNF deployed on virtualised or cloud infrastructure with redundancy enabled for compute, storage, and network resources.
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Verify through architecture, design documents, and vendor undertaking that application-level fault tolerance mechanisms are implemented for compute, storage, and network layers.</li> <li>2. Bring the VNF/CNF to normal operational state.</li> <li>3. Introduce a failure condition (one at a time) such as: <ol style="list-style-type: none"> <li>a. Compute instance failure</li> <li>b. Storage access disruption</li> <li>c. Network connectivity disruption</li> </ol> </li> <li>4. Observe system behavior using OMC/EMS or orchestration platform.</li> <li>5. Verify that the application continues to operate using redundancy or recovery mechanisms without total service disruption.</li> </ol>
6. Test Limits	VNF/CNF should be operational prior to fault simulation.
7. Expected Results	The VNF/CNF demonstrates application-level fault tolerance for compute, storage, and network failures, ensuring continuity of service without complete disruption.

1. Test No	<b>GR_TSTP_4.11</b>
2. Test Details	To Verify that the NE may support Secure File Transfer Protocol like SFTP and SSH for login
3. Test Instruments Required	Network Element (NE), PC/Laptop, Secure Shell (SSH) client, SFTP client
4. Test Setup	TEST SETUP X
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Verify through vendor documentation and undertaking that the NE supports SSH and SFTP.</li> <li>2. Configure management access credentials on the NE.</li> <li>3. Attempt login to the NE using SSH from a client system.</li> <li>4. Verify successful secure login to the NE.</li> <li>5. Perform a secure file transfer operation using SFTP (e.g., file upload/download).</li> <li>6. Verify that the file transfer is completed successfully over a secure channel.</li> </ol>
6. Test Limits	NA
7. Expected Results	The Network Element successfully supports secure login via SSH and secure file transfer using SFTP.

1. Test No	<b>GR_TSTP_4.12</b>
2. Test Details	To Verify that the NE may have their own self-diagnostic functionality to provide their health information.
3. Test Instruments Required	Network Element (NE), Supporting documentation
4. Test Setup	TEST SETUP X
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
7. Expected Results	Self-diagnostic functionality for providing health information is supported by the Network Element.

1. Test No	<b>GR_TSTP_4.13</b>
2. Test Details	To Verify that VNF/CNF shall provide and maintain Telecom Grade KPI.
3. Test Instruments Required	VNF/CNF solution, Supporting documentation
4. Test Setup	VNF/CNF deployed in its supported environment
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	VNF/CNF should be operational
7. Expected Results	The VNF/CNF provides and maintains telecom-grade KPIs as per supported specifications and vendor documentation

1. Test No	<b>GR_TSTP_4.14</b>
2. Test Details	To Verify that VNF/CNF shall be agnostic to all 3GPP access types
3. Test Instruments Required	VNF/CNF solution, Supporting documentation
4. Test Setup	VNF/CNF deployed in its supported environment
5. Test Procedures	Undertaking plus Supporting documentation
6. Test Limits	NA
7. Expected Results	The VNF/CNF is agnostic to all 3GPP access types as per supported specifications and vendor documentation.

1. Test No	<b>GR_TSTP_4.15</b>
2. Test Details	To Verify that for security purpose, all components of Virtualized System, e.g. MANO, VNF/CNF depository etc. shall be hosted in India only
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	Not applicable
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
7. 7. Expected Results	All components of the virtualized system, including MANO and VNF/CNF repositories, are hosted within India as per vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_4.16</b>
2. Test Details	To Verify that the VNF/CNF shall meet availability requirements as envisaged in this GR
3. Test Instruments Required	VNF/CNF solution, Supporting documentation
4. Test Setup	VNF/CNF deployed in its supported environment
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
7. Expected Results	The VNF/CNF meets the availability requirements as specified in this GR, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_4.17</b>
2. Test Details	To Verify that the system shall support mechanisms for system recovery and disaster recovery.
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	Not applicable
5. Test Procedure	Undertaking plus Supporting documentation, including recovery and disaster recovery architecture, procedures, and supported mechanisms.
6. Test Limits	NA
7. Expected Results	The system supports system recovery and disaster recovery mechanisms as per the GR, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_4.18</b>
2. Test Details	To Verify that the system shall support scalability features to accommodate varying demands in disaster and temporary deployments efficiently
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	NA
5. Test Procedure	Undertaking plus Supporting documentation, including scalability architecture and supported mechanisms for disaster and temporary deployments.
6. Test Limits	NA
7. Expected Results	The system supports scalability features to handle varying demand in disaster and temporary deployment scenarios, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_4.19</b>
2. Test Details	To Verify that the control software shall be responsible for logging and sending the log file on the network to a designated server (such as syslog or any other).
3. Test Instruments Required	Network Element (NE), Log server (Syslog or equivalent), PC/Laptop, Network connectivity
4. Test Setup	TEST SETUP X
5. Test Procedure	<ol style="list-style-type: none"> <li>1. Configure the Network Element (NE) to forward logs to the designated log server (e.g. syslog server).</li> <li>2. Bring the NE to an operational state.</li> <li>3. Trigger log-generating events such as configuration changes, service start/stop, or alarm conditions</li> </ol>
6. Test Limits	NA
7. Expected Results	The control software successfully generates logs and transmits them to the designated log server over the network..

1. Test No	<b>GR_TSTP_4.20</b>
2. Test Details	To Verify that the NEs may be capable of providing the system configuration data to the Management Information Base (MIB) of the system (applicable with SNMP based management only)
3. Test Instruments Required	Network Element (NE), SNMP Manager / SNMP client, PC/Laptop, Network connectivity
4. Test Setup	TEST SETUP X
5. Test Procedure	<ol style="list-style-type: none"> <li>2. Configure SNMP on the Network Element and SNMP Manager.</li> <li>3. Ensure the NE is operational and reachable via SNMP.</li> <li>4. Perform SNMP query (GET/GET-NEXT) from the SNMP Manager to retrieve system configuration-related objects from MIB.</li> <li>5. Observe the responses returned by the NE for the requested MIB objects.</li> <li>6. Verify that the retrieved MIB data correctly represents the current system configuration of the NE.</li> </ol>
6. Test Limits	NA
7. Expected Results	<ol style="list-style-type: none"> <li>1. The NE successfully responds to SNMP queries from the SNMP Manager.</li> <li>2. System configuration data is correctly exposed through the relevant MIB objects.</li> <li>3. The information retrieved from the MIB is accurate, complete, and consistent with the actual NE configuration.</li> <li>4. No errors or access violations are observed during SNMP-based management operations.</li> </ol>

1. Test No	<b>GR_TSTP_5.1</b>
2. Test Details	Software Requirements
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	Not applicable
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
7. Expected Results	The software requirements as specified in the GR are supported, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_5.2</b>
2. Test Details	Software Maintenance Requirements
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	Not applicable
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
Expected Results	The software maintenance requirements as specified in the GR are supported, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_5.3</b>
2. Test Details	Documentation
3. Test Instruments Required	Supporting documentation, Vendor undertaking
4. Test Setup	TEST SETUP 1
5. Test Procedure	Undertaking plus Supporting documentation
6. Test Limits	NA
7. Expected Results	The required documentation as specified in the GR is provided and supported, as evidenced through vendor undertaking and supporting documentation.

1. Test No	<b>GR_TSTP_5.4</b>
2. Test Details	Quality Requirements
3. Test Instruments Required	Supporting documentation, Certificates, Vendor undertaking
4. Test Setup	TEST SETUP 7
5. Test Procedure	Undertaking plus Supporting documentation, including: <ol style="list-style-type: none"> <li>1. MTBF calculation report as per applicable standards</li> <li>2. ISO 9001:2015 (or equivalent) certification</li> <li>3. Quality assurance plan</li> <li>4. Environmental compliance certificates/reports (where applicable)</li> </ol>
6. Test Limits	NA
7. Expected Results	The manufacturer provides valid MTBF data, quality certifications, quality assurance plan, and environmental compliance evidence in accordance with the requirements specified in the GR.

**J. Summary of Test Results:**

**GR/IR No.**

**TSTP No.** \_\_\_\_\_

**Equipment name & Model No.** \_\_\_\_\_

<b>Clause No.</b>	<b>Compliance</b> <i>(Complied /Not Complied / Submitted/Not Submitted / Not Applicable)</i>	<b>Remarks / Test Report Annexure No.</b>

*[Add as per requirement]*

**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 along with Form-A. The Authorised signatory shall be the same as the one for Form 'A'.**