

## **NGN Control Lab**

Telecommunication Engineering Centre (TEC), Janpath, New Delhi has set up a state-of-art world class NGN Control Lab (Mobile Core & IMS Testing Lab or Network Core Testing Lab) which is conceptualized as a test bed for a host of devices under test (DUT) and test equipment offered by clients.

2. Test facilities available in aforesaid test lab may be availed by OEM and/or their Channel Partners/Developers/R&D Institutes/Students/Research Scholars/Startups etc. free of cost for three months from 12.11.2021.

3. **Scope of the Lab:** The capabilities of the lab are as follows:-

- A. Wireless Core testing comprising of complete LTE Core Network testing or testing of individual elements within the Core Network(e.g. MME, SGW, PGW, PCRF and other related nodes.)
- B. Complete IMS Network testing or testing of individual elements within the IMS Network (E.g: P-CSCF, S-CSCF, I-CSCF, SBC, HSS, Media GW, Tr GW and other related nodes;)
- C. End-to-End testing including wireless core + IMS testing;
- D. Testing of services such as Data, Video, VoLTE, SIP session for Wi-Fi Calling;
- E. Diameter testing: The test solution also ensures testing of diameter based interfaces.

4. **Typical Test Scenarios:**

- A. E2E testing of whole EPC;
- B. Individual node based testing & emulation of all nodes in EPC;
- C. E2E testing of IMS Core; Individual node based testing & emulation of all nodes in IMS;
- D. Support for inter-operability testing of LTE, IMS and traditional 3G, 2G networks;
- E. E2E testing of EPC+IMS; MME testing; SGW testing; SBC testing; P/S/I-CSCF testing; Media GW Tests;

5. **Types of test covered:**

- A. Conformance and Functional
- B. Negative Test

### C. Interoperability Tests

### D. Capacity and Performance tests

6. The Lab is capable of testing the different elements of the Core Networks (e.g. MME, SGW, PGW etc.) and the IMS (e.g. SBC, P/S/I-CSCF, HSS, BGF, MGC etc.) by simulating all the surrounding elements. The elements could be tested in isolation or in any combination. It can also test combo elements (e.g. MME+SGSN) to verify condensed nodes which can support both LTE and 3G in the same equipment. To replicate real network behavior, the Lab can simulate millions of subscribers/end point, thousands of network elements and is be able to generate and analyze hundreds of thousands of control plane messages per second.
7. The test system installed in the Lab comprises of Landslide Manager SPT-C100-S4 and Six Landslide servers SPT-C100-M4 connected to each other through a switch. The Landslide Test System uses a modular architecture consisting of one Landslide Manager and 6 Test Server platforms. The Landslide Manager hosts the Test Administration Server (TAS) software, which serves the user interface through the LAN, acts as the data repository, and controls overall system operations. The Landslide Test Server hosts the Test Server software, which performs the test operations. The Landslides communicate with the Device under Test (DUTs) via an Ethernet LAN or a direct Ethernet connection.



Fig 1: Control Lab Set-up

## 8. How DUTs are tested in the Lab:

The test applications comprising MME, SGW, PGW, IMS, HSS, PCRF etc. can test specific wireless technologies or networks, and control test operations:

- Emulate the devices necessary to complete a network configuration
- Generate control and bearer plane traffic to the Device Under Test (DUT)
- Process and respond to the traffic received from the DUT
- Report test measurements to the TAS.

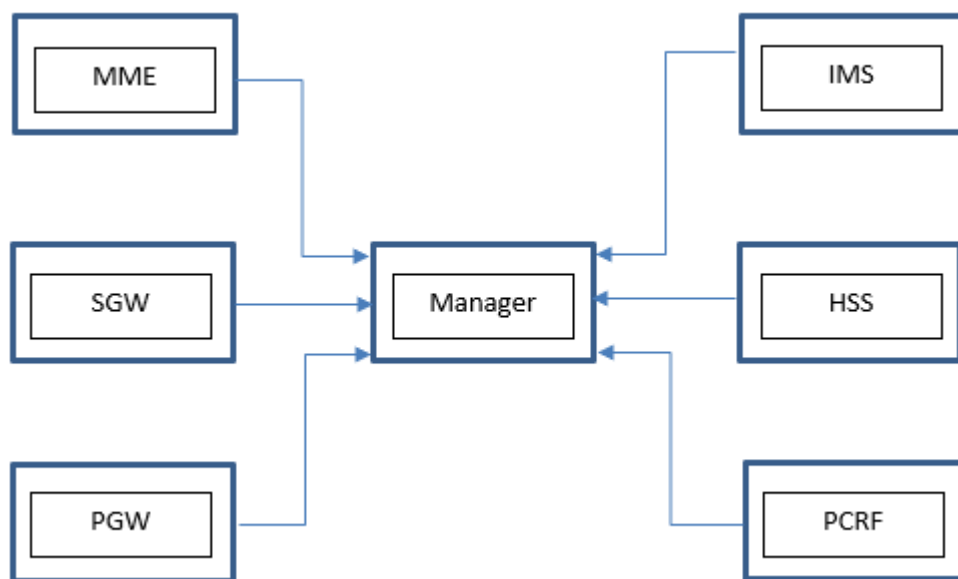


Fig 2: Applications at a glance

**Important stake holders:** TEC offers its Control Lab Testing facility to all stakeholders (OEM and/or their Channel Partners/Developers/R&D Institutes/Students/Research Scholars/Startups etc. For any further queries, you may send mail to the [dircl.tec@gov.in](mailto:dircl.tec@gov.in).

## GLOSSARY

**LTE (Long Term Evolution):** LTE is an evolved technology based on 3GPP standards developed to promote an *evolved* 3GPP packet system accessible from multiple access technologies that supports higher data rates, lower latency, and an all-IP network.

**DUT (Device under test):** A DUT is a device that is tested to determine performance.

**EPC (Evolved packet core):** The EPC is the latest evolution of the 3GPP core network architecture.

**MME (Mobility Management Entity):** The MME is the key control-node for the LTE access-network. It is responsible for Idle mode UE tracking and paging procedure including re-transmissions. It is involved in the bearer activation/deactivation process and is also responsible for choosing the Security Gateway (SGW) for a UE at the initial attach. MME is also responsible for authenticating the user (by interacting with the HSS).

**SGW (Serving Gateway):** The SGW routes and forwards user data packets. During inter-eNodeB handover, SGW acts as the mobility anchor for the user plane and also acts as an anchor for mobility between LTE technology and other 3GPP technologies (terminating S4 interface and relaying the traffic between 2G/3G systems and PDN GW).

**PGW (PDN Gateway):** The PGW provides connectivity to the UE to external packet data networks by being the point of exit and entry of traffic for the UE. A UE may have simultaneous connectivity with more than one PDN GW for accessing multiple PDNs.

**PCRF (Policy and Charging Rules Function):** PCRF is the part of the Evolved Packet Core (EPC) that supports service data flow detection, policy enforcement and flow-based charging, Billing, Quality of services, Duration of call and Data Consumption.

**P-CSCF (Proxy-Call Session Control Function):** The P-CSCF is the first contact point for the users of the IP Multimedia Subsystem (IMS). The P-CSCF functions as a proxy server for the user equipment; all Session Initiation Protocol (SIP) signalling traffic to and from the user equipment must go through the P-CSCF.

**S-CSCF (Serving-Call Session Control Function):** The S-CSCF is the primary node in the IMS responsible for session control. Subscribers will be allocated a S-CSCF for the duration of their

IMS registration in order to facilitate routing of SIP messages as part of service establishment procedures.

**I-CSCF (Interrogating Call Session Control Function):** I-CSCF is the contact point at operator's network for users from that network or roamed users which are using services and are located within network operator's service area.

**SBC (Session Border Controller):** A Session Border Controller (SBC) is a network function which secures voice over IP (VoIP) infrastructures while providing interworking between incompatible signalling messages and media flows (sessions) from end devices or application servers.

**HSS (Home Subscriber Server):** The HSS is a key element of LTE and IMS core networks; it is a master user database that is stored in one single node the role of the HSS is to communicate with the network and provide subscriber profile and authentication information. The database stores information about subscribers to help in the authorization, details of devices, as well as the user's location and service information.

**Media Gateway:** A media gateway is a device used in the core network of a telecom network operator to provide transformation and interworking between media streams that use different network standards, communication protocols, codecs and physical connections, so that phone calls work properly between networks using different technologies.

**SIP:** Session Initiation Protocol

**Diameter Testing:** Diameter is a peer-to-peer protocol that provides basic services such as capability negotiation, connection and user session management, accounting, and error notification, and also provides a framework that can be extended to support various applications.

**IMS (IP Multimedia Subsystem):** The IMS gives service providers the ability to securely deliver IP multimedia services to their subscribers while maintaining full control over access to those services.

**Conformance testing:** Conformance Testing is a software testing technique used to certify that the software system complies with the standards and regulations as defined by IEEE, W3C or ETSI.

**Performance testing:** Performance testing is a testing measure that evaluates the speed, responsiveness and stability of a computer, network, software program or device under a workload.

**Functional Testing:** Functional Testing is a type of software testing that validates the software system against the functional requirements/specifications.

**Interoperability testing:** Interoperability testing is a software testing type that checks whether the software can interact with other software components and systems.

**Negative testing:** Negative testing is a method of testing an application or system that ensures that the plot of the application is according to the requirements and can handle the unwanted input and user behaviour.