Landslide for IoT Testing

Test the Internet of Things (IoT)

Key Features

Keysight's Landslide IoT testing feature set includes the following device emulation and network testing capabilities:

- High-scale fourth/fifth-generation (4G/5G) IoT device emulation with mobility as defined in CAT-M, narrowband IoT (NB-IoT), and Reduced Capability (RedCap) standards
- Power saving mode (PSM) and extended discontinuous reception (eDRX) with loose hyperframe timing
- S11-U based internet protocol (IP), non-IP data, and Diameter-based non-IP data via service capability exposure function (SCEF)
- Low access priority indicator (LAPI) for device identification in the network
- Combined IoT and non-IoT device load generation capability
- IoT-specific node testing and emulators: cellular IoT (CIoT) serving gateway node (C-SGN), S11-U based, and the IoT-enhanced home subscriber server (HSS)
- IoT-specific interfaces and protocols (non-IP data delivery [NIDD], T6a, T6b, S6t, S11-U)
- Third generation (3G) short message service (SMS) messaging-based IoT via either SGs or SGd interface
- Dedicated Core Network (DECOR) support
- Delivery of non-IP Data via Diameter and point-to-point (PtP) SGi tunnel
- IoT device and service busy hour call modeling

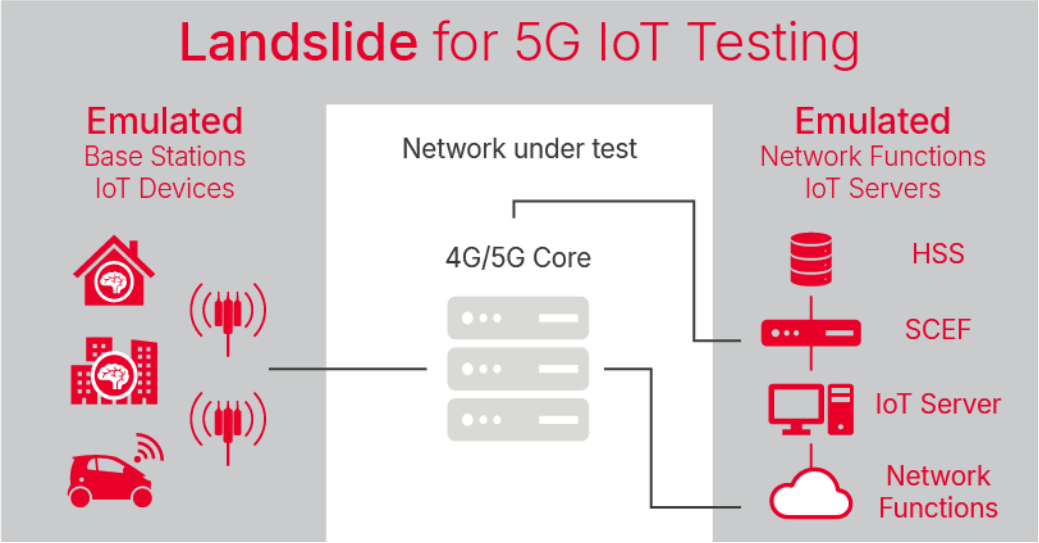

Figure 1. Landslide emulates IoT devices and tests the mobile and core IoT nodes to ensure their readiness for successful IoT networks and service rollouts

What is the Internet of Things?

The Internet of Things (IoT) connects devices, from sensors to smart systems, to deliver automated services over cellular networks. At scale, networks must support high device density, efficient resource use, and seamless operation across 4G and 5G.

Highlights:

- Confidently scale IoT deployments without risking network performance
- Deliver consistent, reliable IoT service experiences across 4G and 5G
- Reduce time to launch with faster, repeatable validation

Benefits

Landslide's IoT scale and performance enable validation of next-generation IoT deployments, emulating millions of connected devices, including CAT-M, NB-IoT, and RedCap, at rates of tens of thousands of events per second. With dynamic testing capabilities, Landslide validates infrastructure nodes in isolation and progressively expands test topologies to achieve full end-to-end validation.

Complex call models simulate devices across activation, deactivation, handovers, and data transfer scenarios, helping ensure reliable service performance. Carriers can capture live network measurements and replicate them in the lab to increase test realism and confidence.

Landslide also provides individual IoT node emulators such as short message service center (SMSC), CIoT serving gateway mode (C-SGN), SCEF, mobility management entity (MME), and HSS, enabling flexible lab setups with Third Generation Partnership Project (3GPP) compliant nodes to meet specific test objectives. It also supports SCEF validation against a fully emulated RAN and core network within a single platform.

Applications

- Generate massive scale of device connections (CAT-M, NB-IoT, RedCap or all) to the network as it is expected in IoT
- Emulate power saving mode (PSM) and extended discontinuous reception (eDRX)
- Verify compliance of IoT nodes (SMSC, C-SGN, SCEF, and HSS), in isolation prior to network integration
- Perform progressive network integration and interoperability of new nodes
- Validate performance and scale of the entire IoT infrastructure
- Compare and contrast the performance differences between CIoT control plane and CIoT user plane evolved packet system (EPS) optimization
- Analyze and monitor the quality of IoT services under real-world conditions
- Evaluate impact of IoT in current infrastructure
- Characterize traffic prioritization and resource management policies for IoT in shared networks
- Test and emulate network slicing capabilities
- Model and test busy hour scenarios
- Emulate full mobile core and IoT infrastructure for IoT platform interaction with the network

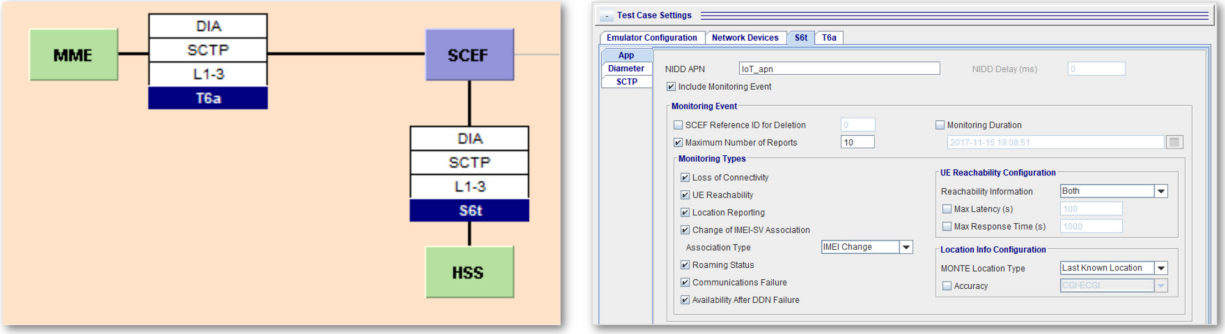

Figure 2. An example of the numerous IoT test configurations supported by Landslide, showing the emulation of an SCEF and communicating with two systems under test: the MME and the HSS

IoT-Related Specifications

- 3GPP TS 23.401 v13.7.0
- 3GPP TS 24.301 v13.6.1
- 3GPP TS 36.413 v13.3.0
- 3GPP TS 29.274 v13.6.0
- 3GPP TS 29.336 v13.4.0
- 3GPP TS 29.230 v13.3.0
- 3GPP TS 23.682 v13.6.0

Technical Specifications

- Test Activities
  - Capacity test
  - Session loading
  - Command mode/command sequencer
  - Session loading with mobility
  - Intra-LTE mobility scenarios
- IoT Node Emulators
  - C-SGN
  - HSS
  - SCEF
  - SMSC
- IoT Interfaces
  - Non-IP data delivery
  - S1-MME non-access stratum (NAS) NB-IoT data delivery
  - S6t
  - S11-U
  - T6a
  - T6b
- Landslide Test Platforms
  - Landslide C100-M6
  - Landslide C50
  - Landslide E20
  - Landslide Virtual

Ordering Information

Part number	Description
L-FT-099	**NB-IoT LTE Device and Core Emulation** Emulate NB-IoT devices with IP and non-IP-based in NAS over S1-MME. Functional tests for R13 features such as PSM and Extended DRX Mode also supported. Requires MME Emulation Feature or MME Test Features
L-FT-099-C50	**Landslide C50 NB-IoT LTE Device and Core Emulation** Emulate NB-IoT devices with IP and non-IP-based in NAS over S1-MME. Functional tests for R13 features such as PSM and Extended DRX Mode also supported
L-FT-100	**NB-IoT Diameter Interfaces and SCEF Emulation** Emulate SCEF Node and provide NB-IoT Diameter interfaces
L-FT-100-C50	**Landslide C50 NB-IoT Diameter Interfaces and SCEF Emulation** Emulate SCEF Node and provide NB-IoT Diameter interfaces