# Spirent **Landslide**™ **for IoT**

Testing the Internet of Things

The Internet of Things (IoT) is a new networking technology which allows devices such as sensors, computers and everyday items to connect to the cellular network and provide services with no or minimal human interaction. To ensure a successful adoption of this new technology, mobile carriers, equipment manufacturers and IoT platform providers must ensure their infrastructure can handle the IoT requirements—massive device scale, new node integration and network resources management.

Key Features

The Landslide IoT testing feature set includes the following device emulation and network testing capabilities:

- High scale 4G IoT device emulation with mobility as defined in the CAT-M and NB-IoT standards
- Power Saving Mode (PSM) and eDRX with Loose Hyperframe Timing
- S11-U based IP and Non-IP data and Diameter-based Non-IP data via 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 – CIoT Serving Gateway Node (C-SGN), Service Capability Exposure Function (SCEF) and the IoT-enhanced Home Subscriber Server (HSS)
- IoT-specific interfaces and protocols (NIDD, T6a, T6b, S6t, S11-U)
- 3G SMS messaging-based IoT via either SGs or SGd interface
- Dedicated Core Network (DECOR) support
- Delivery of Non-IP Data via Diameter and Point-Point (PtP) SGi tunnel
- IoT device and service Busy Hour call modelling
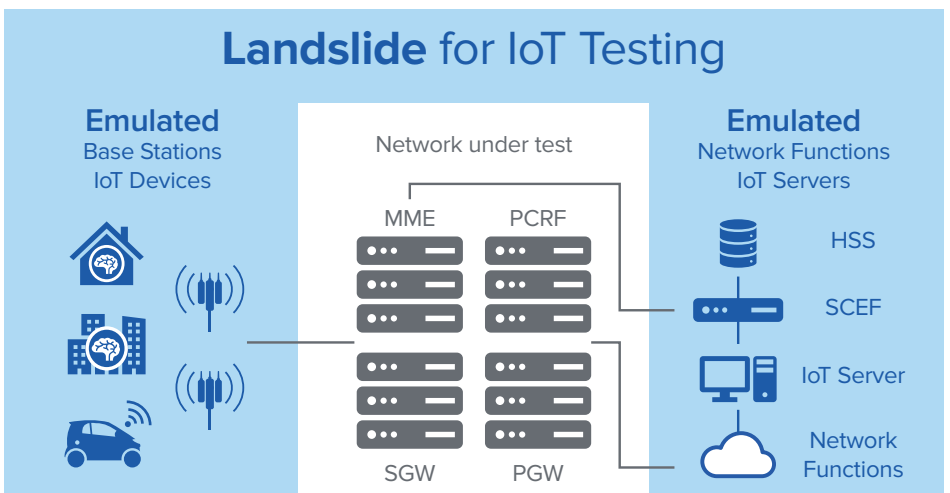
Landslide emulates IoT devices and tests the mobile and core IoT nodes to ensure their readiness for successful IoT networks and service rollouts.

Benefits

Landslide's IoT capacities and performance align with the requirements of IoT testing, being able to emulate millions of connected devices of all types communicating with the network at rates of tens of thousands of events per second. With its unique dynamic testing capability, Landslide can test all the IoT infrastructure of nodes in isolation and subsequently change the testing topology to progressively incorporate more nodes to the testbed for a full end-to-end validation.

Complex IoT call modeling scenarios can be created that include specific IoT devices in various stages of activation, deactivation, handovers and IoT data transfers. Carriers can capture measurements in the live IoT network and replicate them in the lab with Landslide for increased realism in the testbed.

In addition to the extensive IoT testing capabilities, Landslide offers individual IoT node emulators (SMSC, C-SGN, SCEF, MME, HSS). This emulation option is ideal for lab setups where a 3GPP compliant IoT node is required to complete a test objective.

Landslide also provides the means to test an SCEF against a fully emulated RAN and/or EPC all in one emulator.

Applications

- Generate massive scale of device connections (CAT-M, NB-IoT or both) 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, HSS), in isolation prior to network integration
- Perform progressive network integration and interoperability of the 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 EPS optimization
- Analyze and monitor quality of IoT services under real world conditions
- Evaluate impact of IoT in current infrastructure
- Characterize traffic prioritization and resources management policies for IoT in shared networks
- Network Slicing testing and emulation
- Busy hour Call Modeling testing
- Emulate full mobile core and IoT infrastructure for IoT Platform interaction with the network

An example of the numerous IoT test configurations supported by Landslide, shows Landslide emulating an SCEF and communicating with two Systems Under Test, the MME and the HSS.
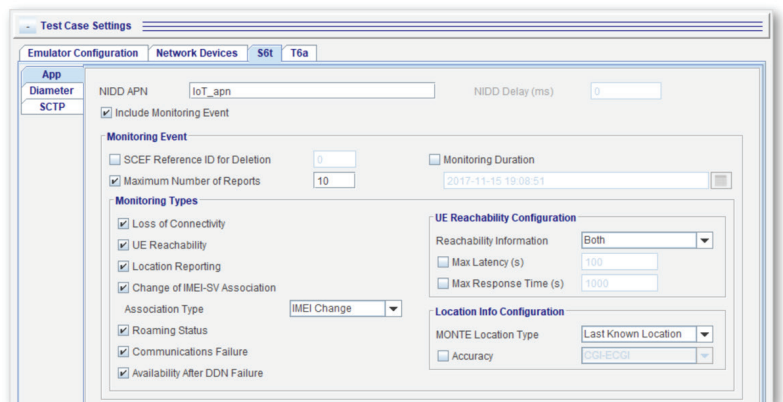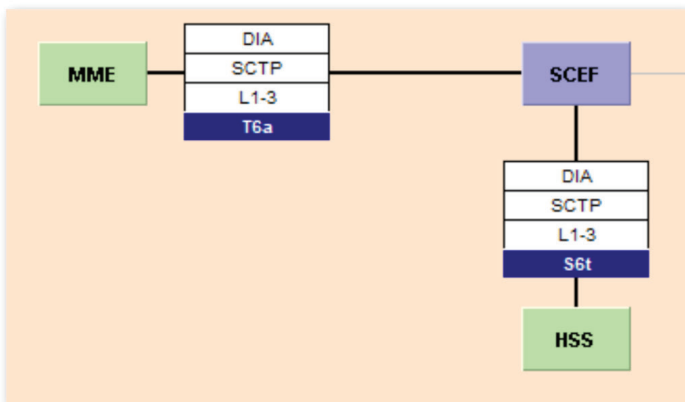
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IoT Related Specifications

- 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 NAS NB-IoT Data delivery
  - S6t
  - S11-U
  - T6a
  - T6b

- Landslide Test Platforms
  - Landslide C100-M4
  - Landslide C50
  - Landslide E10
  - Landslide Virtual

Ordering Information

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