# Spirent Landslide™ for ORAN CU Testing

Open RAN (ORAN) architecture disaggregates and splits traditional RAN into CU (Centralized Unit), DU (Distributed Unit) and RU (Radio Unit), supporting standardized open and interoperable interfaces, and allowing key functions to run as virtualized software functions on vendor-neutral hardware. This avoids single-vendor dependency by opening the architecture to multiple suppliers.

However, lack of domain maturity, coupled with an increasing push for momentum, is creating a perfect storm when it comes to ORAN. There are major challenges yet to overcome: ensuring performance & robustness, interoperability, internal preparedness to deploy & manage ORAN, new costs, and security, just to name a few.

The CU sits between the DUs and the core network. The CU handles the higher layers of the protocol stack, where the critical packet processing functions typically reside (SDAP, RRC, and PDCP). A single CU handles many DUs. CUs are also virtualized and can be deployed on inexpensive, vendor-neutral COTS hardware. Cloud deployments are also an option, which brings its own set of challenges.

Disaggregated architecture, open interfaces, virtualization, multi-vendor interworking, and cloud deployments are some of the many challenges that mandates comprehensive testing of the CU.
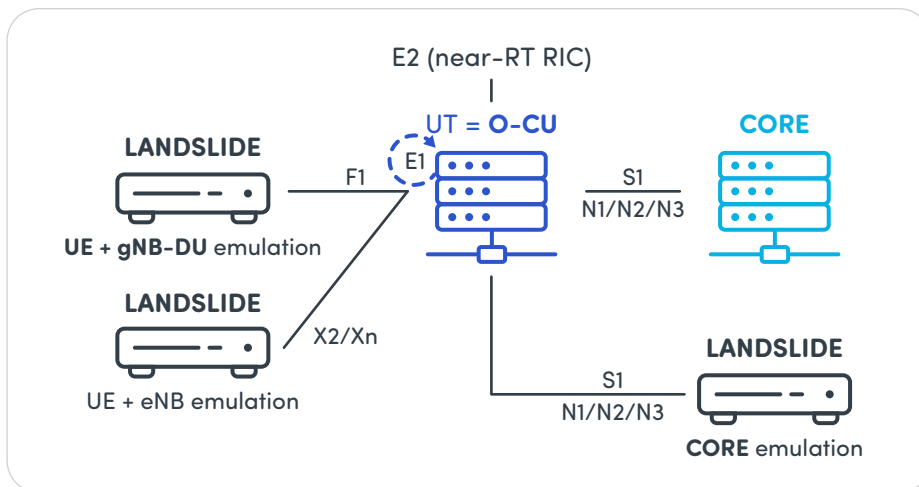
The CU can be tested in isolation, in wraparound testing mode. In this case, Landslide emulates all the network functions surrounding the CU, including DUs & UEs, Core network, eNBs/gNBs, neighboring CUs and RIC. The Core network emulation can be 5GC for SA mode or it could be the EPC for NSA mode. The CU can also be tested in an end-to-end configuration, in which case the Core network is part of the System Under Test (SUT).

Key Features

The Landslide CU Testing feature set includes the following capabilities:

- Non-standalone (NSA) and Standalone (SA) modes

- Emulation of UEs, DUs and 5GC and/or EPC to completely surround the CU being tested

- Relevant interfaces F1-C, F1-U, N1, N2, N3, S1-U, S1-MME, X2, Xn are supported

- Control plane and user plane testing

- Functional, performance & capacity testing

- Support for intra-CU & inter-CU mobility scenarios

- High performance solution that can be scaled to 1000s of emulated DUs, millions of emulated subscribers, 100s of gbps of user plane traffic

- Call modeling capabilities to shape test traffic as needed, for control and user planes

- Highly customizable, with ability to edit messages onsite as needed

- Appliance-based or virtualized deployment options, including ability to deploy on public cloud platforms

- Automation through RESTful or Tcl API

Benefits

Landslide CU testing provides a flexible, scalable, high-performance solution for comprehensively testing the CU for compliance, functionality, performance & capacity. With the need to interoperate with network functions from different vendors, compliance to the specification is of paramount importance. Often the same specification gets interpreted differently by different vendors. This often manifests itself in whether certain optional Information Elements (IE) are included or not in certain procedures. Message editing capabilities provided by Landslide empower users to quickly deal with these situations themselves. Powerful traffic modeling capabilities allow users to shape the test traffic as needed, both for the control and user planes. This enables easy replication of live network traffic conditions, patterns, and scale in the lab.

Some of the key use cases that can be addressed include:

- DU, EPC, 5GC, eNBs and gNB interoperability
- CU subscriber capacity
- CU DU capacity
- CU Performance . E.g. registration rate
- Single UE and aggregate data throughput capacity
- Real-world user plane traffic performance (such as HTTPS, QUIC and application traffic such as Facebook, YouTube, Zoom, etc.)
- Voice and video quality
- Ability to handle real world mix and scale of events, including different types of mobility events
- CU robustness for handling abnormal, non-compliant messages & scenarios
- CI/CD automation pipeline integration
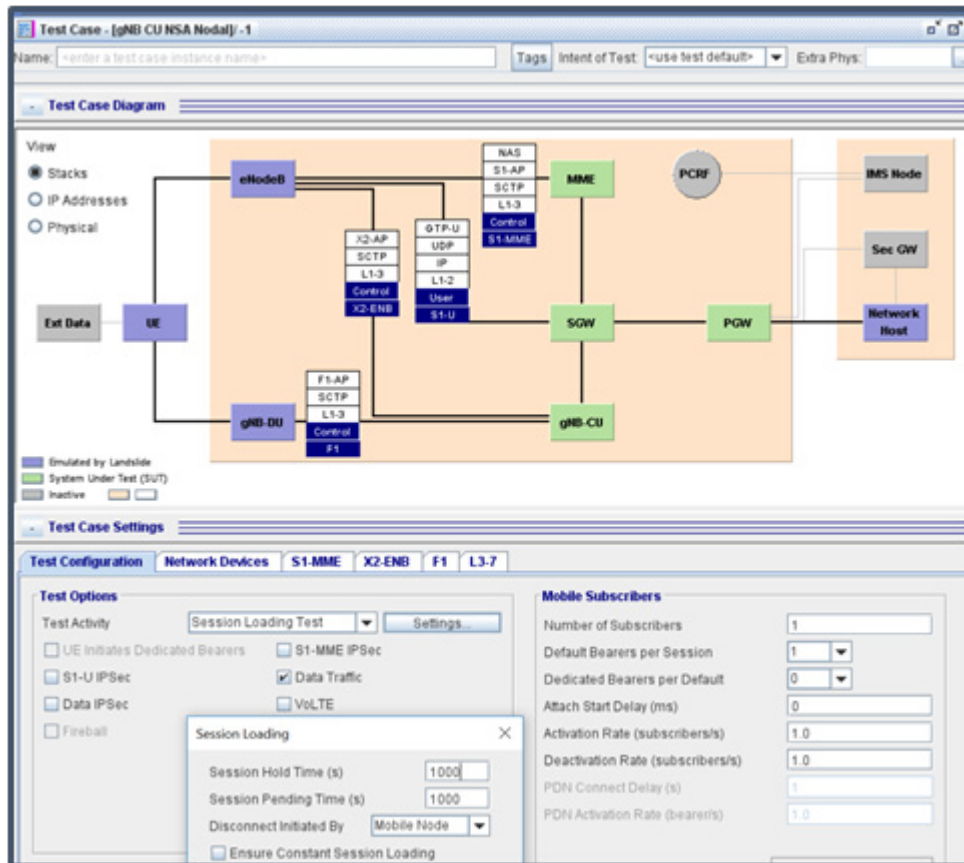
An intuitive, easy-to-use graphical interface enables quick configuration & execution of tests and analysis of test results. Landslide also provides robust automation options including RESTful & Tcl APIs.

Technical Specifications
Landslide CU Testing is compliant to Release 15 of the following 3GPP specifications:
3GPP TS 24.301 Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3
3GPP TS 24.501 Non-Access-Stratum(NAS) protocol for 5G System (5GS); Stage 3
3GPP TS 29.281 General Packet Radio System (GPRS) Tunneling Protocol User Plane (GTPv1-U)
3GPP TS 36.331 Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification
3GPP TS 36.413 Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)
3GPP TS 36.423 Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 application protocol (X2AP)
3GPP TS 37.324 E-UTRA and NR; Service Data Adaptation Protocol (SDAP) specification
3GPP TS 37.340 NR; Multi-connectivity; Overall description; Stage-2
3GPP TS 38.300 NR;NR and NG-RAN Overall Description
3GPP TS 38.323 Packet Data Convergence Protocol (PDCP) Specification
3GPP TS 38.331 Radio Resource Control (RRC) protocol specification
3GPP TS 38.401 NG-RAN; Architecture description
3GPP TS 38.413 NG-RAN; NG Application Protocol (NGAP)
3GPP TS 38.415 NG-RAN; PDU Session User Plane Protocol
3GPP TS 38.423 NG-RAN; Xn Application Protocol (XnAP)
3GPP TS 38.425 NG-RAN; NR User Plane Protocol
3GPP TS 38.473 NG-RAN; F1 Application Protocol (F1AP)

Ordering Information	
Part Number	**Description**
L-R-APP-080	LANDSLIDE RAN gNB-CU TEST APPLICATION for 5G NSA CORE (Option 3x)—Adds gNB CU testing to a Landslide C100 test system. Includes F1-C, F1-U, X2-C, X2-U RAN interfaces. Fingerprint of existing manager required.
L-R-APP-082	LANDSLIDE RAN gNB-CU TEST APPLICATION for 5G SA CORE—Adds gNB CU testing to a Landslide C100 test system. Includes F1-C, F1-U, Xn-C, Xn-U RAN interfaces. Fingerprint of existing manager required.
L-APP-053	LANDSLIDE 5G AMF CORE NODE EMULATION APPLICATION—Adds 5G AMF core node or a combined AMF+SMF core node emulation to a Landslide C100 test system. Fingerprint of existing manager required.
L-APP-055	LANDSLIDE 5G UPF CORE NODE EMULATION APPLICATION—Adds 5G UPF core node emulation to a Landslide C100 test system. Fingerprint of existing manager required.
L-FT-035	LANDSLIDE LTE CORE EMULATION—Emulates LTE MME, SGW and PDN-GW as one core unit. Provides S1-MME, S1-U and SGi interfaces. Multiple interfaces included. TAS ID or fingerprint of LS test system required.

About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information visit: **www.spirent.com**

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