



SPIRENT LANDSLIDE

MOBILE PACKET CORE PERFORMANCE TEST SYSTEM

Spirent's Landslide® Mobile Packet Core (MPC) test system is a comprehensive end-to-end performance test system that emulates millions of mobile data subscribers using various access technologies to simultaneously access the wireless network. Mobility—whether it is 2.5G/3G, LTE or “any G”, is a fact of life in today's mobile networks. Landslide has the performance and capacity to fully test inter- and intra-technology mobility—with or without user-plane data, to help ensure the best user experience possible.

Spirent's Landslide is the premier mobility test tool for MPC network testing. Building on its impressive 2.5G/3G MPC and FMC test reputation, Landslide is the performance and scalability test system of choice for mobile network equipment vendors and operators worldwide. Its strong history of testing multiple mobile technology generations and successfully enabling operators to deliver high quality 2G/3G mobile services enables Landslide to meet mobile operator's emerging needs as their networks evolve.



APPLICATIONS

Network Equipment Manufacturers

- Fully test mobility
- Characterize system before trial/delivery
- Validate system scalability
- Identify capacity limits
- Measure control-plane capacity
- Stress data-plane performance
- Automatic regression testing

Operators and Service Providers

- Multi-vendor interoperability testing
- Facilitate vendor selection
- Identify performance ceilings
- Enable accurate capacity planning
- Provide end-to-end testing
- Network planning and deployment analysis
- Validate new software before roll-out
- Test multi-generation mobility

By emulating key wireless core packet data network elements and combining control plane and data plane simulation, Landslide provides real-world emulation of millions of mobile subscribers in various stages of activation, deactivation, and hand-off between cells, all while transmitting and receiving application data.

Landslide applications include:

- LTE, MME and GW
- WiMAX (CSN and ASN-GW)
- GPRS
- UMTS
- CDMA2000
- MIPv4/MIPv6
- AAA RADIUS/Diameter
- IP Client Data
- IPSec
- CDMA Femtocell
- CDMA PCF
- WiFi Convergence—PDIF PDG
- 3GPP HNB-GW
- PCRF
- DCCA
- eHRPD

Landslide's competitively unique solution enables comprehensive nodal and end-to-end system testing by emulating millions of mobile data subscribers, simultaneously accessing the mobile packet core network. Real-world user experience emulation allows Landslide users to simultaneously test control-, data- and security-plane capacities, performance and scalability while providing complete user control of the test scenario. Extensive mobility testing between 3GPP and non-3GPP mobile access technologies is supported.

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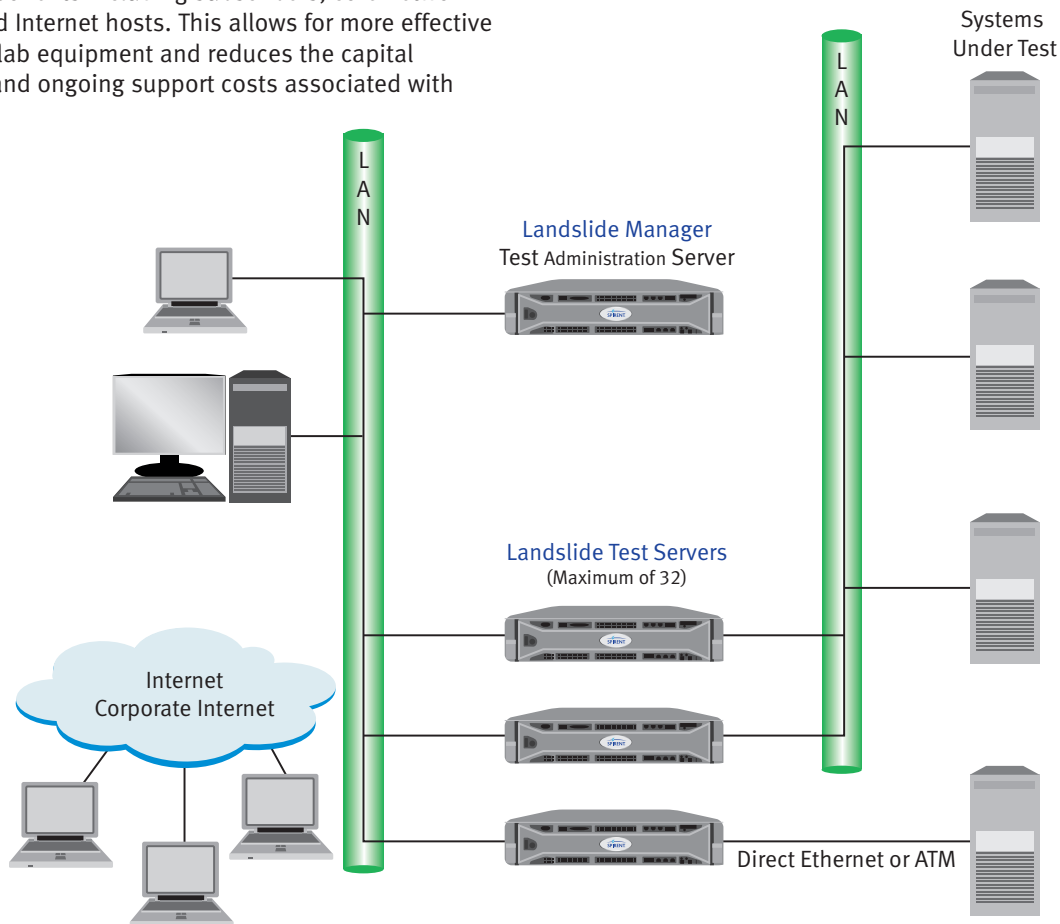
BENEFITS

- **Peace of Mind**—Landslide allows equipment vendors to accurately specify equipment performance characteristics under real-world conditions experienced in their customers' networks. It allows service providers to measure the performance of their network and to validate new features and services in the lab. By simulating real users with real applications, Landslide ensures the transition from the evaluation lab to the live network is smooth and free of performance problems.
- **Ease of Use**—The Landslide system features a powerful, easy-to-use graphical user interface that allows a test operator to quickly set up complex test sessions. These sessions can be saved, modified, and reused, allowing quick and easy creation of numerous scenarios covering various aspects of the test plan. In addition, test sessions can be converted to Tcl scripts for interfacing with higher-level test management and statistics collection systems.
- **More effective use of lab resources**—Landslide's emulation capabilities allow the user to test a variety of network topologies and mobility scenarios by emulating all necessary network components including subscribers, core network elements, and Internet hosts. This allows for more effective utilization of lab equipment and reduces the capital expenditure and ongoing support costs associated with a test lab.

- **Unmatched Scalability**—Landslide's modular, high-performance architecture offers unmatched scalability and allows the user to simulate subscriber loads ranging from a small rural town to the largest metropolitan city. Landslide is composed of a manager and 1 to 32 test servers depending on the capacity and throughput performance needs.

The user has two options to control the Landslide: using a standard web browser or via a Tcl command line interface. Both connect to the Landslide Manager, which controls one or more Landslide Test Servers.

The Landslide Manager supports up to 48 simultaneous users and can control up to 32 Landslide Test Servers. With a total capacity of up to 25.6 million simultaneous connections—and depending on the application—IP bearer traffic capability in excess of 40 million pps and 490 Gbps, Landslide can scale to stress the largest operator networks.



KEY FEATURES

- Emulates hundreds of thousands of mobile subscribers per test server
- Emulates up to 2000 nodes (i.e., Base Stations, SGSN, PDSN, etc.) per test server
- Performs nodal tests to isolate a single element or end-to-end tests to test the entire network core
- Simultaneously tests control-, data- and security-planes
- Offers detailed reports including summary reports, per-interval reports, and per-session reports

For detailed information on specific test applications, refer to the individual product data sheets.

Landslide LTE

Spirent's Landslide LTE test applications performance test the individual elements within the Enhanced Packet Core (EPC), as well as performance test an end-to-end configuration.

- MME Nodal Testing—Isolates the MME, emulates the UE, eNodeB and Serving GW
- Serving GW Nodal Testing—Isolates the Serving GW, emulates UE, eNodeB, MME, PDN GW and Network Host
- PDN GW Nodal Testing—Isolates the PDN GW, emulates UE, eNodeB, MME, Serving GW and Network Host
- Combined Gateway Testing—Isolates the combined Serving/PDN GW, emulates UE, eNodeB, MME and Network Host
- PCRF Testing and Emulation—Optional PCRF nodal testing or emulation can be added to any of the LTE test applications
- End-to-End Testing—Tests the EPC, emulates UEs, eNodeB and Network Host
- Mobility testing—Test various MME, SGW, PDN-GW and GERAN/UTRAN scenarios

Landslide WiMAX

Spirent's Landslide WiMAX test applications performance test the ASN-GW and CSN (HA and AAA) individually or combined in an end-to-end configuration. These test applications are compliant with WiMAX Forum specifications. Variants to the WiMAX Forum specifications may also be supported based on individual customer needs.

- ASN-GW Nodal Testing—Isolates the ASN-GW, emulates MSS, BS, HA, AAA and Network Host
- CSN Nodal Testing—Isolates the CSN (HA and AAA), emulates MSS, BS, ASN-GW and Network Host
- End-to-End Testing—Tests the ASN-GW and CSN, emulates the MSS, BS and Network Host

Landslide CDMA Femtocell

Spirent's Landslide CDMA Femtocell test application performance tests the CDMA Femtocell Network Gateway (FNG) within the packet core. Landslide emulates one or more CDMA femtocell devices with up to 10 CDMA MN behind each emulated femtocell.

- FNG Nodal testing—Isolates the FNG, emulates the MN, femtocell and Network Host.

Landslide GPRS

Spirent's Landslide GPRS test application performance tests a standalone GGSN or GGSN in combination with a Content Based Billing device.

- GGSN Nodal Testing—Isolates the GGSN (or GGSN/CBB device), emulates MS, RNC, SGSN and Network Host

Landslide HNB-GW

Spirent's Landslide 3GPP Home NodeB Gateway test application allows users to performance test the HNB-GW over Iuh and Iu-PS interfaces. IPSec is supported for use over the Iuh interface to test the SeGW component of the HNB-GW.

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KEY FEATURES (CONTINUED)

Landslide UMTS

In addition to GGSN testing as described above, Spirent's Landslide UMTS test application performance tests a standalone SGSN or the SGSN and GGSN in an end-to-end configuration.

- SGSN Nodal Testing—Isolates the SGSN, emulates MS, RNC, GGSN and Network Host
- End-to-End Testing—Tests the SGSN and GGSN, emulates MS, RNC and Network Host

Landslide CDMA

Landslide CDMA test application performance tests a standalone PDSN, a standalone FA, a standalone Home Agent, or the PDSN-FA and Home Agent in an end-to-end configuration.

- PDSN Nodal Testing—Isolates the PDSN, emulates the MN, PCF, LNS (optional) and Network Host
- FA Nodal Testing—Isolates the FA, emulates MN, PCF, HA and Network Host
- HA Nodal—Isolates the HA, emulates MN, PCF, FA, and Network Host
- End to End Testing—tests the PDSN-FA and HA, emulates MS, PCF and Network Host

Landslide Mobile IP

Spirent's Landslide Mobile IP test application tests the performance of both MIPv4 and MIPv6 devices. This application also includes Landslide's Dynamic IPsec option.

Mobile IPv4

- HA Nodal Testing—Isolates the HA, emulates MN, FA, CCoA and Network Host
- FA Nodal Testing—Isolates the FA, emulates MN, HA and Network Host

Mobile IPv6

- HA Nodal Testing—Isolates the HA, emulates the MN and CN
- CN Nodal Testing—Isolates the CN, emulates the MN and HA

Landslide AAA

Spirent's Landslide AAA applications can be used to performance test or emulate AAA RADIUS/Diameter servers. Landslide AAA supports both authentication and accounting, including a comprehensive set of EAP methods.

- AAA Nodal Testing—Isolates the AAA Server, emulates the NAS
- AAA Emulation—Emulates AAA RADIUS/ Diameter servers, removes bottlenecks in device testing where AAA server performance is the limiting factor. Can be use in conjunction with other Landslide applications, such as WiMAX, to provide a complete test bed solution.

KEY FEATURES (CONTINUED)

Landslide IP Data

Spirent's Landslide IP Data Application provides the ability to perform lab tests for performance and accuracy of new applications and billing systems. Landslide IP Data can be used with most other Landslide applications to generate bearer plane data when bearer or application server testing is required.

- IP Data Application—Tests application servers and billing systems, emulates IP clients
- Network Host—Emulates application server/remote peer
- Data Message Flows—Method used to create data flows for sending and receiving stateful/stateless data. Can be used in any application that uses data plane. Also allows for creation of custom message flows and import of pcap traces.

Landslide IPSec

Spirent's Landslide Dynamic IPSec feature can be added to a number of Landslide applications to performance test private network secure access devices. Landslide Dynamic IPSec can be used with any of Landslide's wireless packet data test applications for transmissions and supports both IKEv1 and IKEv2, including EAP. Landslide Dynamic IPSec helps test the following:

- Femtocell Network Gateways
- Security Gateways
- MIPv6 network entities
- Base Station to Network Node links
- Diameter devices
- Countless other devices

Landslide PDIF

To enable convergence between fixed line and CDMA2000 wireless networks, a new network element, the Packet Data Interworking Function (PDIF), was defined. The PDIF allows access to the CDMA2000 packet core via WiFi access points. Spirent's Landslide WiFi Convergence test feature, in conjunction with the IP Data and MIP test applications, allows the customer to test the PDIF. Additionally, when used in conjunction with the CDMA2000 test application, this enables the testing of Fixed Mobile Convergence between the fixed line and wireless networks.

- PDIF Nodal Testing—Tests the PDIF, emulates the MN, AP and Network Host
- Fixed Mobile Convergence Testing—Tests the PDIF and CDMA2000 packet core, emulates the MN, AP, BTS, PCF and Network Host

Landslide PDG

To enable convergence between fixed line and 3GPP wireless networks, a new network element, the Packet Data Gateway (PDG) was defined. The PDG allows access to the 3GPP packet core via WiFi access points. Spirent's Landslide WiFi Convergence test feature, in conjunction with the IP Data test application and Dynamic IPSec option, allows the customer to test performance and accuracy of secure access to the 3GPP packet core via the PDG.

- PDG Nodal Testing—Tests secure access to the 3GPP core via the PDG, emulates the MN, AP and Network Host

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KEY FEATURES (CONTINUED)

Landslide L2TP

Spirent's Landslide L2TP VPN/Secure Gateway test application provides an end-to-end test system capable of emulating up to millions of data subscribers, all accessing private networks simultaneously via L2TP tunnels. In addition, Landslide can terminate the L2TP tunnels into the private network by emulating the L2TP Network Servers (LNS). IPsec can be added to the LNS Nodal test application and LNS server emulation feature for secure network access testing.

- LNS Nodal Testing—Tests the LNS, emulates the MN, LAC and Network Host
- LNS emulation—Emulates the LNS to support L2TP testing driven by test devices external to the test system

Landslide PCRF

Next generation networks promise a transition to a host of different IP services. These services unite voice, video and data into a seamless offering to be delivered across an access medium, with assured quality to an increasingly large mobile subscriber base. Access Gateways (containing a Bearer Binding and Event Reporting Function or a Policy Charging and Enforcement Function) and applications functions interface with a policy decision function (PCRF) which determines policy and charging rules. Spirent's Landslide PCRF test application performance tests the PCRF. Additionally, Landslide's PCRF emulation provides a configuration in which the AGW and AF can be tested.

- PCRF Nodal Testing—Tests the PCRF via Tx/ Ty or Gxx (Gx, Gxa, Gxc)/Rx, emulates AGW and AF
- PCRF Node Emulation—Emulates a PCRF to test access gateways and application functions, including LTE serving gateways and PDN gateways

Landslide DCCA

Spirent's Landslide Diameter Credit Control Application (DCCA) test application allows customers to test the performance characteristics of their DCCA servers under real-world network conditions. Landslide's DCCA server emulator eliminates the real DCCA server's performance as a factor when measuring DUT performance.

- DCCA Nodal Testing—Isolates the DCCA server, emulates the DCCA client
- DCCA Emulation—Emulates DCCA server, removes DCCA introduced bottlenecks during device testing

Landslide eHRPD

The CDMA Evolved High Rate Packet Data (eHRPD) network provides an IP environment that supports a variety of differentiated IP services via the 3GPP evolved packet core (aka LTE). The HRPD Serving Gateway (HSGW) and evolved Packet Control Function (ePCF) interface directly with elements in the ePC to provide the necessary interworking that takes advantage of the 3GPP evolved packet core. The Landslide eHRPD test application provides the necessary reference points and interfaces (i.e. A10/A11', S2a, S103) to thoroughly measure performance and provide load to an HSGW.

- HSGW Nodal Testing—By emulating the ePCF (providing the A10/A11' interface) on the access side and emulating the AAA, PCRF, and PDN GW on the core side, Landslide provides an environment in which the HSGW can be tested in isolation
- End-to-End Testing—In an end-to-end scenario Landslide will emulate the ePCF on the access side and the AAA, PCRF, and network host on the core side to provide an environment in which the gateways can be tested as an entirety
- Mobility—Landslide provides a diverse set of mobility options including inter-ePCF handover, inter-HSGW handover, and inter-technology handover

KEY FEATURES (CONTINUED)

Landslide Data Accelerator

With Spirent's Landslide Data Throughput Accelerator option, data performance is at least doubled* when compared to Landslide data throughput performance without the Data Accelerator Option.

- Doubles (or more) the data performance on the Landslide
- Lowers the total number of Test Servers necessary for achieving required data throughput

* This does not apply to applications bound by the hardware constraints of the ATM or IPSec accelerator cards. Three NIC cards are required to reach optimal performance.

Landslide Performance Accelerator

Spirent's Landslide Performance Accelerator option gives you the same data acceleration capability described above, as well as doubling control plane capacity. For example, a test case that supports 200,000 simultaneously active sessions with an activation rate of 1,000 sessions/second would, with the Performance Accelerator option, support 400,000 simultaneously active sessions and an activation rate of 2,000 sessions/second.

- Doubles the number of simultaneously active sessions for all test applications
- Doubles the activation rate for all test applications
- Includes Data Throughput Accelerator option
- Lowers the total number of Test Servers necessary for achieving desired capacity, activation rate and data throughput

TECHNICAL SPECIFICATIONS

Landslide Test Server and Manager

- 2U rack height form factor
- Dual, quad-core Intel Xeon 5500 series processors
- 2 PCIe x8 and 2 PCIe x4 G2 I/O slots
- Power Supply
 - 870W non-redundant
 - 90-264 VAC, 47 to 65 Hz auto-ranging
- Dimensions
 - H 8.04 cm (3.40")
 - W 44.3 cm (17.44")
 - D 68.07 cm (26.8")
- Weight 26.1 Kg (57.54 lbs) maximum
- Operating temperature 10° to 35° C (50° to 96° F)
- Temperature rise maximum rate 10° C per hour

Landslide Test Server Network Test Ports

- Quad-port, 10/100/1000Base-T NIC
- Quad-port, 10/100/100Base-SX multi-mode NIC
- Single-port 10 Gigabit XF SR multi-mode NIC
- Single-port ATM multi-mode, OC3/STM-1 NIC
- Single-port ATM single-mode, OC3/STM-1 NIC

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SPIRENT SERVICES

Spirent Global Services provides a variety of professional services, support services and education services—all focused on helping customers meet their complex testing and service assurance requirements.

For more information, visit the Global Services Website at www.spirent.com/gs or contact your Spirent sales representative.

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