Spirent **Landslide™ Diameter**

Landslide Diameter is used by mobile network operators and mobile equipment manufacturers worldwide for testing during development, verification, network design, solution marketing, deployment and maintenance.

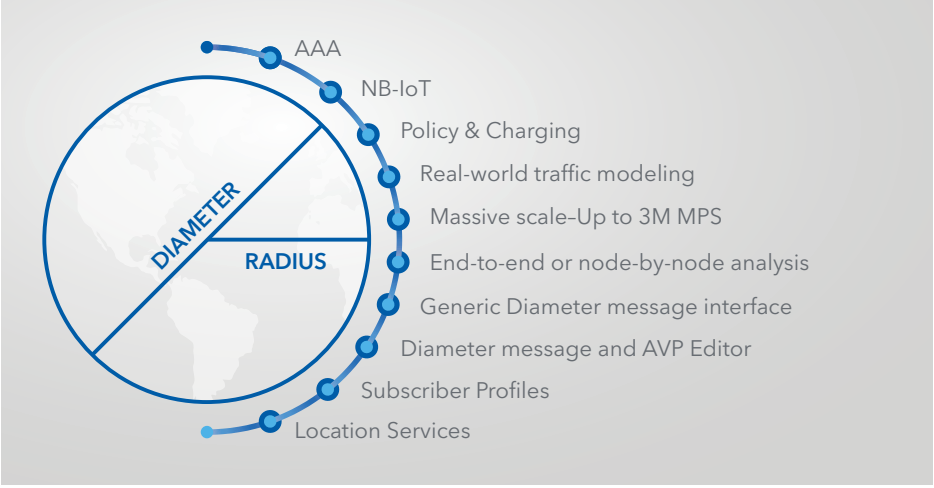
The Solution

Landslide Diameter is a comprehensive end-to-end test system that enables you to ensure efficient and optimized Diameter signaling operation. It is the leading solution for testing AAA functions, mobility management, policy and charging controls in today's advanced all-IP communications networks.

Simulate real-world traffic scenarios and call models at scale to review and adjust network element functionality and performance on a node-by-node basis. Landslide Diameter provides real-world emulation of millions of authentication and authorization, policy and charging transactions, as well as determining equipment performance characteristics in multi-vendor environments.

Optimize network design by emulating current and planned usage models to help right-size the network and eliminate contention and the guesswork of predicting signaling traffic loads.

Landslide Diameter Solution delivers high scale UE emulation



Ensure Diameter devices and networks can weather the signaling storm

Solution Overview

High Scale UE Emulation

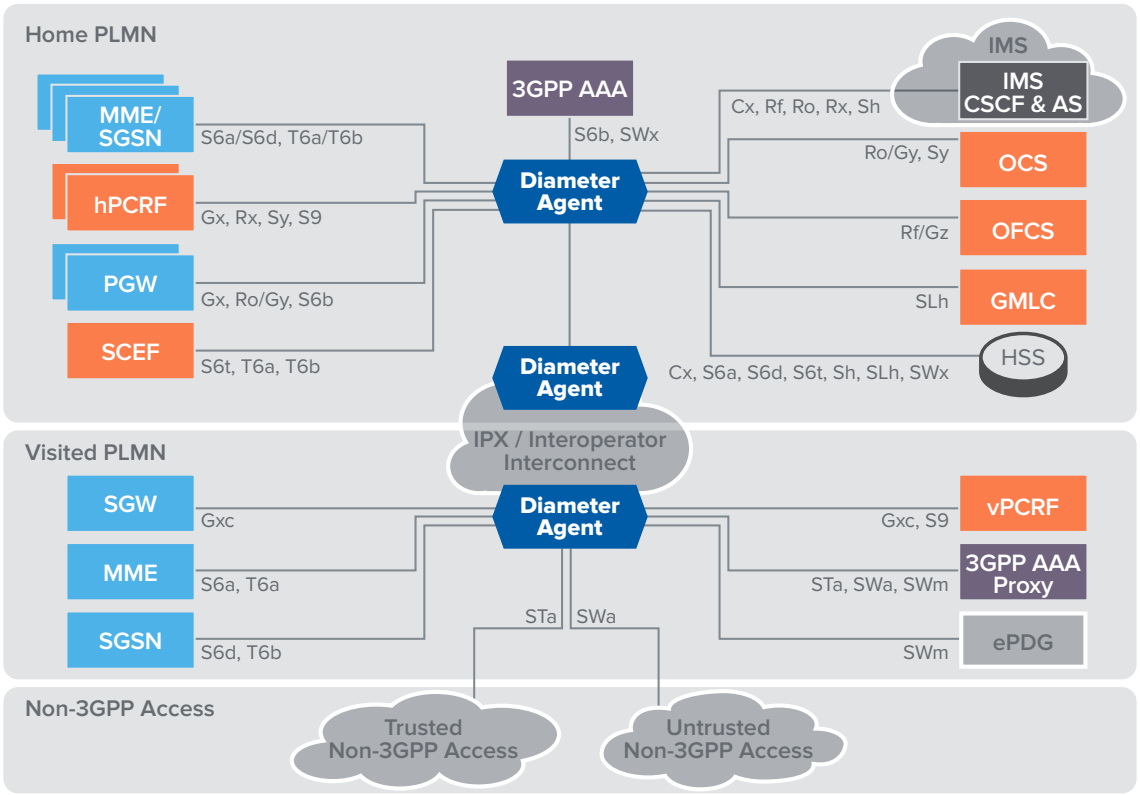
- State machine driven UE signaling traffic emulation
- Enables advanced busy hour call modeling of real-world services
- Highly scalable up to 10 million sessions per server / 320 million sessions per system
- Performance up to 1.6m TPS per server

Node Emulation

- Emulate peer nodes
- Simplify complex topologies
- Isolate specific functions or test end-to-end
- Test more than 40 Diameter applications
- Subscriber data management
- Network signaling
- Support for both RADIUS & Diameter interfaces enables testing of fixed/mobile/Wi-Fi convergence

Application

- Simple configuration for scaling of users or nodes
- Topology driven—simplifies visualization of complex tests
- Integrated sequencer for codeless automation
- Message flow and AVP editor for easy customization
- Create any standardized, vendor-specific or proprietary Diameter Application
- Support for Spirent's virtual and high-performance platforms



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Test Objectives

- Test network control and charging functions
- Combined RADIUS and Diameter testing
- Fixed & mobile network coverage
- Key tests include:
  - Performance & scaling
  - Load balancing
  - Resiliency (failover/failback)
  - Session binding
  - Topology hiding

Test Coverage

- Diameter Agents and Edge Agents
- Diameter Signaling Controller
- Policy Control
- Subscriber Data Management
- Charging
- Session Management
- AAA (RADIUS & Diameter)

PCRF Testing

- Dynamic policy control
- VoLTE bearer scenarios
- QoS control
- Mobility scenarios

DRA Testing

- Performance and scaling
- Failover/failback
- Intra-operator centralized implementations
- Inter-operator edge implementations

AAA Testing

- Access
- Authentication & Authorization Methods
- Resiliency
- Trusted & untrusted scenarios
- Multiple AAA Server interfaces at scale

HSS Testing

- UE authentication & authorization
- Location updates
- ePC and IMS subscription profiles
- Black/gray/white list (EIR)
- Session and capacity loading
- User-friendly and highly configurable AVP editor

LCS Testing

- Report device location
- Emergency handling
- Access Location Services
- Managed location QoS
- High Scale full GMLC Emulator
- Simultaneous MME, HSS connections

NB-IoT Testing

- Handle device access to IoT Service
- Relay communication between device and IoT server
- Configure NIDD communication control
- Relay Non-IP Data between device and IoT Server
- High Scale full SCEF Emulator

Generic Diameter Message Interface

- Create new Diameter-based interfaces
- Customize existing interfaces
- Define messages and AVPs
- Performance and scaling
- Negative testing
- User friendly

Benchmarking Test Methodologies

- Isolated Capacity and Performance
- 'Bucket' stress test
- 'Burst' control test
- Network modeling
- Inter-Technology Mobility at scale
- Session loading and capacity testing

Technical Specifications

Partial list of diameter interfaces and applications tested by Landslide:

Interface	Network Elements	AAA Node	AAA Nodal	DRA Nodal	HSS Node	HSS Nodal	IMS Node	IP App Node	LCS Node	LCS Nodal	MME Node	MME Nodal	OCS Node	OFCS Node	PCRF Node	PCRF Nodal	PGW Node	PGW Nodal	SCEF Node	SGW Node	SGW Nodal
Cx	IMS CSCF/HSS			Y	Y	Y															
Gr	SGSN/HLR				Y	Y															
Gx	PCEF/PCRF			Y											Y	Y	Y				Y
Gxc	SGW/PCRF			Y											Y	Y					
Gy	CTF/OCS			Y									Y					Y			
Gz	CTF/CDF													Y			Y	Y		Y	Y
R3	AGW/PCRF														Y	Y					
Rf	CTF/CDF													Y			Y	Y		Y	Y
Ro	CTF/OCS												Y				Y				
Rx	AF/PCRF			Y			Y					Y			Y	Y		Y			Y
S13/S13'	MME(SGSN)/EIR				Y	Y															Y
S6a	MME/HSS			Y	Y	Y					Y										Y
S6b	3GPP AAA/PGW	Y	Y					Y									Y				
S6d	SGSN/HSS			Y	Y	Y															
S6t	SCEF/HSS			Y	Y	Y													Y		
S9	hPCRF/vPCRF			Y											Y	Y					
Sd	TDF/PCRF			Y											Y						
Sh	AS/HSS			Y	Y	Y															
SLg	MME/GMLC								Y	Y											
SLh	HSS/GMLC				Y				Y	Y											
SLs	MME/e-SMLC								Y	Y											
STa	Non-3GPP Access /3GPP AAA	Y	Y																		
SWm	ePDG/3GPP AAA	Y	Y																		
SWx	3GPP AAA/HSS	Y			Y																
Sy	PCRF/OCS			Y									Y		Y						
T6a	SCEF/MME			Y															Y		
T6b	SCEF/SGSN			Y															Y		
Tx	AF/PCRF														Y	Y					
Ty	AGW/PCRF														Y	Y					
Ud	UDR/PCRF					Y															
Wm	PDG/3GPP AAA	Y	Y					Y													
Zh	BSS/HSS				Y																

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