Spirent **Elevate**®

Simplified end-to-end testing for next-generation wireless services on mobile devices

Spirent Elevate® provides access to an end-to-end network in a compact and flexible solution to support device testing of multiple emerging wireless needs:

- **Audio Quality** for voice services, such as VoLTE and VoWi-Fi

- **Video Quality** for rich media experiences; streaming, chat

- **Battery Life** for testing drain and power consumption

- **Inter-carrier Traffic** to ensure QoE for device interoperability

- **Cellular Off-Load** to ensure QoE for LTE/3G to Wi-Fi mobility

- **Location Services** for testing emergency call scenarios over LTE and Wi-Fi

- **Internet of Things (IoT)**: to address new types of devices with unique challenges and testing needs

Spirent Elevate integrates the Wireless Test Station, ProLab IMS Testing Suite and User Experience measurement systems to deliver unparalleled device-to-device testing capabilities. The solution provides rich coverage in IMS, VoLTE and RCS protocol and performance testing plus extensive user experience analytics.

Device-to-device testing—allows interoperability testing of multiple devices over LTE, 3G, and Wi-Fi. Test scenerios cover IMS, VoLTE, and RCS call functionality and performance with VoLTE dedicated bearer representation over carrier-modeled IMS networks.

Comprehensive QoE—provides the broadest and deepest set of Quality of Experience (QoE) metrics for end-to-end tests enabling voice and video quality, call performance, battery performance, and data throughput in a lab environment.

Extensive coverage—offers the most complete IMS, VoLTE, and RCS test coverage capable of interacting with sophisticated IMS network topologies, allowing more robust testing and faster time to market. Extensive testing capabilities span next-generation technologies, such as the complex feature set of the EVS audio codec.

In-depth analytics—provides the ability to isolate and analyze the root cause to resolve issues and improve the quality of wireless services.

Automatable test environment—comes with customizable built-in scripts, including scripts for interoperability test cases based on IR.92, IR.94 and RCS 5.1 specification and sample test cases. Automated carrier acceptance testing is available via integration with Spirent's industry-leading 8100 Mobile Device Test System.
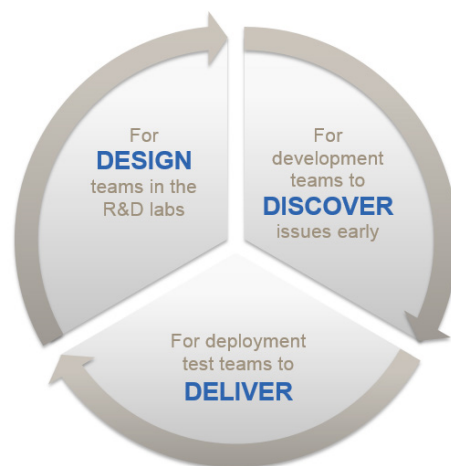
Spirent Elevate provides a comprehensive all-in-one approach throughout the mobile device lifecycle

Chipset Vendors | Application Developers Device Manufacturers | Service Providers

Decrease test time with parallel UE testing on a single instrument

Ensure high QoE with extensive user experience analytics for voice, video, battery and data

Reduce costly in-field issues by detecting complex interoperability issues early on in the lab

Increase productivity and solve capacity issues with Spirent Elevate's flexible, scalable and open network-of-test resources architecture

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Spirent Elevate is a scalable, sharable, virtualized test environment that spans critical test areas and maximizes productivity.

User experience	Quality of Experience (QoE) from the user's perspective

- Voice or video quality as measured by MOS
- Fully integrated bi-directional IP network impairments
- Call connect time, battery performance, service interaction, jitter buffer management, network impairment
- Covers the broad spectrum of EVS codec testing including varying bandwidths (NB, WB,S-WB, FB), voice/sound activity detector, comfort noise generation system, error concealment mechanism, and channel-aware mode

Device-to-device interoperability	Functional and performance testing across LTE, Wi-Fi, and UMTS (3G) with different device vendors, device versions and carriers

- Enabled by support for multi-device testing
- Device-to-device negotiation to provide the required parameters for VoLTE (e.g., AMR-WB or EVS codec)
- VoLTE, IMS, and RCS interoperability scenarios between devices connected to Wi-Fi and devices connected to LTE/3G

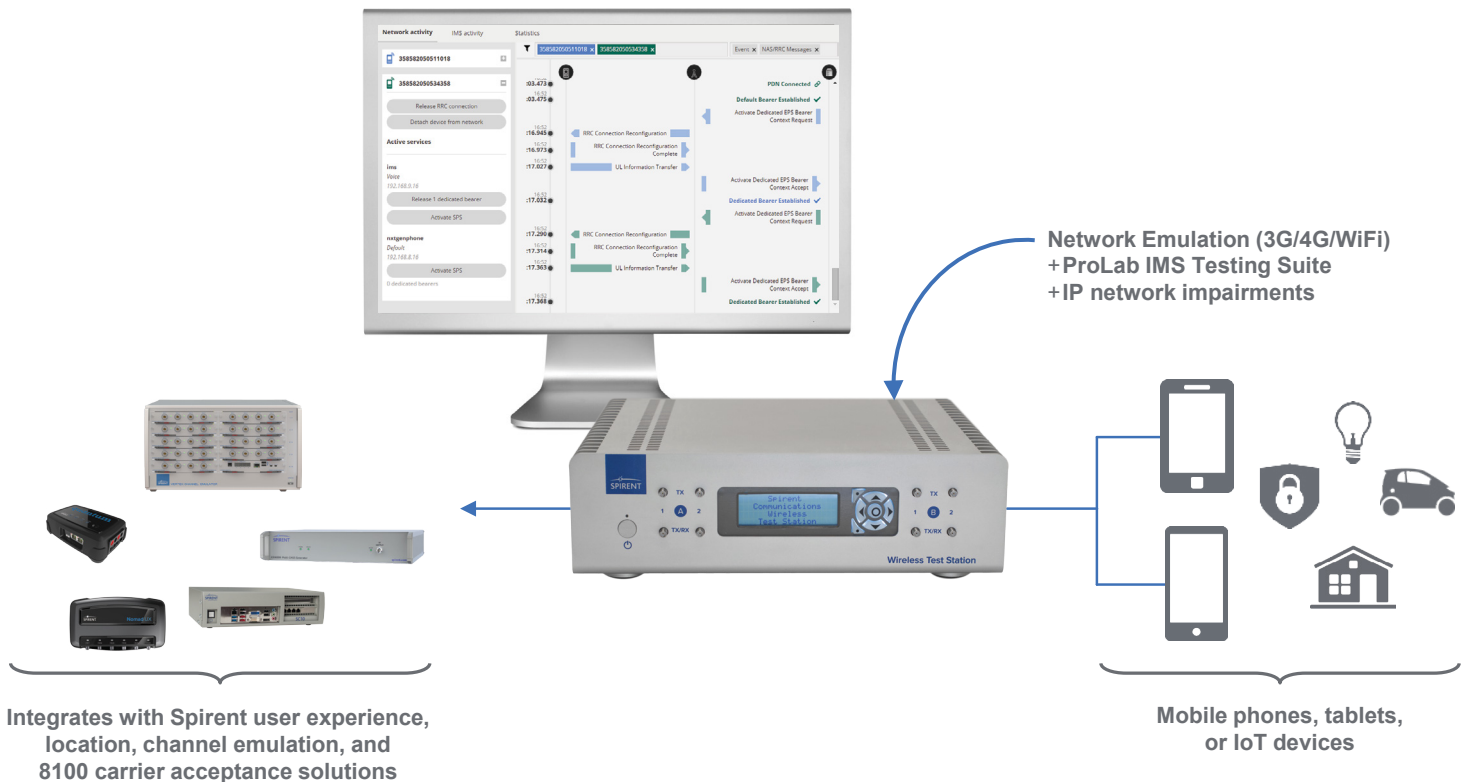|	
Functional & protocol	Evaluation of a single device performance for IMS, VoLTE and RCS feature functionality and protocol messaging and signaling

- Provided by tight integration with ProLab IMS Testing Suite
- Call features such as up to 20-way conference and group chat via media server simulation
- Security & authentication, audio codecs (including EVS), RTCP usage
- Core network behavior can be customized to emulate adversarial scenarios

Conformance	Minimum performance requirements as specified by GCP, PTRCB, and OMA

- IMS and RCS: Initial registration, mobile originated de-registration (IR.92/3G TS 34.229)
- Location and signaling: UTRA, E-UTRA (FDD) and EPC device conformance (TS 37.571); SUPL 1.0 & 2.0

Network Emulation (3G/4G/WiFi)
+ProLab IMS Testing Suite
+IP network impairments

Integrates with Spirent user experience, location, channel emulation, and 8100 carrier acceptance solutions

Mobile phones, tablets, or IoT devices

Key components

Wireless Test Station

- Co-location of two cells enables device-to-device LTE, UMTS, and Wi-Fi interoperability testing with one instrument

- Provides correct dedicated bearer setup and timing to carry VoLTE and multimedia calls properly

- Network emulation easily configured for major carriers' networks

- Web-enabled user interface allows internet access from anywhere

- Users can reserve resources as needed for dedicated test time

Functionality		
Network technology	Two individually configurable cells: LTE-FDD, LTE-TDD, UMTS (3G)	Wi-Fi 802.11a/b/g/n/ac
Frequency range	400MHz - 6GHz	2.4GHz, 5.0GHz
IMS and VoLTE capabilities	RoHc, TTI bundling, SPS, QCI, up to eight dedicated bearers, QoS management, IPSec	
Logging	Core network, RRC, and MAC logging synchronized across layers and cells	
Software upgrades	Remote via LAN	

ProLab IMS Testing Suite

- Industry-leading solution for IMS/RCS/VoLTE testing and validation

- Emulates a wide range of real-world network conditions including IME UE, IMS core, media server, and RCS server

- Allows real-time testing of voice and video over LTE, 3G, and Wi-Fi

- Comprehensive test capabilities to evaluate the extensive feature set of the EVS audio codec

- Built-in scripts, including interoperability test cases according to GSMA PRD IR.92 and GSMA PRD IR.94

- Unique test creation environment and rich collection of ready- to-use test cases enables engineers to significantly reduce testing time

ProLab Architecture	
IMS Core	The ProLab IMS Core implements the logic and functionality of the Call Session Control Function including S-CSCF, I-CSCF and P-CSCF and Home Subscriber Servers (HSS) and allows you to create IMS Policies applied to incoming and outgoing SIP/IMS messages.
IMS UE simulation	ProLab comes pre-packaged with an abundance of plug-and-play scripts and media files. The built-in scripts perform a wide variety of test case simulations, including IMS and RCS signaling, audio and video media call generation, audio codec (AMR-NB, AMR-WB, EVS), video codec (H.263 and full HD H.264) and message analysis.
Media Analysis and Network Impairment	ProLab enables advanced analysis of audio and video for both incoming and outgoing media streams including audio MOS and frame distribution, and emulates multiple errors, such as packet loss, random delay, and jitter.
Media Server	The media server performs media processing, mixing several sources and spreading them to a single media source among many such sources, and other media-related processing.
RCS Server/Client	ProLab provides the capability to simulate MSRP (Message Session Relay Protocol) and XDM Client. There is also an option to simulate RCS servers including XCAP server, GBA server, HTTP server, presence server, and Ut Interface (Supplementary Service).

User Experience Analytics Solutions

- Provided by Umetrix Analytics Systems and Spirent Video Analyzer

- Quantify critical user experience metrics: voice quality, data throughput, video quality, and battery performance

- Measurement of user experience with a unified approach across all major mobile OS platforms and PCs

- Test cases can evaluate any mobile device in the lab or live network

Test Area		KPIs
Voice	End-to-end quality VoLTE / VoIP	- Voice quality (POLQA/PESQ MOS) - Audio delay (ms)
Call	Service & availability Setup & retention	- Call initiation success/failure rate (%) - Call retention/drop rate (%)
Data	Upload / download Browsing / streaming Latency	- Web page load time(s) - HTTP / FTP file download/upload speed (Mbps)
Video	Streaming Chat	- Video MOS (VMOS) - Observed frame rate (fps) - Impaired / frozen frames (%) - Frame loss rate (%) - Audio/video sync (+/- ms) - Video smoothness (1-5)
Battery	Power consumption By application By user profile	- Power consumption (mW) - Current drain (mA) - Battery life (h)

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** or contact your Spirent sales representative.

Application scenarios

Spirent Elevate addresses complex deployment and performance challenges:

How do I verify the interoperability of multiple devices?

Wireless Test Station:

- Offers multiple device-to-device testing between LTE, UMTS, and Wi-Fi on a single instrument, including conference scenarios
- Provides accurate VoLTE call setup via tight integration with the ProLab IMS Testing Suite

### How can I simplify IoT device and application testing?

Spirent Elevate:

- Provides easy access to an end-to-end network in a compact and flexible solution
- Makes IoT adoption simple, safe & secure

How do I verify voice and video interoperability between devices connected on Wi-Fi, 3G and LTE? How do I enable 3G/4G to Wi-Fi offloading?

Wireless Test Station:

- Combines LTE, 3G, and Wi-Fi in a single instrument
- Facilitates easy call setup between two devices across different network technologies
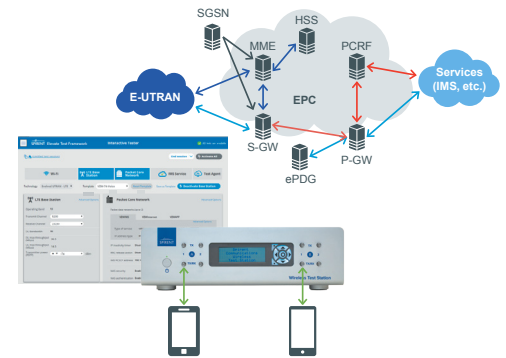
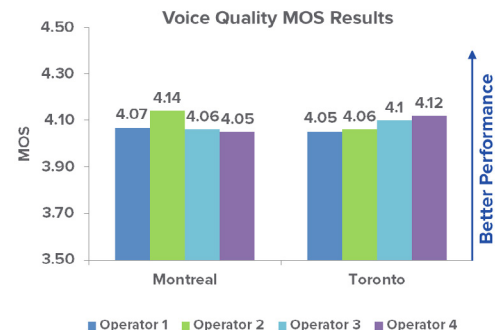### How can I measure video quality for streaming applications?

Spirent Video Analyzer:

- Is built from Spirent Elevate and measures critical KPIs and VMOS for streaming, chat and multicast applications
- Unique camera-capture method presents a more realistic view of the user perspective over MHL and Miracast methods
- Software correction methods identifies and ignores Picture-in-Picture (PIP) scenarios to elimnate MOS measurement distortion

How do I know if I'm achieving the best audio performance?

Spirent Nomad UX:

- Is a part of Elevate to provide evaluation of audio user experience performance in the lab; the same system can be used in the live network
- Provides the ability to measure key device characteristics to understand the "why" of device performance
- Tests for the highest levels of voice quality performance in EVS codec implementations

Voice Quality MOS Results

Montreal — Operator 1: 4.07, Operator 2: 4.14, Operator 3: 4.06, Operator 4: 4.05

Toronto — Operator 1: 4.05, Operator 2: 4.06, Operator 3: 4.1, Operator 4: 4.12

■ Operator 1   ■ Operator 2   ■ Operator 3   ■ Operator 4

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