Spirent Umetrix® LM

Powered by Link Master Logging™

5G Solution for QoE Evaluation with RF & IP Logging

Umetrix LM enables users to better understand and triage the root cause of problems that impact the user experience of 5G mobile services.



Use Cases

1. Reduce the mean time to identify and resolve QoE issues.

The powerful combination of Umetrix QoE measurements alongside RF and IP signaling enables efficient debugging of network or device related problems, leading to a shorter time to problem resolution.

- 2. Pre-testing for carrier device acceptance programs with QoE and logging.
 Umetrix LM enables device manufacturers to pre-test new device models prior to submission to carrier acceptance programs. By addressing QoE issues proactively with additional RF and IP KPIs, technical acceptance can proceed without delay.
- 3. Launch readiness assessment for voice services (VoWi-Fi, VoLTE, OTT, etc.). Compare the user experience of new voice services to legacy or competitive services prior to launch. Set launch criteria and evaluate trial, soft launch and commercial networks to determine readiness.



Highlights:

- Evaluate the user experience of 5G mobile services in a live 5G network using actual consumer mobile devices.
- Correlate RF and signaling information with voice, call, and data QoE metrics for up to 12 devices simultaneously.
- Assess the launch readiness of voice and data services for 5G, VoLTE, VoWi-Fi, OTT and more.
- Execute Umetrix Data test campaigns with logging to collect layer 1 and layer 3 data to determine possible sources of application throughput bottlenecks.

Key Metrics



5G baseband chipset logging



Speech Quality MOS (POLQA)



Call Completion Success Rate



Audio Delay



Maximize KPIs, Reduce Churn

It is critical in today's competitive environment to meet key performance indicators (KPIs) to minimize dropped and blocked calls and maximize data throughput. Umetrix LM collects the underlying RF, IP, and signalling data to determine your KPIs and allows you to analyze and easily identify where you can boost your network and device performance.

Air Interface Data Collection

Umetrix LM enables complete collection of all the parameters characterizing wireless device performance. Setting up a test configuration is quick and easy via the intuitive graphical user interface.

Key Features

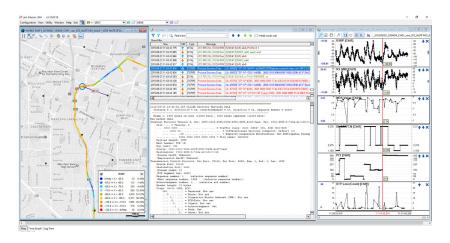
- Connect up to 12 UEs plus a scanning receiver (hardware sold seperately)
- Supports any network type: 5G NR NSA/ SA, LTE-A, LTE, CDMA / EVDO, WCDMA / HSPA+ / GSM / EDGE
- VoLTE testing
- Collect layer 1 and layer 3 data
- Real-time mapping with trace lines to the serving cell sector
- Simple multi-floor in-building network characterization
- Full playback capability and one-click synchronization
- Collect LTE-A data on the primary and secondary bands
- Includes MIMO Testing

Ease of Use

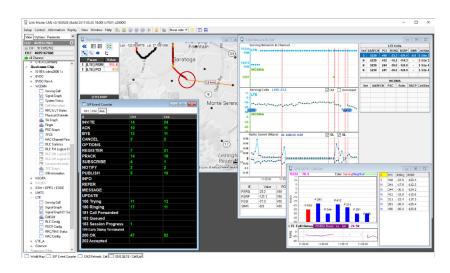
- Set up fast and get going
- · Voice, data call configurations
- · Voice, data call monitors
- Robust, no system crashes

Get All the Data You Need

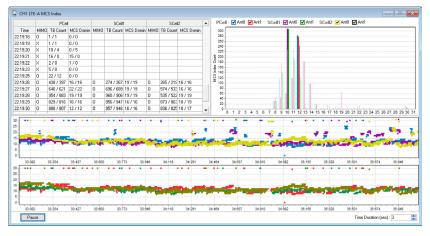
- · Integrated mapping with trace line
- · Full replay
- Analyze LM data with Umetrix Analysis or other third-party analysis tools



View synchronized map, charts, logs and messages



LM provides real-time views of key parameters



Identification of modulation and coding scheme usage



Umetrix LM Measurements and Views

For 5G NR NSA/SA, LTE/LTE-A, W-CDMA/HSPA+, and/or GSM/EDGE

Layer 1-3 Measurements

Active set EC/No Finger Combined Handover State **Spreading Factor** Active Set RSCP **AGC Report** Application Layer Throughput Band Bandwidth BLER (%) Cell RSRP Cell RSRQ CFI Information

CRI CSI-RS DCI

DLACK Detection Rate DRX mode **EARFCN** EC/No

Channel Information

Estimated SIR Power Control Frequency (MHz) MAC Throughput MIMO Statistics **Modulation Statistics** Neighbor Intra/Inter/EUTRA NR/E-ARFCN

Neighbor Intra/Inter/EUTRA PCI

Neighbor Intra/Inter/EUTRA **RSRP**

Neighbor Intra/Inter/EUTRA RSRQ

Neighbor Intra/Inter/EUTRA RSSI

Neighbor Intra/Inter/EUTRA SINR

NR+LTE Throughput NR-ARFCN

Num of CC Path Profile **PBCH BLER PCC Information**

PCI

PDCCH Detection Rate RI

PDCCH SER

PDCP DL In-Traffic Leg Switch PDCP DL RRC Leg Switch

PDCP Throughput

PDCP UL RRC Leg Switch

PDSCH BLER **PDSCH SER**

PDSCH Throughput PPP Throughput

PUSCH Thropughput RLC Throughput

Quality Reporting

RSCP RSSI (dBm) SCC Information

SCS

Serving Beam RSRP (dBm) Serving Beam RSRQ (dB)

Serving Beam rxbeamid Serving Beam SINR (dB)

Serving Beam SSB

Serving Cell RSSI

Serving Cell SNR SSB Index (Mode)

System Bandwidth Information

Tx Power Tx Power

Tx Power/RB Tx State

Wideband CQI Information

Rank Information

Views

Beam List **CA Status** Cell Information Compressed Mode GSM Measurements Debug messaging **ENDC Status** Finger Full L3 Decoding **GPS Status** Handover

Layer 1 Graphs

LLR Information

MAC statistics Map **Modulation Counts** Neighbor Cell Information AGC Symbol Distribution Symbol Constellation Channel Information Path Profile Information **PRACH Information PDCCH PDCP Statistics** PDSCH MAC BLER **Physical Channel**

RACH Reason Result MSG1-4 **RLC Statistics** RLC UL/DL Throughput graph MAC UL/DL Throughput graph RRC & L1 State RRC information / Statistics NAS information / Statistics Scheduling/Grant Statistics Scrambling code graph **RLC** statistics and Logical Channels

Signal Graph Sub Band CQI information PDCP UL/DL Throughput graph System Information Block summary System Status TA Graph **Timing Adjustment UE** Information **Umetrix Data Monitor VOD Call Monitor** Voice Call Monitor

Network Revision	on RRC: 13.2.1 NAS: 9.5.0					
Mobile Category, Rev		Cat 12				
Serving RAT, Channel	, PCI	L[450:75] -> L[3743:190] -> L[3743:190][1550:190][450:190]				
Current	PCell	SCell1	SCell2	PCell + SCells	PCell - SCells	
EARFCN	3743	1550	450	-		
PCI	190	190	190			
Bandwidth	10MHz (50 RBs)	20MHz (100 RBs)	10MHz (50 RBs)			
RSSI (Ant1, Ant2)	-46.3	-40.3	-43.4			
RSRP (Ant1, Ant2)	-71.3	-72.2	-73.4			
RSRQ (Ant1, Ant2)	-7.9	-11.4	-11.6			
RSRP - RSSI (Ant1, Ant2)	-25.0	-31.9	-30.0			
SINR (Ant1, Ant2)	7.6	9.5	15.6			
Tx Power	2 -9 -1					
MIMO State	MIMO (2x2)	MIMO (2x2)	MIMO (2x2)			
Transmission Mode	OL_SM	OL_SM	OL_SM			
PDSCH MCS (%)	12 (0%/100%/0%)	10 (0%/100%/0%)	12 (0%/100%/0%)			
PUSCH MCS (%)	14 (0%/100%/0%)					
PDSCH MCS (Count)	2 (0/2/0)	2 (0/2/0)	2 (0/2/0)			
PUSCH MCS (Count)	1 (0/1/0)					
CQI (Ant1, Ant2)	3 (7 0)	3 (6 0)	3 (7 0)			
RI	1.97	1.98	1.99			
BLER (DL, UL)	7.9 (8.6 7.3)	3.9 (7.9 0.0)	4.0 (8.0 0.0)			
DL RB Num	47201	87728	43799	178728	-84326	
UL RB Num	5551			5551	5551	
PDSCH Throuhgput	32.1 Mbps	54.9 Mbps	28.5 Mbps	115.6 Mbps	-51.3 Mbps	
PUSCH Throuhgput	1.0 Mbps			1.0 Mbps	1.0 Mbps	
FTP DL Throuhgput	112.4 Mbps			112.4 Mbps	112.4 Mbps	
FTP UL Throuhgput	26.4 Mbps			26.4 Mbps	26.4 Mbps	

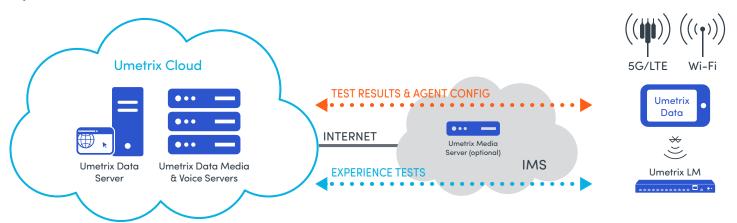
Example over	view of	carrier	agareagtion	status

	CC#	PCC	SCC1	SCC2	SCC3	SCC4
LTE	Band	66				
	EARFCN	66811				
	Bandwidth	15MHz (75 RBs)				
	PCI	420				
	RSRP(dBm)	-69.2				
	RSRQ(dB)	-8.1				
	SINR(dB)	17.8				
	PDSCH Modul	64QAM				
	PUSCH Modul	64QAM				
	PDSCH TP(Mbps)	10.18				
	PUSCH TP(Mbps)	0.71				
NR 5G	Band	260	260	260	260	
	NR-ARFCN	2243333	2244999	2246665	2248331	
	Bandwidth	100 MHz	100 MHz	100 MHz	100 MHz	
	SCS	120 kHz	120 kHz	120 kHz	120 kHz	
	PCI	0	0	0	0	
	SSB	14				
	RSRP(dBm)	-81.8				
	RSRQ(dB)	-10.9				
	SINR(dB)	16.3				
	PDSCH Modul	64QAM	64QAM	64QAM	64QAM	
	PUSCH Modul					
	PDSCH TP(Mbps)	417.48	386.78	410.51	411.79	
	PUSCH TP(Mbps)	0.26				
APP/E	NDC DL TP (Mbps)		/ PDSCH [1636.73 Mbps (5G:1626.56	+ LTE:10.18)]	
APP/E	ENDC UL TP(Mbps)		/ PUS	CH [0.97 Mbps (5G:0.26 + LT	TE:0.71)]	

Example view of 4G + 5G status



System Overview



Umetrix LM. The Umetrix LM solution consists of small portable hardware units and PC-based software. For voice experience evaluation, the solution can perform three types of tests: mobile-to-mobile (between two devices on the same or different instruments), mobile-to-PSTN or mobile-to-IMS. Umetrix LM evaluates the voice experience of end-to-end connections by performing speech quality tests (POLQA), call initiation and retention tests, and audio delay tests. For data experience tests, Umetrix LM integrates with Umetrix Data to collect layer 1-3 logs. This can help determine possible sources of application throughput bottlenecks.

conducting field testing. The server is hosted in the Umetrix Cloud and connects to the PSTN via a T1 or E1 interface. The Voice Server acts as virtual landline phone and voice probe for performing end-to-end voice experience evaluation. The Umetrix Cloud also contains **Umetrix Data Media Servers**, which act as an endpoint for all data experience tests, hosting various types of media and services required to perform HTTP, FTP, and UDP file transfers and ping tests.

uplink MOS delivered to Umetrix LM in real-time while

Umetrix HD Voice Server (optional). The HD Voice Server enables mobile-to-IMS tests using narrowband or wideband / HD codecs. The server is deployed within a carrier's core network and interfaces directly to the IMS, acting as a virtual SIP/IP device and experience testing endpoint. The HD Voice Server helps isolate issues by enabling independent analysis of the uplink and downlink for a specific mobile-to-IMS connection.

Umetrix Cloud. The Umetrix Cloud is a worldwide set of Spirent-hosted cloud endpoints for voice and data test services. The **Umetrix Voice Server** enables mobile-to-PSTN tests using narrowband codecs. With the Voice Server, customers can get

	PC and Hardware Requirements
CPU	i7 for MOS reporting
RAM	16GB or higher
OS	Windows 10 or higher
Display	1024 x 768 resolution
USB ports	For GPS, UEs, receivers, and USB license key, if used
Disk Space	30GB available, for log file storage
UE Chipsets	Qualcomm, Samsung, GCT, LG, Altair—Must match tool configuration; additional support always being added
Scanning Receivers	V-Comms; PCTel™ SeeGull LX and EX scanning receivers (single or multi-band technology support); Viavi or JDSU W1314A/B scanning receivers; R&S TSMW

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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