

- Měření kvality pokrytí a služeb, spektrální analyzátoary, skenery, měřicí terminály
- Locking-funkce, datová struktura výsledků, pevný obal měřicích terminálů s výměnou SIM karty a externí anténou
- Aplikace pro automatizovaná měření, VoLTE, LTE-A
- Varianty měřicích přístrojů a jejich využití

Měření kvality pokrytí a služeb

Cell Master / Spectrum Analyzer

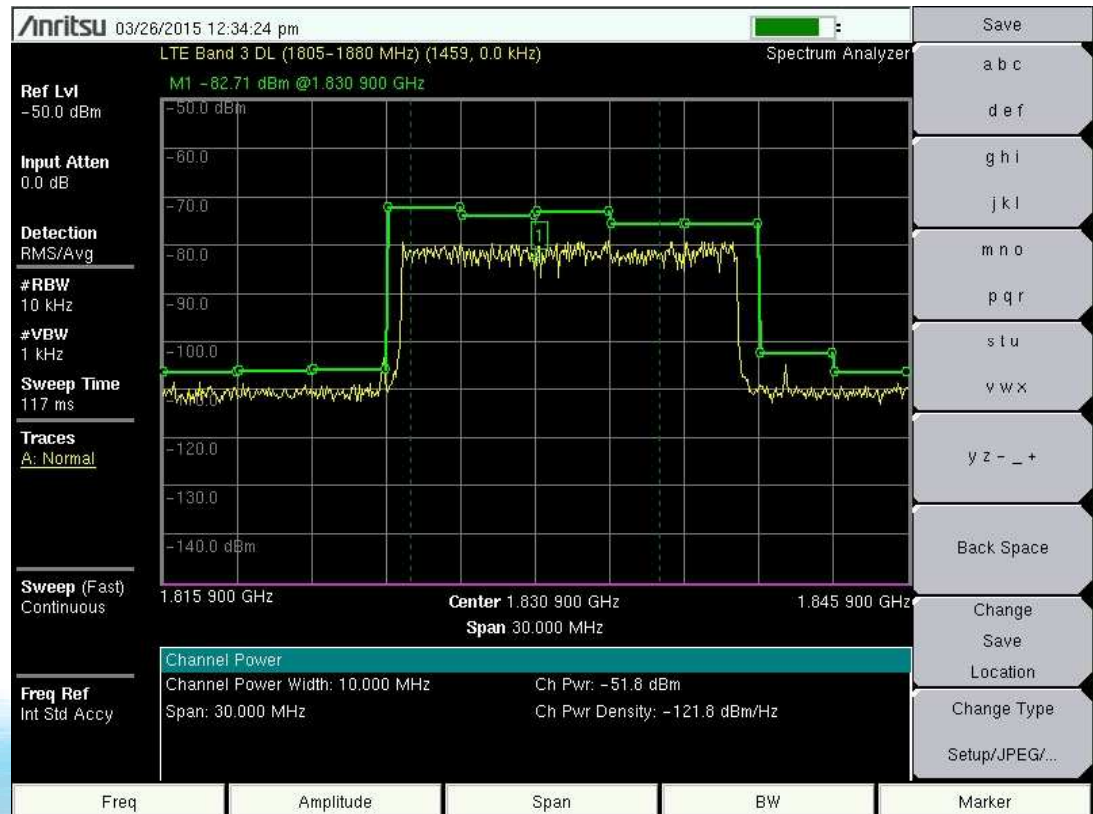
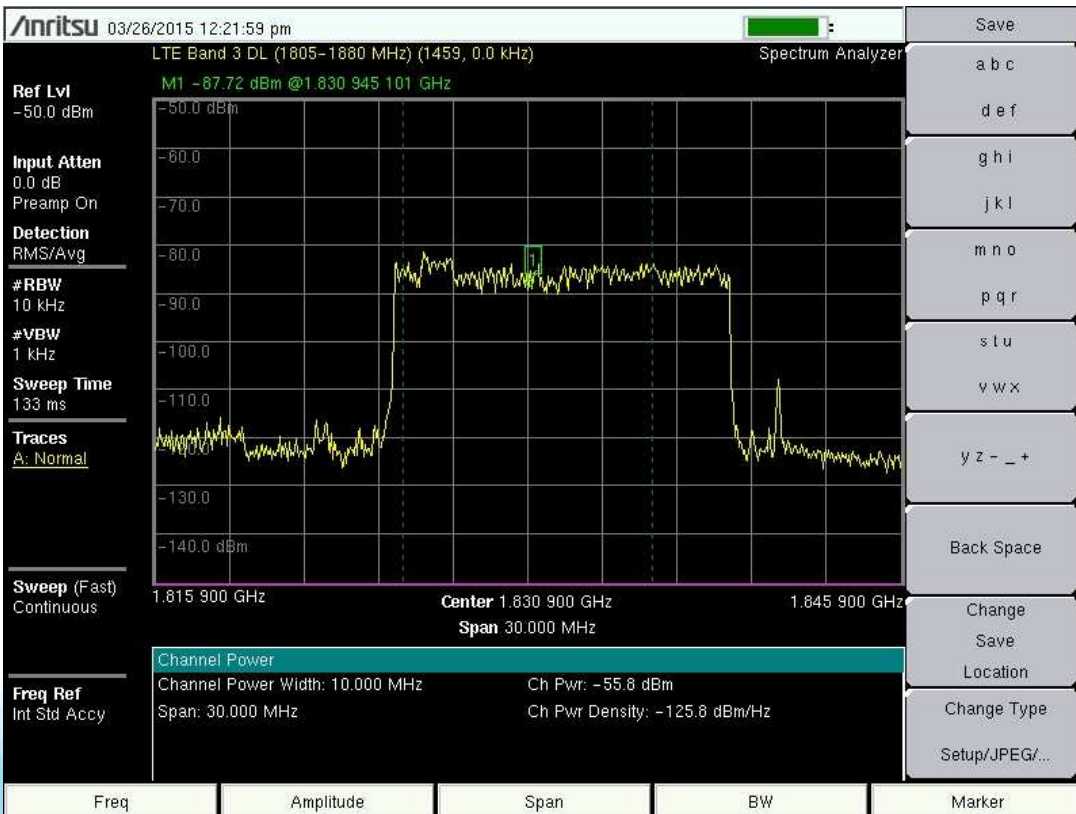


Nemo Handy / Scanner /Invex II



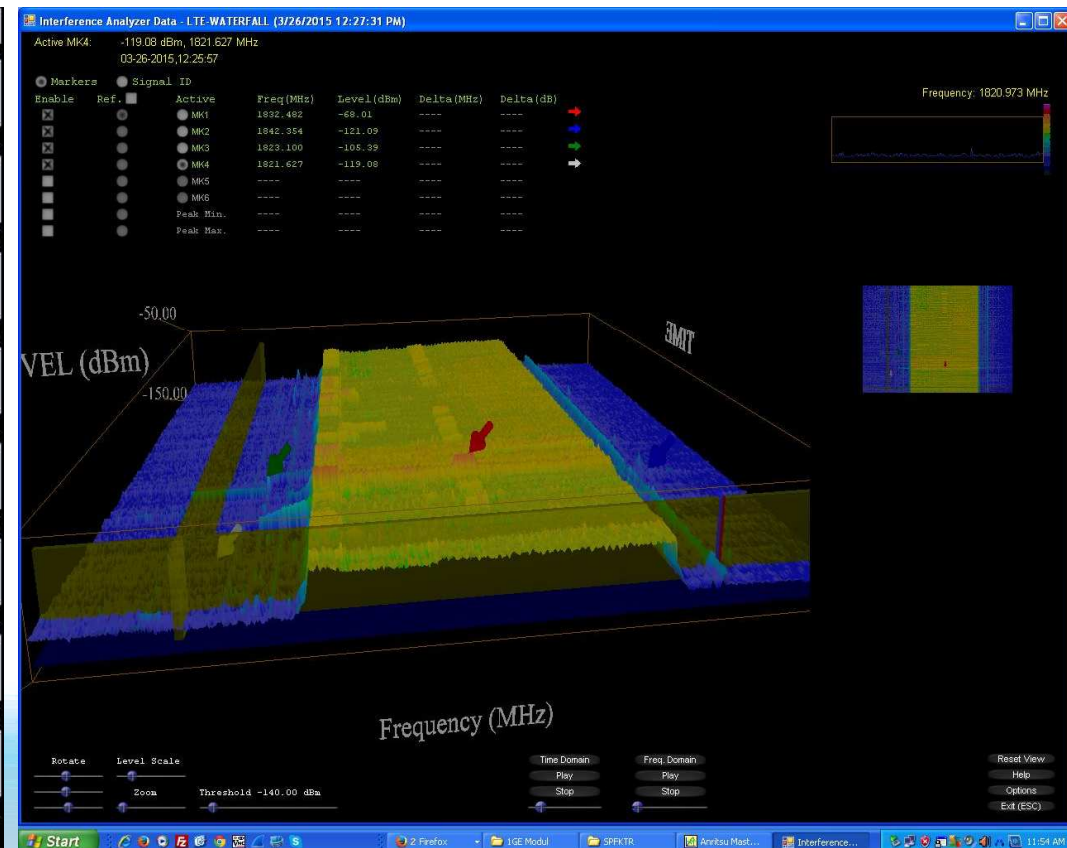
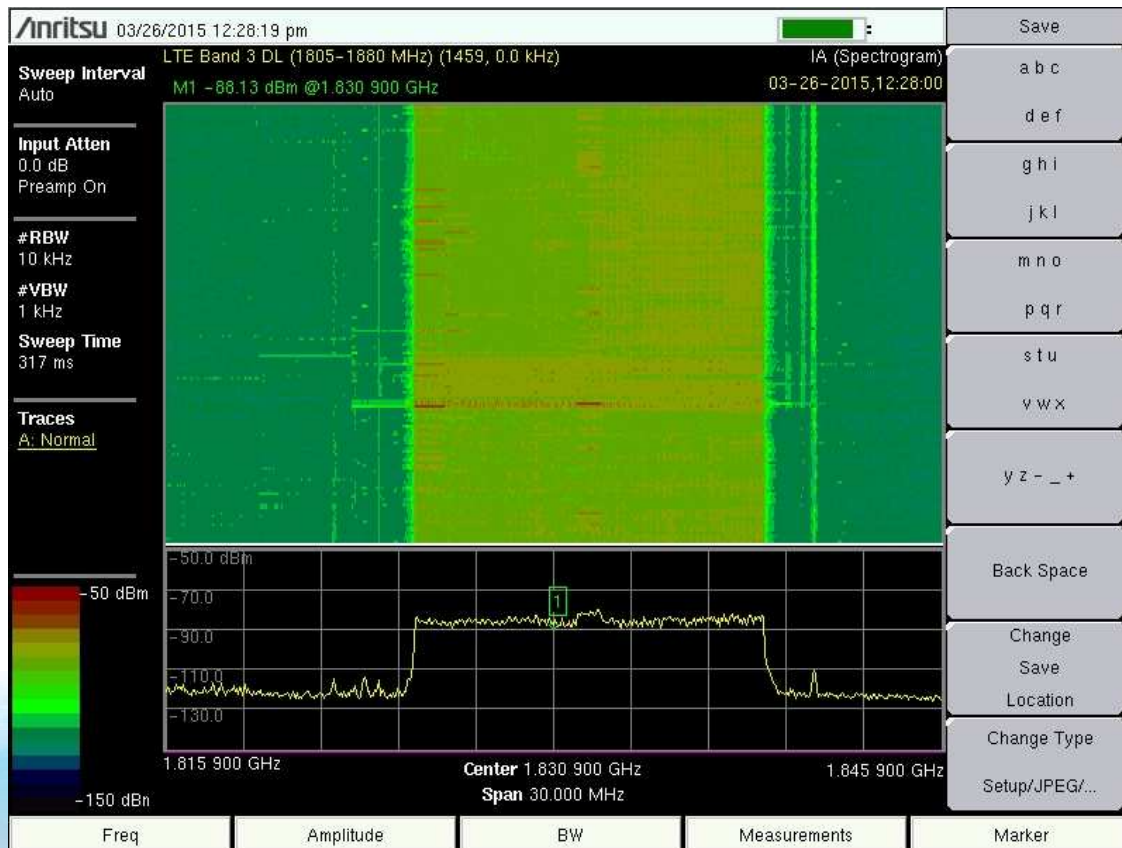
Spectrum Master/BTS Master

Channel power

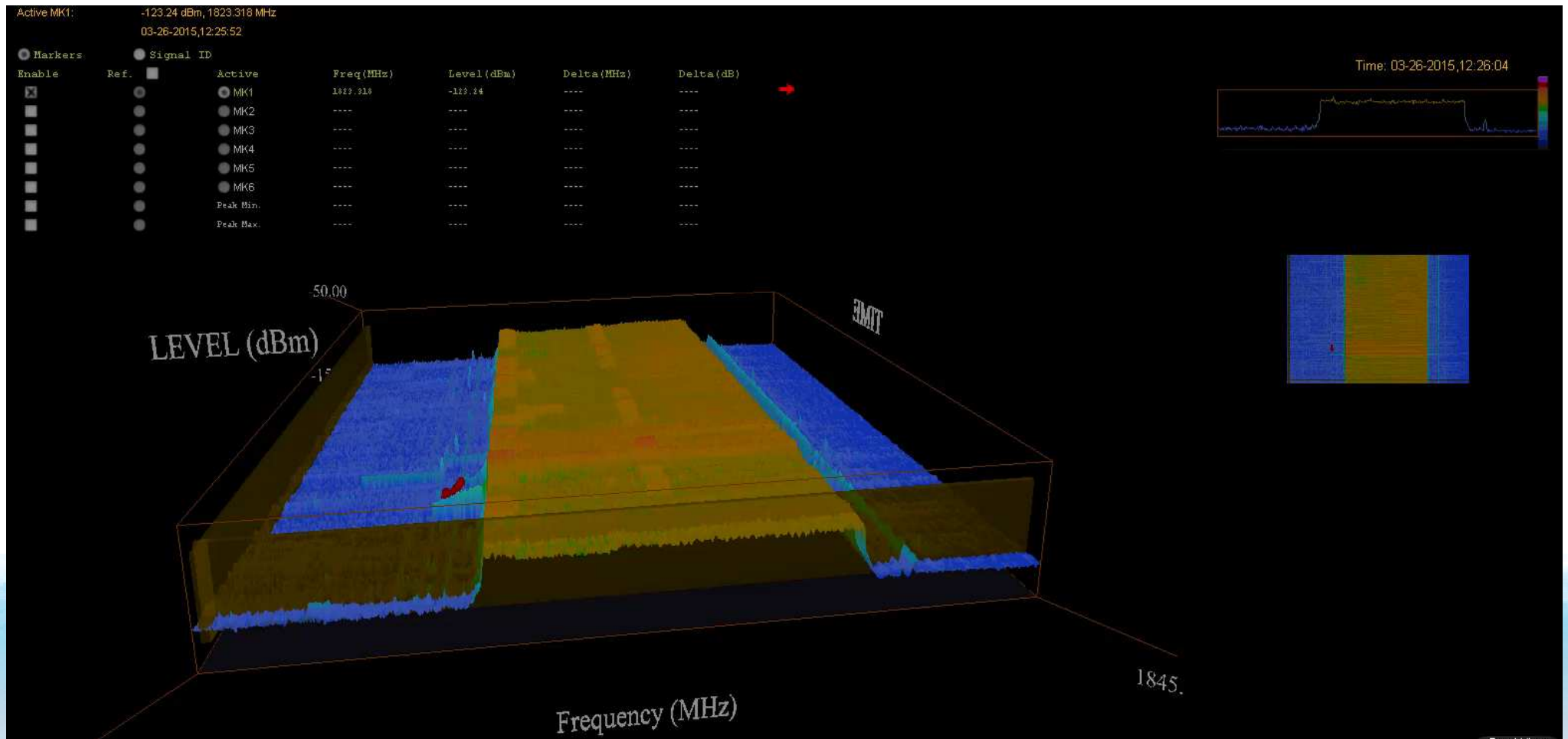


Spectrum Master/BTS Master

Interference analyzer



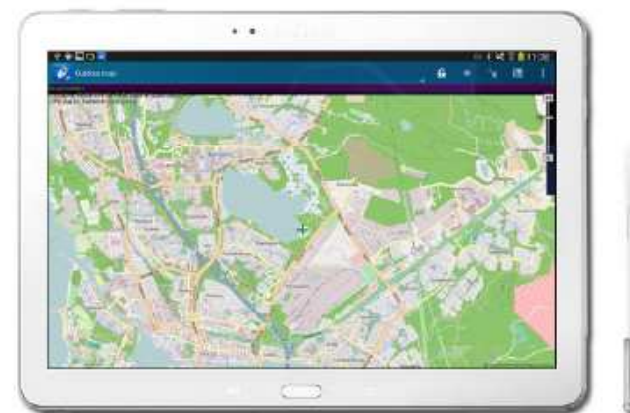
Spectrum Master/BTS Master Interference analyzer



Consists of smart phone and tablet based tools supporting Android



Nemo Handy-A with
Samsung Galaxy S5

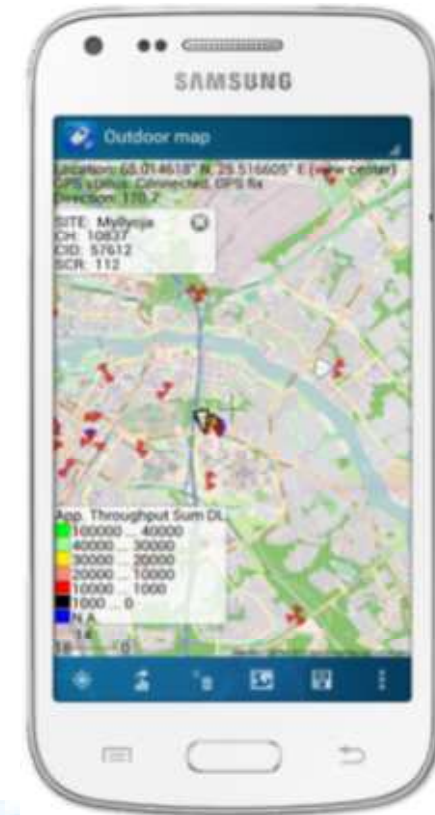


Nemo Handy-A with Samsung
Galaxy Note 10.1 2014 edition

NEMO HANDY KEY FEATURES

HKE
elektronické měřicí přístroje

- Supports GSM/WCDMA/HSPA/HSPA+/LTE/WiFi measurements
- Application testing with scripts
- Automated testing
- Comprehensive real-time voice quality testing based on POLQA and PESQ
- Forcing commands for system, band, LTE PCI and preferred carrier lock (UMTS)*
- Indoor map with markers and geodetic coordinates (support e.g. for iBwave maps)
- Live outdoor map with base station overlay
- Notifications on the map and graphs
- HTML testing with real web browser
- Direct upload of log files to an FTP server
- LTE/CDMA dual radio support



NEMO HANDY KEY FEATURES

User interface:

Page splits displaying several views

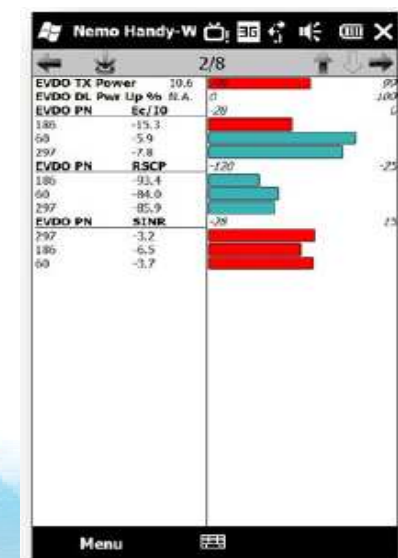
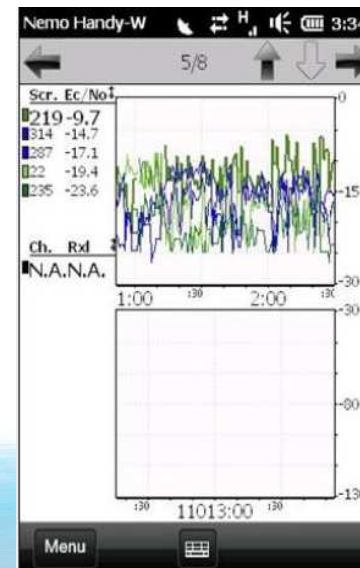
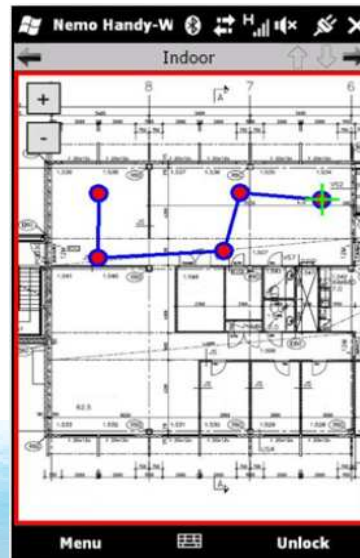
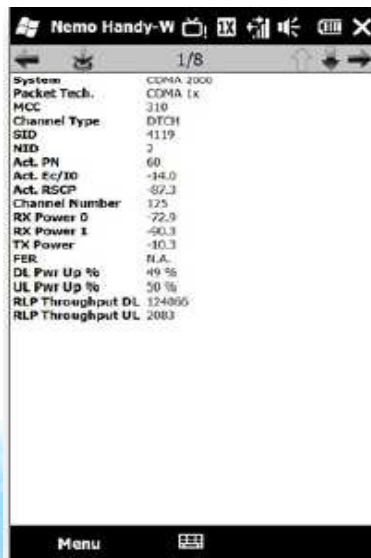
Custom page building

Bar graphs, line graphs, numerical views

Indoor map

Outdoor map

Real-time statistics



SAMSUNG GALAXY CORE LTE SM-G386F WITH BROADCOM CHIPSET

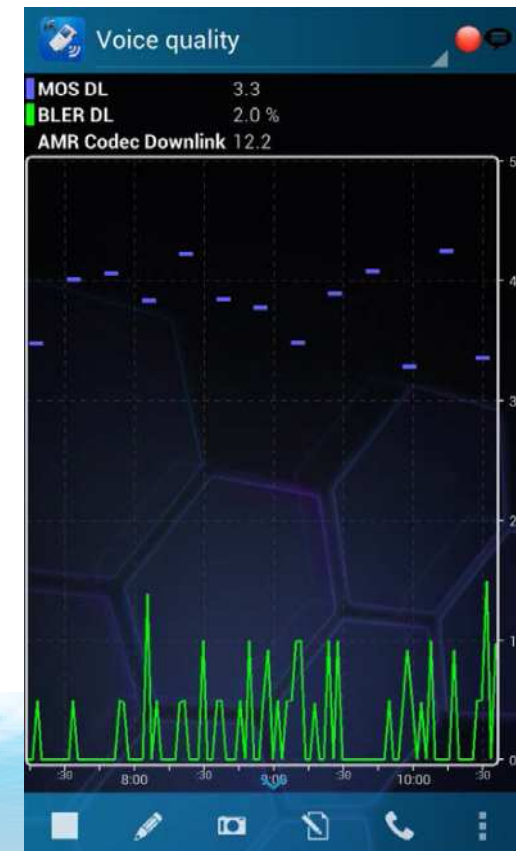
Nemo Handy-A now supports Samsung Galaxy Core LTE SM-G386F with Broadcom chipset, including extensive forcing features:

- System lock
- Band lock
- Cell barring
- Channel (ARFCN) lock in GSM
- Carrier (UARFCN) and scrambling code lock in UMTS
- Carrier (EARFCN) and PCI lock in LTE
- For controlling handovers: Measurement suppression (to prevent handovers)
- Measurement biasing (for assisted handovers)



Nemo Handy-A, QUALCOM CHIPSET **HKE** elektronické měřicí přístroje

Voice Quality Testing (POLQA and PESQ)
Uplink and downlink
SWB (SuperWideband) and NB (Narrowband)
POLQA measurement modes
Can be performed between two Nemo Handy-A terminals or between a terminal and Nemo Server
Real-time calculation of voice quality score (MOS) for POLQA, individual MOS scores are displayed during the call



Handy-A VoLTE Views Voice MOS and SIP Signaling



Signaling messages

↓ Trying	16:03:45.661	SIP
↓ Session progress	16:03:47.127	SIP
↑ PRACK	16:03:47.184	SIP
↓ Session progress	16:03:47.567	SIP
↓ OK	16:03:47.809	SIP
↓ Ringing	16:03:48.136	SIP
↓ OK	16:03:48.211	SIP
↑ ACK	16:03:48.316	SIP
↓ INVITE	16:03:51.698	SIP
↑ Trying	16:03:51.741	SIP
↑ OK	16:03:52.205	SIP
↓ ACK	16:03:52.566	SIP

Feb 12, 2014 4:03:56 PM CST

Pevný obal měřicích terminálů



NEMO Walker Air

Centralized control of Slave units from the Master
Synchronized time and start/stop measurements
Synchronized script events
Status display of all units
Indoor marker sharing to Slaves
Master does not measure or perform scripts

- Supports all the same testing functionalities as Nemo Handy-A, including VQ POLQA and PESQ



NEMO Walker Air

Monitor the status of all Slaves on real time

Script status

Battery status

Real-time success rates for transactions

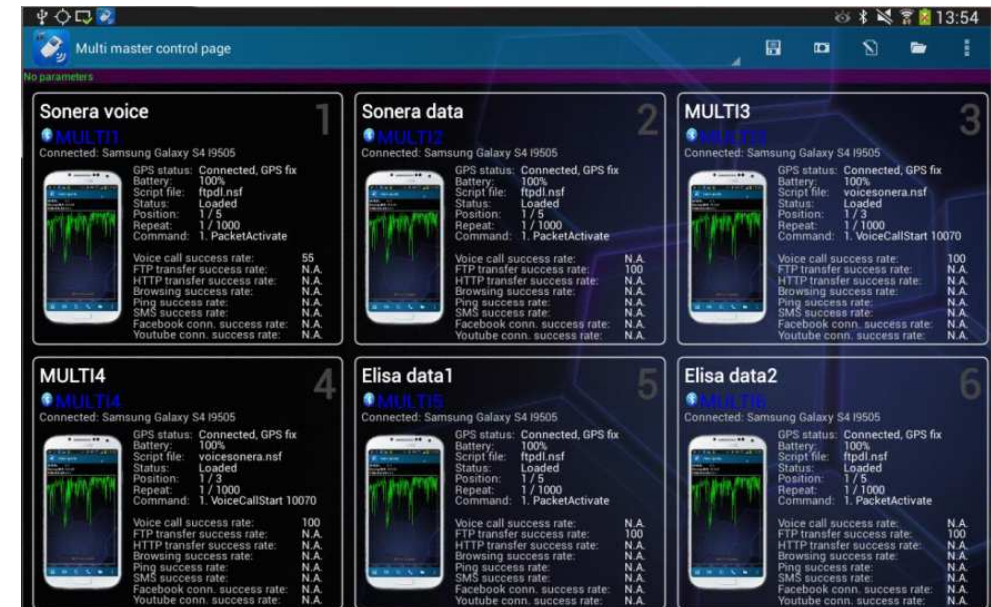
User-defined KPIs

- Full control of Slaves Connect/disconnect Slaves

Define measurement scripts

Set device labels (free-form text describing the device, saved to logfile)

Control logfile upload of the Slaves



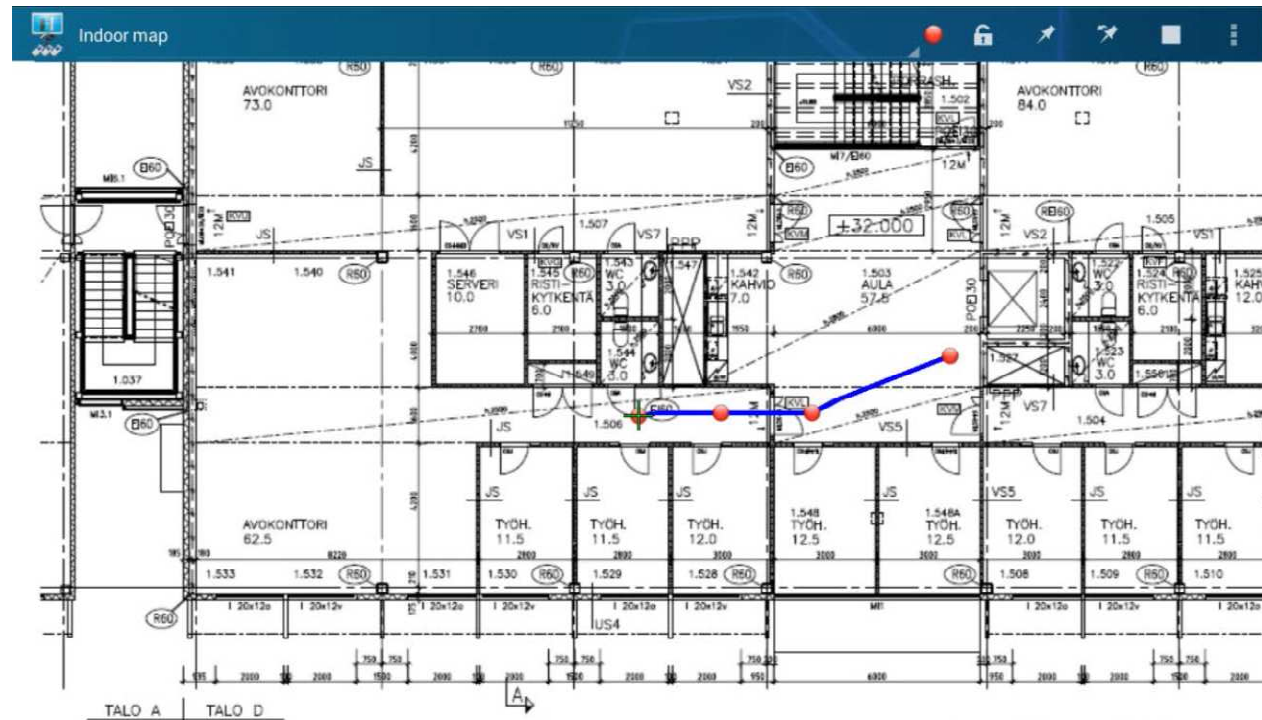
NEMO Walker Air

HKE
elektronické měřicí přístroje

Floor plan is loaded into the Master device

Waypoints are placed on the floor plan during the measurements

Waypoints are embedded on the Slave logfiles automatically to provide location information



NEMO Walker Air

HKE
elektronické měřicí přístroje

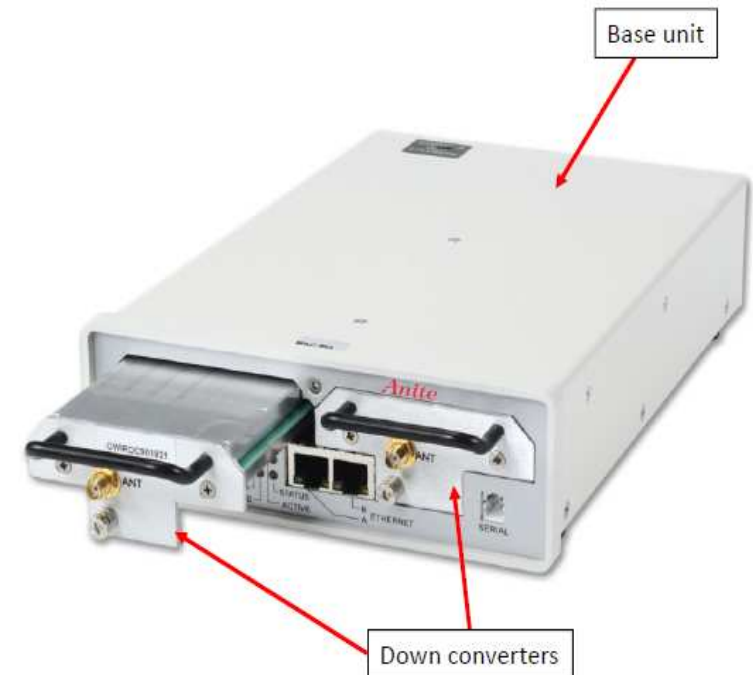


3x10,000mAh Verbatim USB battery back

- Runtime of the complete system: 10 h
- One 12/220/110v charging cable for the whole system

NEMO FSR1

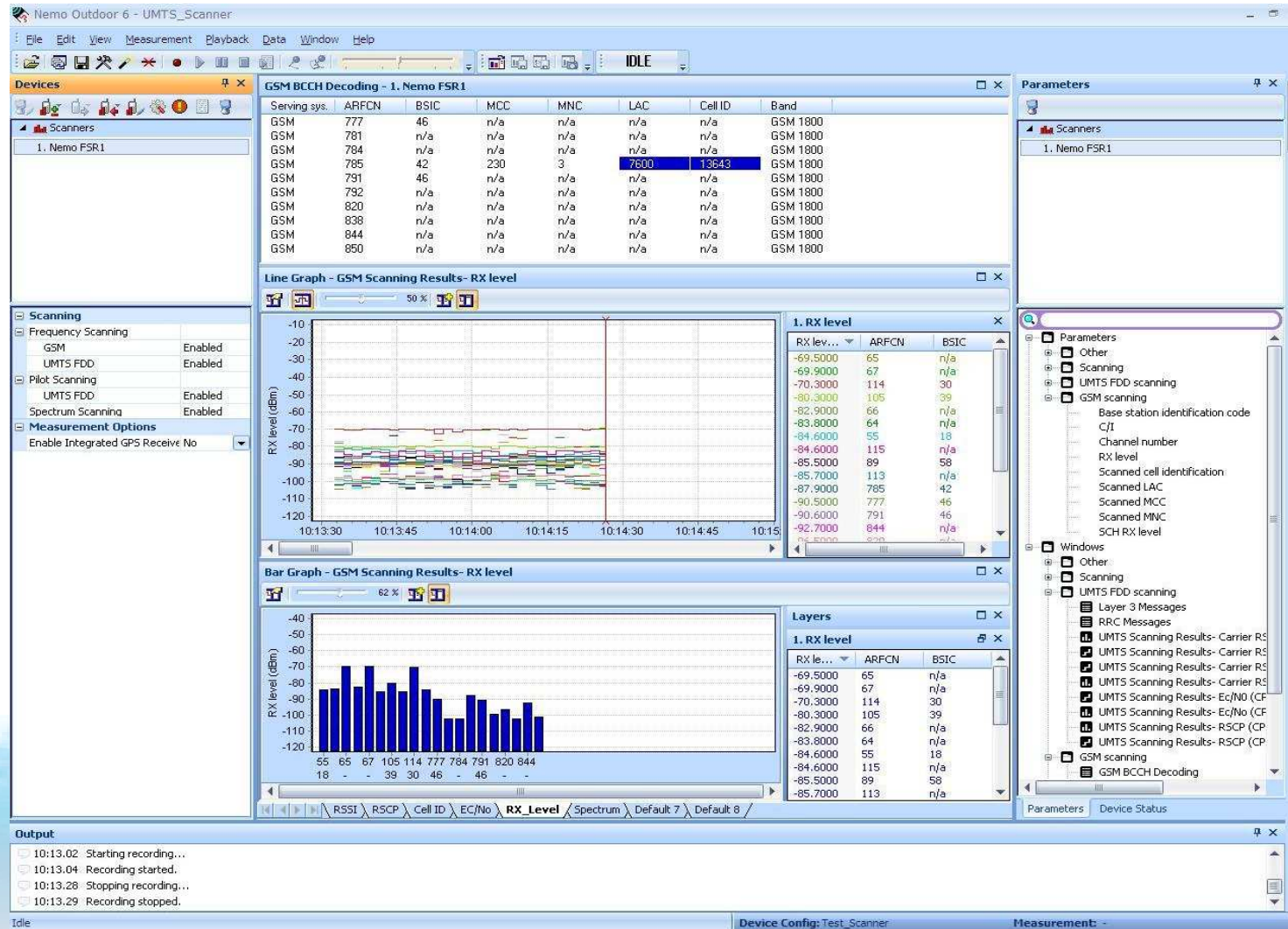
- Features two plug-in modular RF down converters (DC)
 - Down converters available in many frequency band configurations
 - Up to eight bands in a single receiver
 - Down converters can be quickly and easily changed in the field
- Bands and technologies are independent
- Technologies supported: LTE, WCDMA, GSM, CDMA, and EVDO
 - Technologies can be added remotely with license upgrades



NEMO FSR1 DOWN CONVERTERS FREQUENCY RANGES

Model	Band 1	Band 2	Band 3	Band 4
GWIRDC94182126 EU QB	925 – 960 MHz • GSM 900 DL • WCDMA 900 DL • LTE 900 DL (E-UTRA band 8)	1805 – 1880 MHz • GSM 1800 DL • WCDMA 1800 DL	2110 – 2170 MHz • WCDMA 2100 DL, WCDMA 2100AWS DL • LTE 2100, LTE 2100AWS (E-UTRA bands 1, 4)	2500- 2690MHz • LTE 2600 DL/UL (E-UTRA band 7) 2570-2620MHz LTE (E-UTRA band 38)
GWIRDC74851921 NA QB	728 – 768 MHz LTE 700 DL (E-UTRA bands 12, 13, 14)	869 – 894 MHz • GSM 850 DL • WCDMA 850 DL • LTE 850 DL (E-UTRA band 5) • CDMA/ EVDO 850 DL	1930 – 1990 MHz • GSM 1900 • WCDMA 1900 DL • LTE 1900 DL (E-UTRA band 2,) • CDMA/ EVDO 1900 DL	2110 – 2170 MHz • WCDMA 2100 DL • WCDMA 2100AWS DL • LTE 2100, LTE 2100AWS (E-UTRA bands 1, 4)
GWIRDC80192326 LTE FDD/TDD	791 – 821 MHz • LTE 800 (E-UTRA band 20)	1900 – 1920 MHz • LTE 1900 (E-UTRA band 33)	2300 – 2400 MHz • LTE 2300 (E-UTRA band 40)	2496 – 2690 MHz • LTE 2600 (E-UTRA bands 38, 41)
FSR1 81182126-20 EU QB	791 – 821 MHz • LTE 800 DL (E-UTRA band 20)	1805 – 1880 MHz • GSM 1800 DL • WCDMA 1800 DL • LTE 1800 DL (E-UTRA bands 3 and 9)	2110 – 2170 MHz • WCDMA 2100 DL • WCDMA 2100AWS DL • LTE 2100, LTE 2100AWS (E-UTRA bands 1, 4, 10)	2496 - 2690MHz • LTE 2300, 2500, 2600 (E-UTRA bands 7, 38, 41)
FSR1 77881921-20 NA QB	729- 803 MHz • LTE 700 DL (E-UTRA bands 12, 13, 14, 17, 28)	859 – 894 MHz • GSM 850 DL • WCDMA 850 DL • LTE 850 DL (E-UTRA bands 5, 18, 19, 26) • CDMA/ EVDO 850 DL	1930 – 1995 MHz • GSM 1900 • WCDMA 1900 DL • LTE 1900 DL, (E-UTRA bands 2, 25, 36) • CDMA/ EVDO 1900 DL	2110 – 2170 MHz • WCDMA 2100 DL • WCDMA 2100AWS DL • LTE 2100, LTE 2100AWS (E-UTRA bands 1, 4, 10)
MIMO FSR1 1826-20 2x2 BW 20MHz	1805 – 1880 MHz • GSM 1800 DL • WCDMA 1800 DL • LTE 1800 DL (E-UTRA bands 3, 9)	2496- 2690MHz • LTE 2300, 2500, 2600 (E-UTRA bands 7, 38, 41)		

NEMO FSR1 RX Level



Invex II

HKE
elektronické měřicí přístroje



Invex II

Simultaneous testing of max 50 test devices 29 smartphones OR 50 modems (or combinations) AND 3 scanners

Benchmark more with less HW simultaneously all technologies up to LTE-A and beyond, enables test of multiple technologies with one drivetest

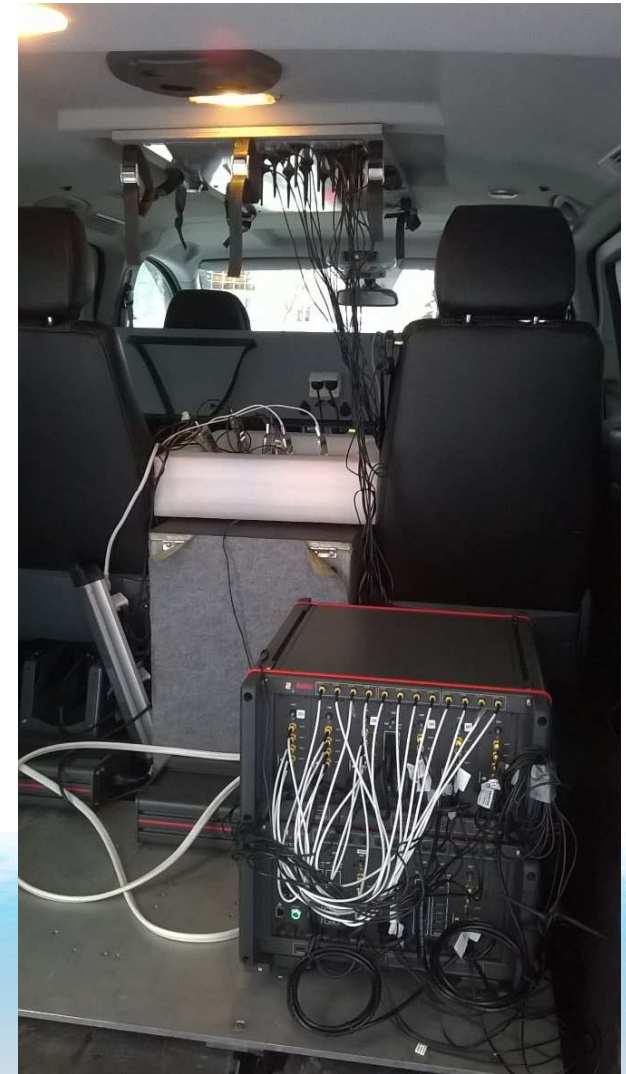
Better performance - Higher test device density per system

Designed for testing/benchmarking high datarates LTE category 6 and beyond

Support for current and future MIMO devices

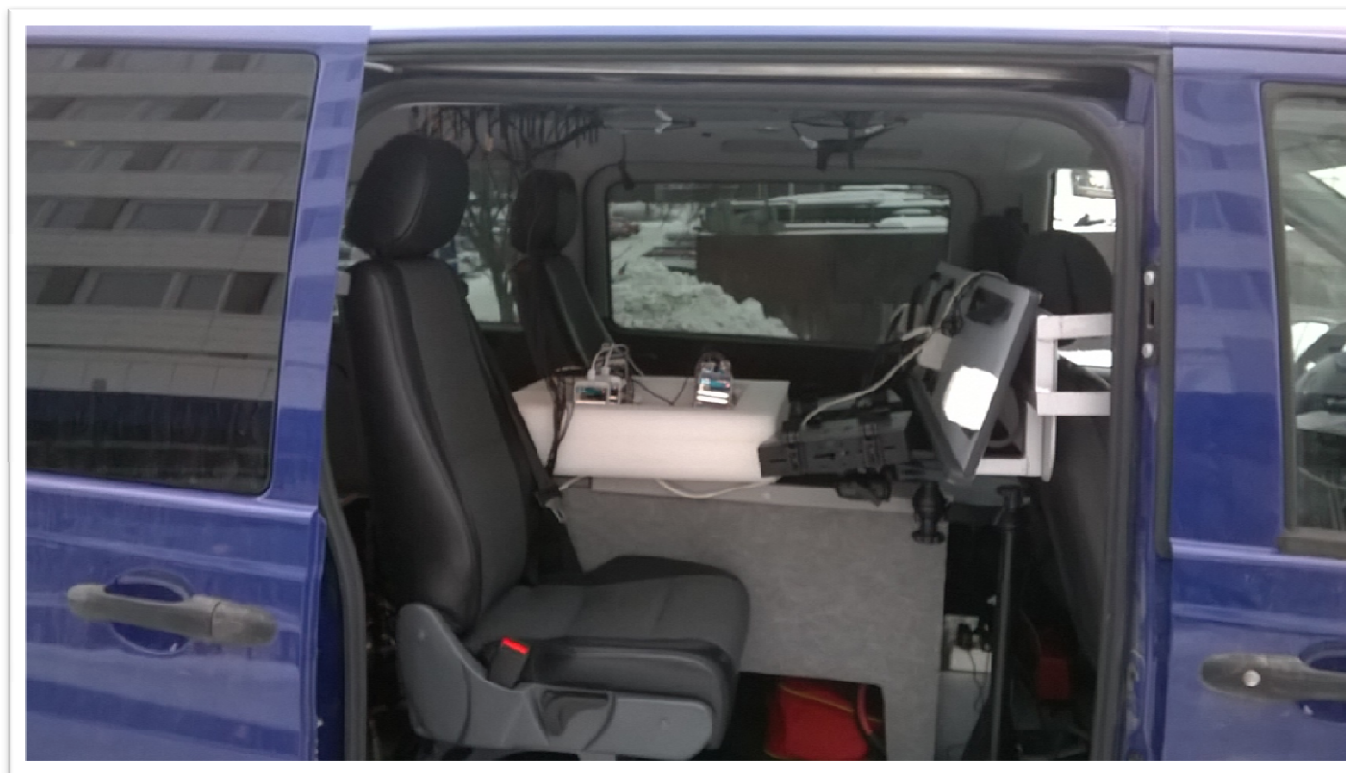
With Low power consumption per test device

Future proof - for LTE-A and beyond



Invex II

HKE
elektronické měřicí přístroje



SIP (Session Initiation Protocol) Signaling Events and Decoding

IMS Registration

```

SIP signaling message 19:27:52.772 SUBSCRIBE
SIP signaling message 19:27:52.888 200 OK
SIP signaling message 19:27:53.022 NOTIFY
SIP signaling message 19:27:53.054 200 OK
SIP signaling message 19:34:12.368 REGISTER
SIP signaling message 19:34:15.095 401 Unauthorized
SIP signaling message 19:34:15.468 REGISTER
SIP signaling message 19:34:16.480 200 OK
SIP signaling message 19:34:16.580 SUBSCRIBE
SIP signaling message 19:34:17.137 200 OK
SIP signaling message 19:34:22.618 NOTIFY
SIP signaling message 19:34:22.645 200 OK
    
```

```

SIP SIGNALLING MESSAGE
Time: 19:34:16.480

SIP/2.0 200 OK
CSeq: 2 REGISTER
f: ;tag=2001673280
i: 400334655
t;tag=SDp46r999-52868092-1392168857180090
v: SIP/2.0/TCP [2600:380:19e0:174:248a:7843:7a0b:2126]:5011;branch=z9hG4bK1101056987smg;transport=TCP
u: reg
Contact: ;expires=2400;+g.3gpp.icsi-ref="urn%3Aurn-7%3A3gpp-service.ims.icsi.mmtel";+g.3gpp.smsip;+sip.instance=""
Date: Wed, 12 Feb 2014 01:34:17 GMT
    
```

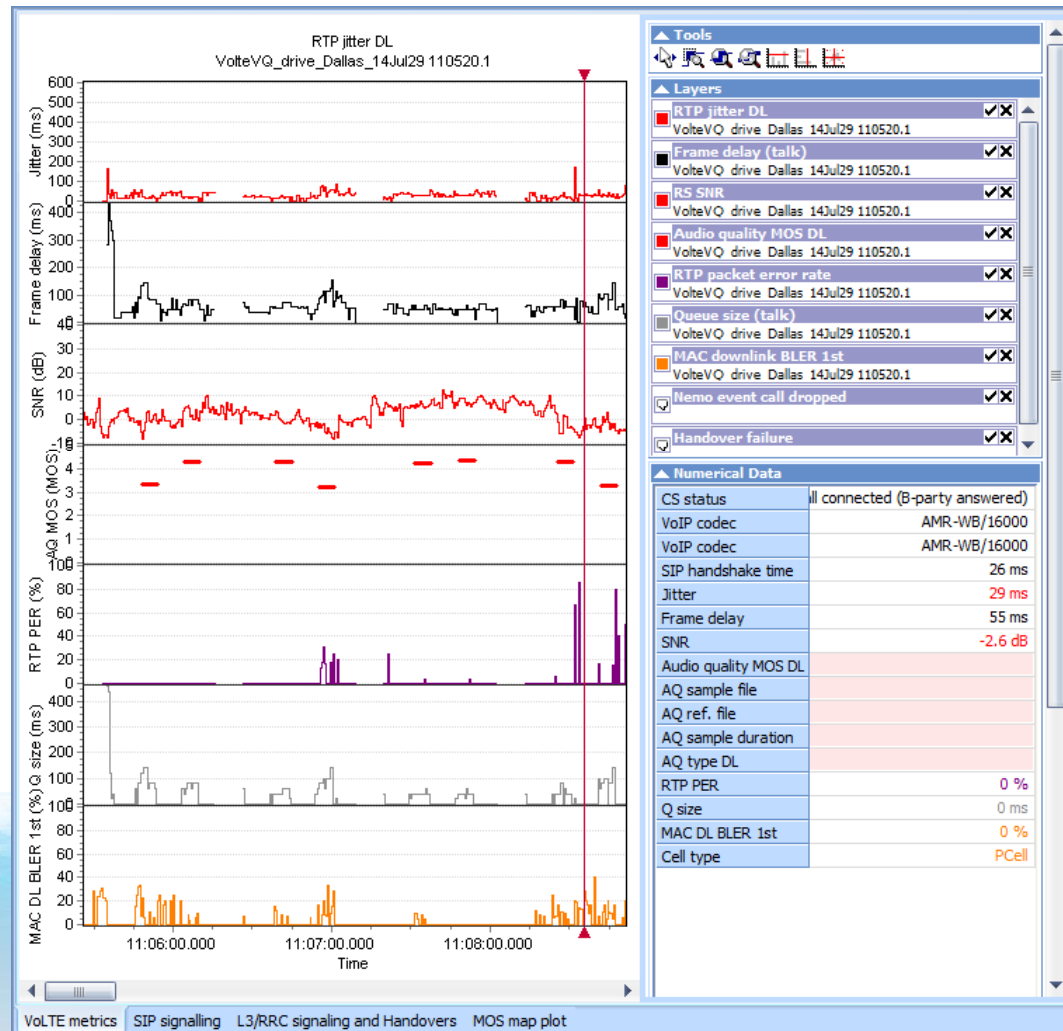
Call Setup Signaling

- Call attempt trigger point: SIP Invite
- Call connected trigger point: SIP Ringing

	Event ID	System	Transf. dir.	Time	Message name
274.	SIPSM	LTE FDD	Uplink	9:59:36.242	INVITE
275.	SIPSM	LTE FDD	Downlink	9:59:36.425	100 Trying
276.	SIPSM	LTE FDD	Downlink	9:59:37.860	183 Session progress
277.	SIPSM	LTE FDD	Downlink	9:59:37.963	200 OK
278.	SIPSM	LTE FDD	Downlink	9:59:38.136	200 OK
279.	SIPSM	LTE FDD	Downlink	9:59:38.425	180 Ringing
280.	SIPSM	LTE FDD	Downlink	9:59:42.952	200 OK

Main VoLTE Metrics in Drive Test Tools elektronické měřicí přístroje

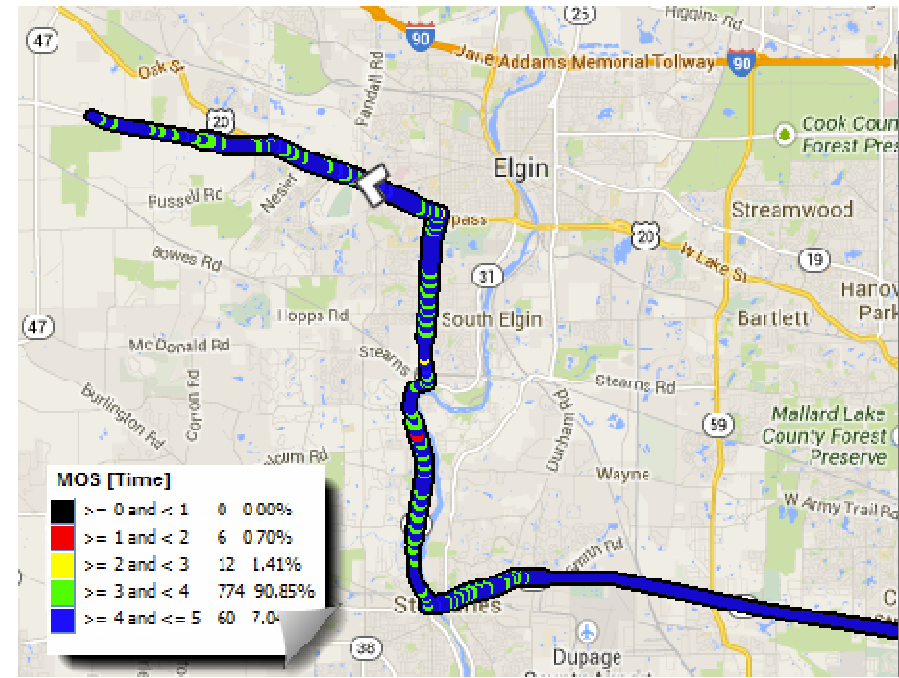
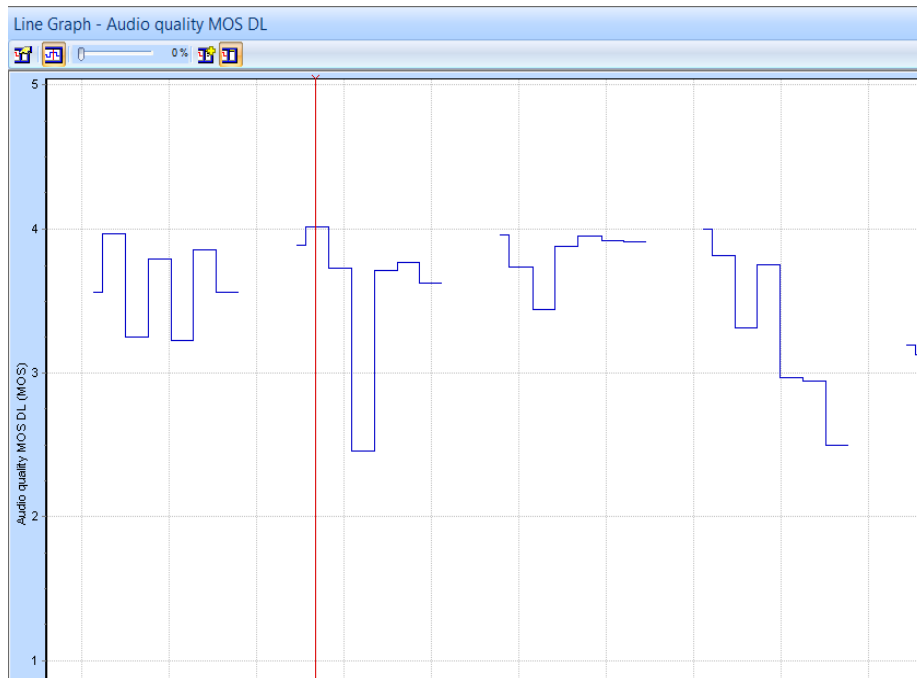
- Following VoLTE parameters are logged among normal LTE parameters:
 - **RTP PER** (Packet Error Rate) (%)
 - **RTP jitter**: delay variation of consecutive RTP packets (ms)
 - **Frame delay** (talk and idle) (ms): delay of received audio frame (ms) (time a frame has been in the dejitter buffer during the reporting period)
 - **SIP** signalling
 - **RTP** signalling
 - **Call statistics**
 - Number of calls
 - Call setup success rate
 - Dropped call rate
 - **POLQA MOS (SWB or NB)**



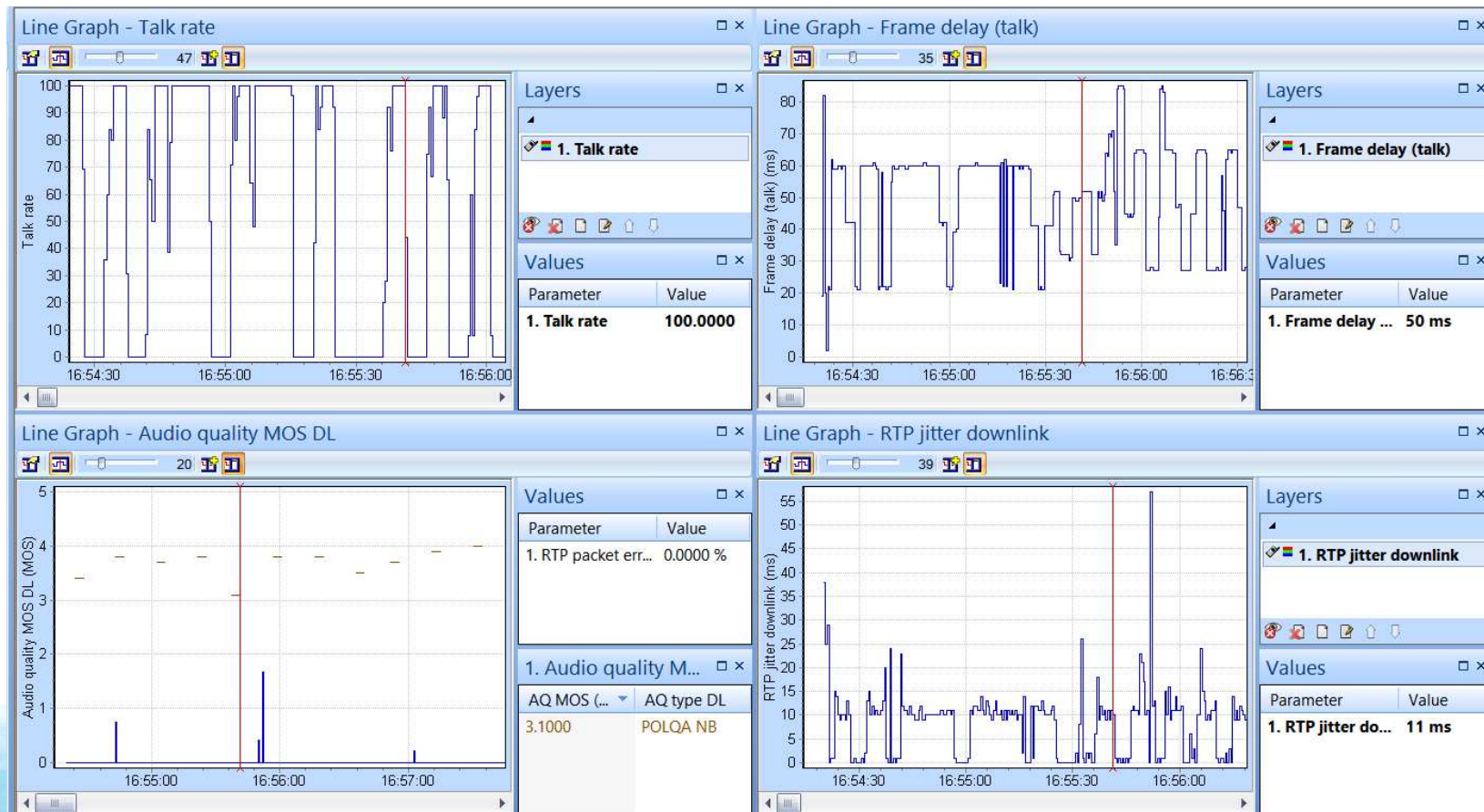
VOLTE Field Measurements – Audio Quality and RF KPIs



Volte Voice Quality, POLQA MOS Score



VoLTE IP KPI Example: Talk Rate, Frame Delay, Voice MOS, RTP Jitter



LTE CS Fallback Signaling, Mobile Originated Call

Event ID	System	Transf. dir.	Time	Message name
L3SM	LTE FDD	Uplink	30.7.2013 9:20:58.800	EXTENDED_SERVICE_REQUEST
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.801	RRCCConnectionRequest
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.865	Paging
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.904	RRCCConnectionSetup
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.908	RRCCConnectionSetupComplete
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.939	SecurityModeCommand
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.939	SecurityModeComplete
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.964	RRCCConnectionReconfiguration
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.965	RRCCConnectionReconfigurationComplete
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.981	UECapabilityEnquiry
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.984	UECapabilityInformation
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:58.984	RRCCConnectionReconfiguration
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:58.988	RRCCConnectionReconfigurationComplete
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:59.654	MeasurementReport
RRCSM	LTE FDD	Downlink	30.7.2013 9:20:59.669	RRCCConnectionRelease
RRCSM	LTE FDD	Uplink	30.7.2013 9:20:59.694	MeasurementReport
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:00.919	LOCATION_UPDATING_REQUEST
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:00.919	ROUTING_AREA_UPDATE_REQUEST
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:01.240	AUTHENTICATION_REQUEST
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:01.285	AUTHENTICATION_RESPONSE
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:01.410	IDENTITY_REQUEST
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:01.410	IDENTITY_RESPONSE
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:01.740	AUTHENTICATION_AND_CIPHERING_REQUEST
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:01.799	AUTHENTICATION_AND_CIPHERING_RESPONSE
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:02.070	LOCATION_UPDATING_ACCEPT
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:02.071	TMSI_REALLOCATION_COMPLETE
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:02.073	CM_SERVICE_REQUEST
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:02.220	CM_SERVICE_ACCEPT
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:02.221	SETUP
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:02.340	ROUTING_AREA_UPDATE_ACCEPT
L3SM	UMTS FDD	Uplink	30.7.2013 9:21:02.343	ROUTING_AREA_UPDATE_COMPLETE
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:02.370	CALL_PROCEEDING
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:03.861	ALERTING
L3SM	UMTS FDD	Downlink	30.7.2013 9:21:06.623	CONNECT

Search

Layers

Information

L3 signaling

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Uplink

EXTENDED SERVICE REQUEST 3GPP TS 24.301 ver 9.7.0 Rel 9

M Protocol Discriminator (hex data: 7)
(0x7) EPS mobility management messages

M Security header type (hex data: 0)
Security header type value: Plain NAS message, not security protect

M Message Type (hex data: 4c)
Message number: 76

M Service type (hex data: 0)
Service type value: mobile originating CS fallback or 1xCS fallback

M NAS key set identifier (hex data: 0)
TSC: native security context
NAS key set identifier: 0

M M-TMSI (hex data: 05f4d0f8 cf49)
Type of identity: TMSVP-TMSVM-TMSI
Identity digits: d0f8cf49

O EPS bearer context status (hex data: 57022000)
EBI(5): ACTIVE
EBI(6): INACTIVE
EBI(7): INACTIVE
EBI(8): INACTIVE
EBI(9): INACTIVE
EBI(10): INACTIVE
EBI(11): INACTIVE
EBI(12): INACTIVE

5s

3s, B-Party CSFB delay

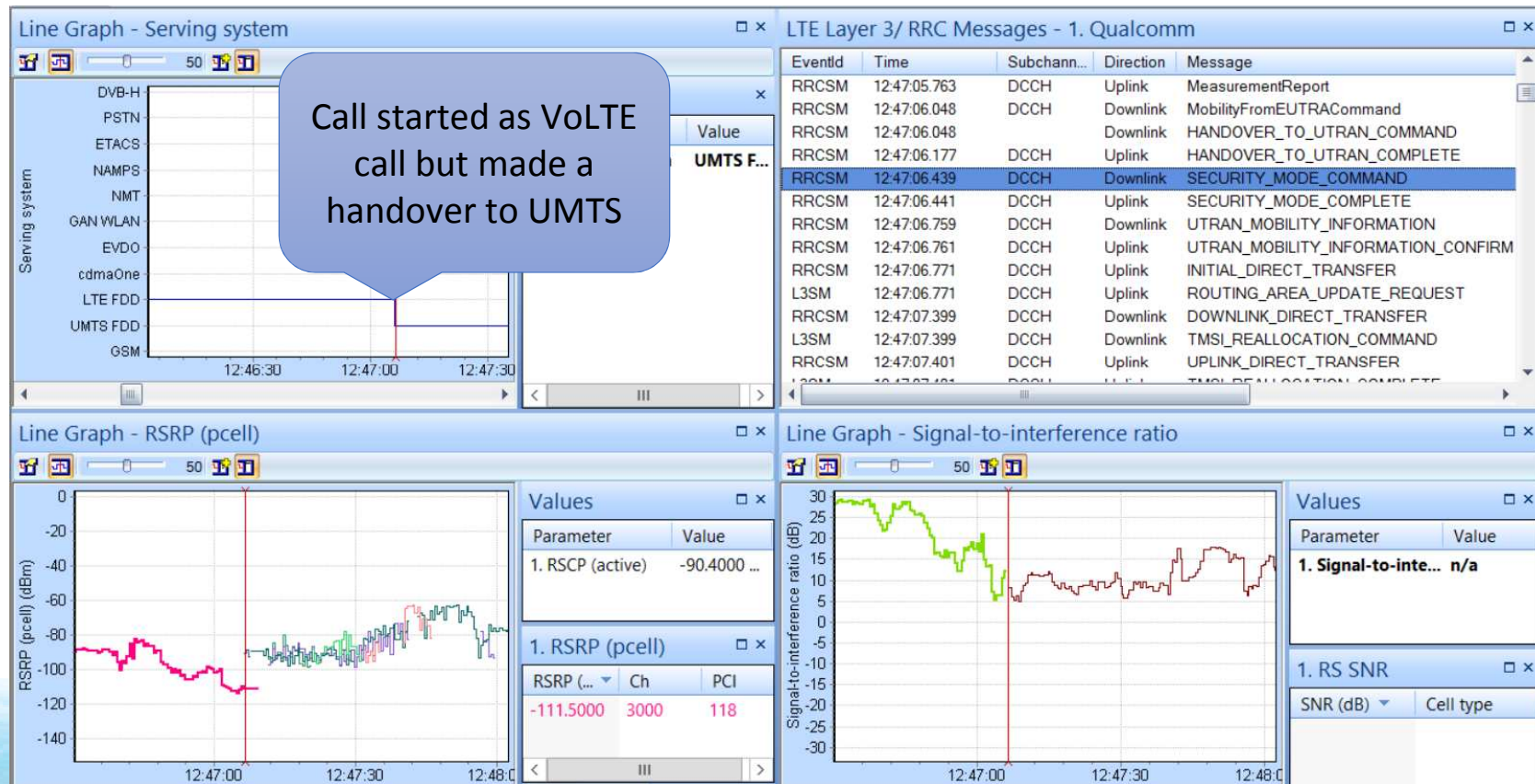
VOLTE /SRVCC analysis



Single Radio Voice Call Continuity (SRVCC)

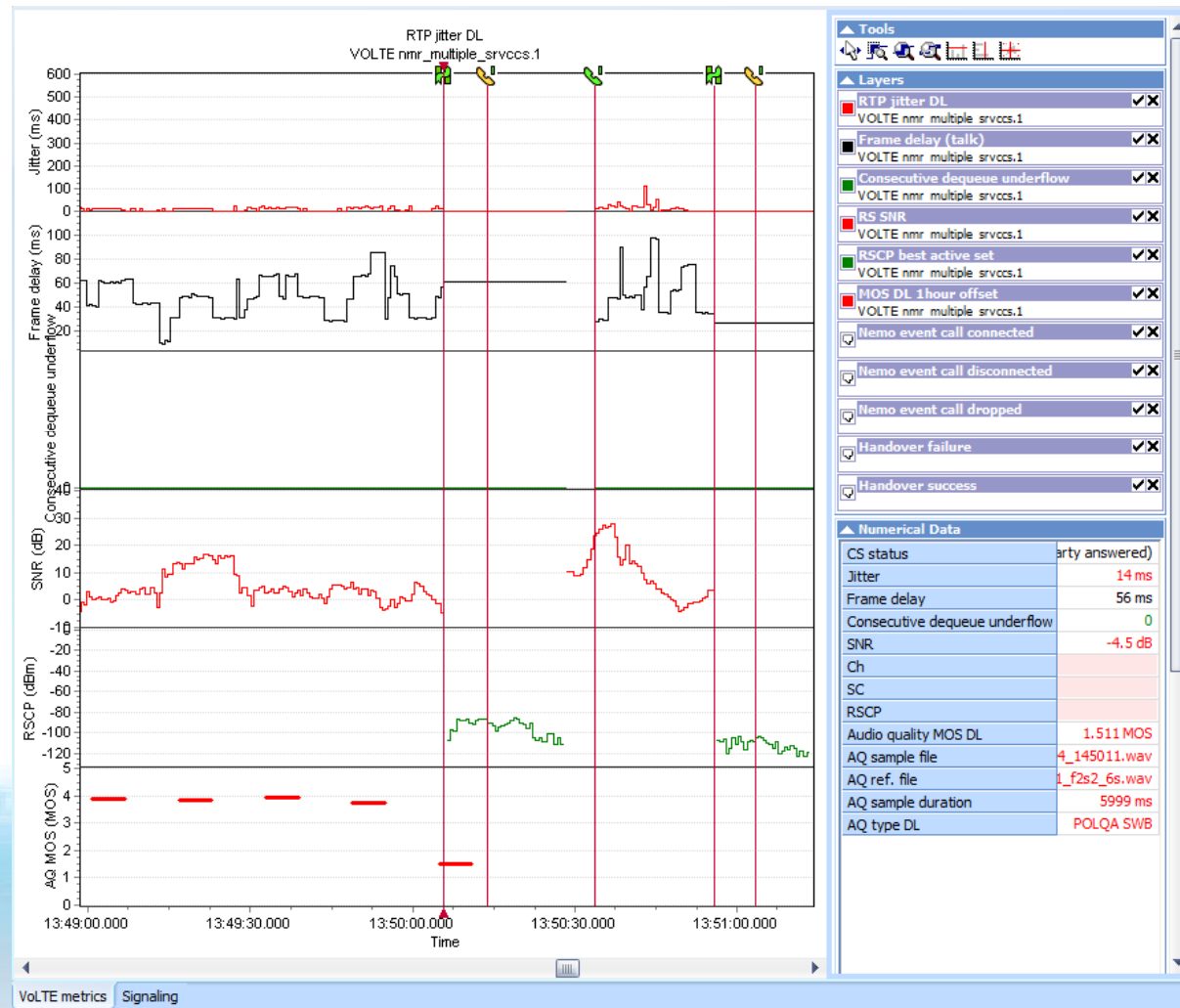
SRVCC is an LTE functionality that allows a VoIP/IMS call in the LTE packet domain to be moved to a legacy voice domain

VoLTE SRVCC, LTE -> WCDMA, Operator in France

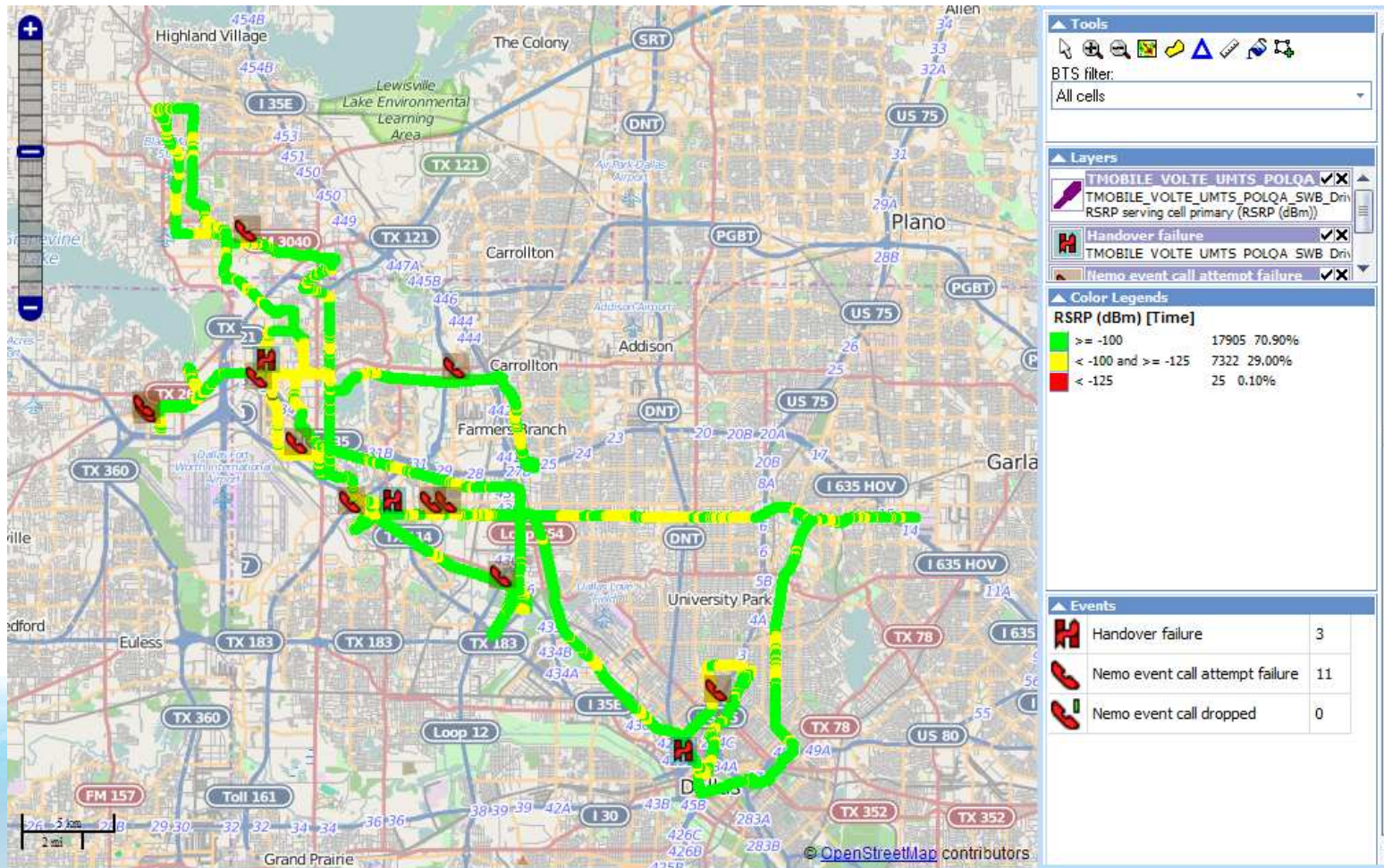


VOLTE SRVCC & Voice Quality

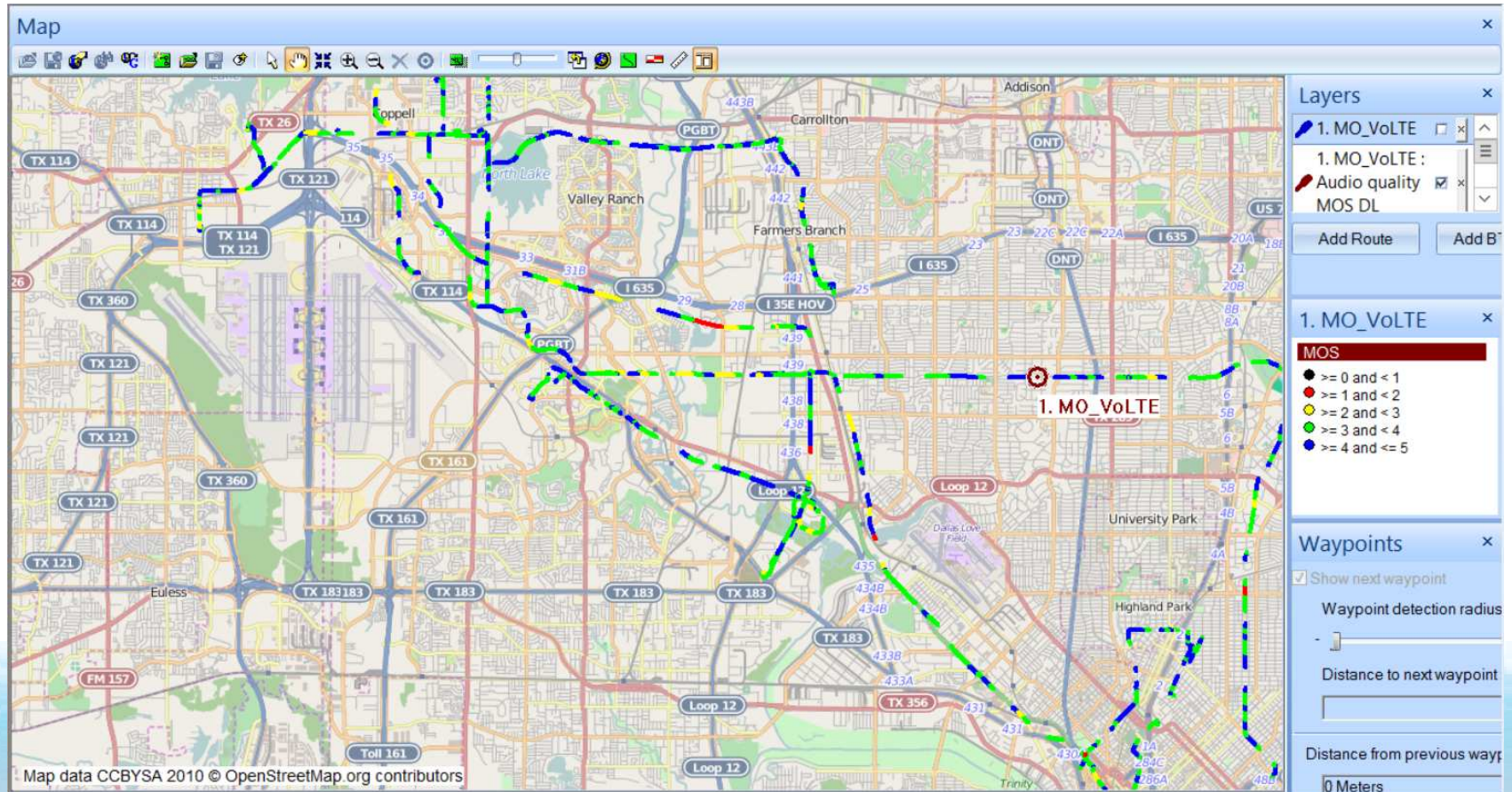
- ~200ms audio interruption, or longer
- → degraded MOS score



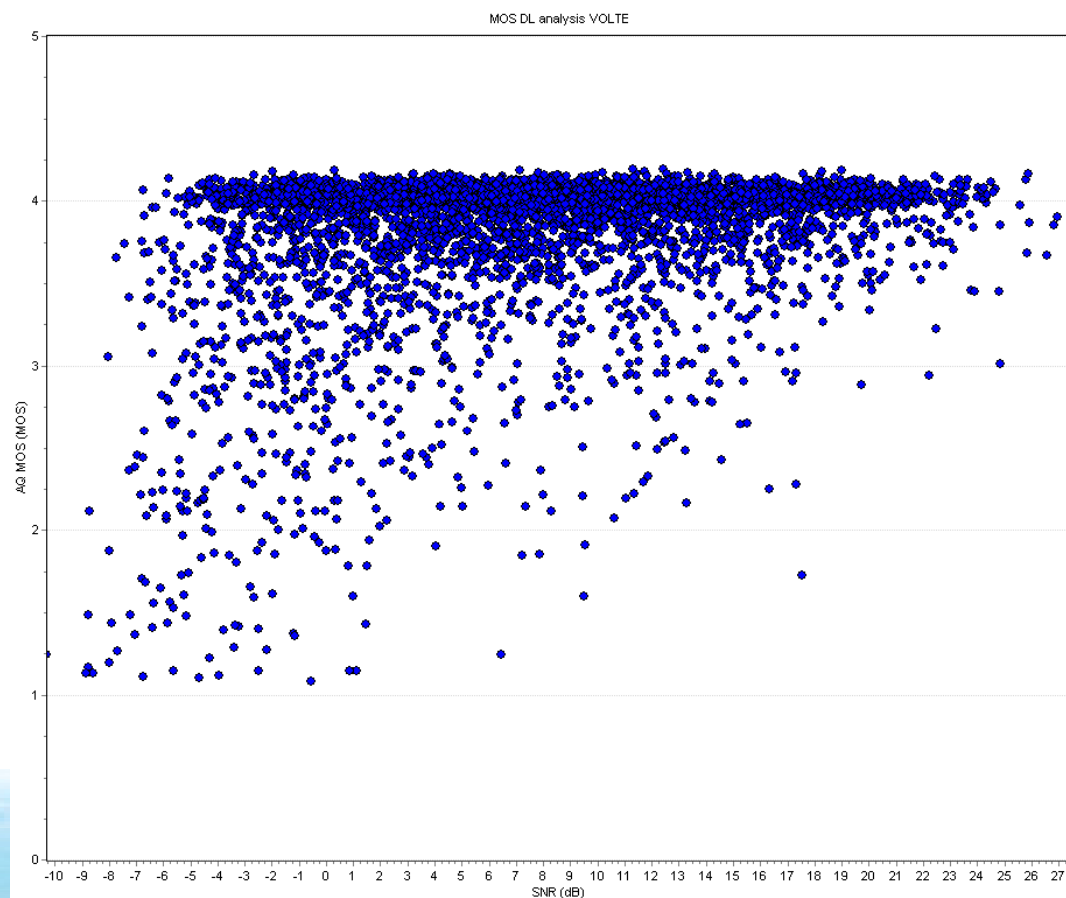
VOLTE Measurements -Commercial Volte Network



VOLTE Measurements -Commercial Volte Network

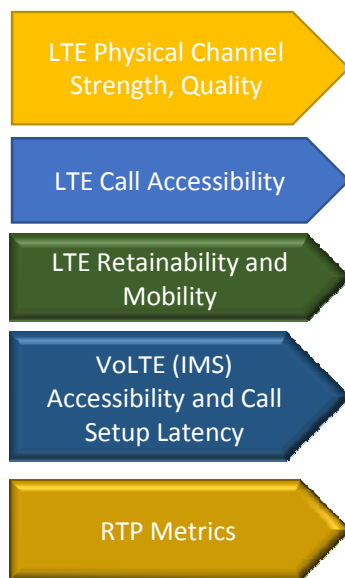


VoLTE DL MOS vs SNR



- Correlation between RF and voice quality exists

Nemo WINDCatcher VoLTE Acceptance Report



RF Metrics	Mandatory Check	Total	Passed	Average
Serving RSRP	Mandatory	242	242	-79.24
Serving RSRQ	Mandatory	242	242	-6.34
Serving RS CINR	Non Mandatory	0	0	--
Serving Channel RSSI	Mandatory	242	242	-64.55
Average PUSCH Tx Power	Mandatory	242	242	-21.53
Average PUCCH Tx Power	Mandatory	242	242	-26.17
Accessibility		Total	Passed	Average
LTE RRC Connection Setup Success Rate	Mandatory	2	2	
VoLTE Bearer Setup Success Rate	Mandatory	1	1	
Retainability/HO Metrics		Total	Passed	Average
LTE Handover Success Rate	Mandatory	0	0	
LTE RRC Connection Drop Rate	Mandatory	2	0	
Handover Latency	Mandatory	0	0	--
Handover Packet Loss Rate (to be developed)	Non Mandatory	0	0	
SIP Metrics		Total	Passed	Average
SIP Session Setup Success Rate	Mandatory	1	1	
SIP Setup Time 180 Ringing [SIP Invite to 180 Ringing]	Non Mandatory	1	1	206
SIP Setup Time 200 OK [SIP Invite to 200 OK]	Mandatory	1	1	206
SIP Registration Success Rate	Non Mandatory	0	0	
SIP Registration Latency	Non Mandatory	0	0	--
SIP Session Disconnect Success Rate	Non Mandatory	1	1	
SIP Disconnect Time [SIP Bye to SIP Bye 200 OK]	Non Mandatory	1	1	41.00
RTP Metrics		Total	Passed	Average
AMR-WB				
RTP Packet Delay	Mandatory	321	321	20.01
Jitter	Mandatory	321	321	2.77
Round Trip Time	Non Mandatory			129.66
Packet Loss Rate (Whole Drive)	Mandatory	31948	31531	
Packet Loss Rate (Bin Based)	Mandatory	321	306	
AMR				

Nemo WINDCatcher VoLTE Acceptance Report

KPI List		PERFORMANCE						
RF Metrics	Mandatory Check	Total	Passed	Average	MEAS	THRESHOLD	TARGET	STATUS
Serving RSRP	Mandatory	196	195	-85.51	99.49%	>=-105dBm	>95%	Pass-Mandatory
Serving RSRQ	Mandatory	192	179	-11.09	93.23%	>=-15dB	>90%	Pass-Mandatory
Serving RS CINR	Non Mandatory	196	193	6.93	98.47%	>=-5dB	>95%	Pass-Non mandatory
Serving Channel RSSI	Mandatory	196	196	-57.48	100.00%	>=-95dBm	>95%	Pass-Mandatory
Average PUSCH Tx Power	Mandatory	79	30	11.54	37.97%	<=10dBm	>90%	Fail-Mandatory
Average PUCCH Tx Power	Mandatory	96	86	0.6	89.58%	<=10dBm	>90%	Fail-Mandatory
Accessibility		Total	Passed	Average	MEAS	THRESHOLD	TARGET	STATUS
LTE RRC Connection Setup Success Rate	Mandatory	23	22		95.65%	>90%	>90%	Pass-Mandatory
VoLTE Bearer Setup Success Rate	Mandatory	12	12		100.00%	>90%	>90%	Pass-Mandatory
Retainability/HO Metrics		Total	Passed	Average	MEAS	THRESHOLD	TARGET	STATUS
LTE Handover Success Rate	Mandatory	13	13		100.00%	>95%	>95%	Pass-Mandatory
LTE RRC Connection Drop Rate	Mandatory	22	21		4.55%	<2%	<2%	Fail-Mandatory
LTE RRC Connection Drop Rate (per 2 minutes hold time)	Mandatory	72	71		1.39%	<2%	<2%	Pass-Mandatory
Handover Latency	Mandatory	13	7	36.69	53.05%	<=20msec	>95%	Fail-Mandatory
Handover Packet Loss Rate (to be developed)	Mandatory	0	0		--	<=2%	>95%	--
SIP Metrics		Total	Passed	Average	MEAS	THRESHOLD	TARGET	STATUS
SIP Session Setup Success Rate (SIP Invite to 200 OK)	Mandatory	12	8		66.67%	>90%	>90%	Fail-Mandatory
SIP Session Success Rate (SIP Invite 200 OK to Bye 200 OK)	Mandatory	8	10		125.00%	>90%	>90%	Pass-Mandatory
SIP Invite to 100 Trng Success Rate	Mandatory	12	12		100.00%	>90%	>90%	Pass-Mandatory
SIP IMS Latency (Only TEMS Investigation)	Mandatory	0	0	--	--	<1500msec	>90%	--
SIP Setup Time 180 Ringing (SIP Invite to 180 Ringing)	Mandatory	0	0	--	--	<1000msec	>90%	--
SIP Setup Time 183 Ringing (SIP Invite to 183 Ringing)	Mandatory	0	0	--	--	<1000msec	>90%	--
SIP Setup Time 200 OK (SIP Invite to 200 OK)	Mandatory	8	0	5914.5	0.00%	<2000msec	>90%	Fail-Mandatory
SIP Handshake Latency (PRACK to PRACK 200 OK)	Non Mandatory	11	8	156.36	72.73%	<300msec	>90%	Fail-Non mandatory
SIP Conversational Delag (Invite 200 OK to 1st RTP)	Non Mandatory	8	8	217	100.00%	<500msec	>90%	Pass-Non mandatory
SIP Registration Success Rate	Non Mandatory	0	0		--	<90%	>90%	--
SIP Registration Latency	Non Mandatory	0	0	--	--	<1000msec	>90%	--
SIP Session Disconnect Success Rate	Non Mandatory	10	11		110.00%	>=90%	>90%	Pass-Non mandatory
SIP Disconnect Time (SIP Bye to SIP Bye 200 OK)	Non Mandatory	11	11	184.45	100.00%	<1000msec	>90%	Pass-Non mandatory
SIP - RTP Timeout Rate (per 2 minutes hold time)	Mandatory	72	71		1.39%	<2%	<2%	Pass-Mandatory
SEER		9	0		0.00%			
RTP Metrics		Total	Passed/Count	Average	MEAS	THRESHOLD	TARGET	STATUS
AMR-VB								
RTP Packet Delay	Non Mandatory	68	45	65.50	66.18%	<50msec	>95%	Fail-Non mandatory
Jitter	Mandatory	68	68	32.78	100.00%	<100msec	>90%	Pass-Mandatory
Round Trip Time	Non Mandatory	0	0	0.00	--	<100msec	>90%	--
Packet Loss Rate (Whole Drive)	Mandatory	21992	21842		0.68%	<5%	<5%	Pass-Mandatory
Packet Loss Rate (Bin Based)	Mandatory	68	65		4.41%	<2%	<5%	Pass-Mandatory
Handover Interruption Time	Non Mandatory	10	6	268.54	60.00%	<150msec	>90%	Fail-Non mandatory
Total Packet Loss, HO Packet Loss	Mandatory	150	5		3.33%	<50%	<50%	Pass-Mandatory
HO Packet Loss per Handover	Non Mandatory	10	9	0.50	90.00%	<5count	>50%	Pass-Non mandatory