

SaskTel 5G Innovation Lab

NEMO Outdoor User Guide

SaskTel 

| *Business Solutions* |

ADDING A NEW PHONE/DEVICE INTO NEMO OUTDOOR

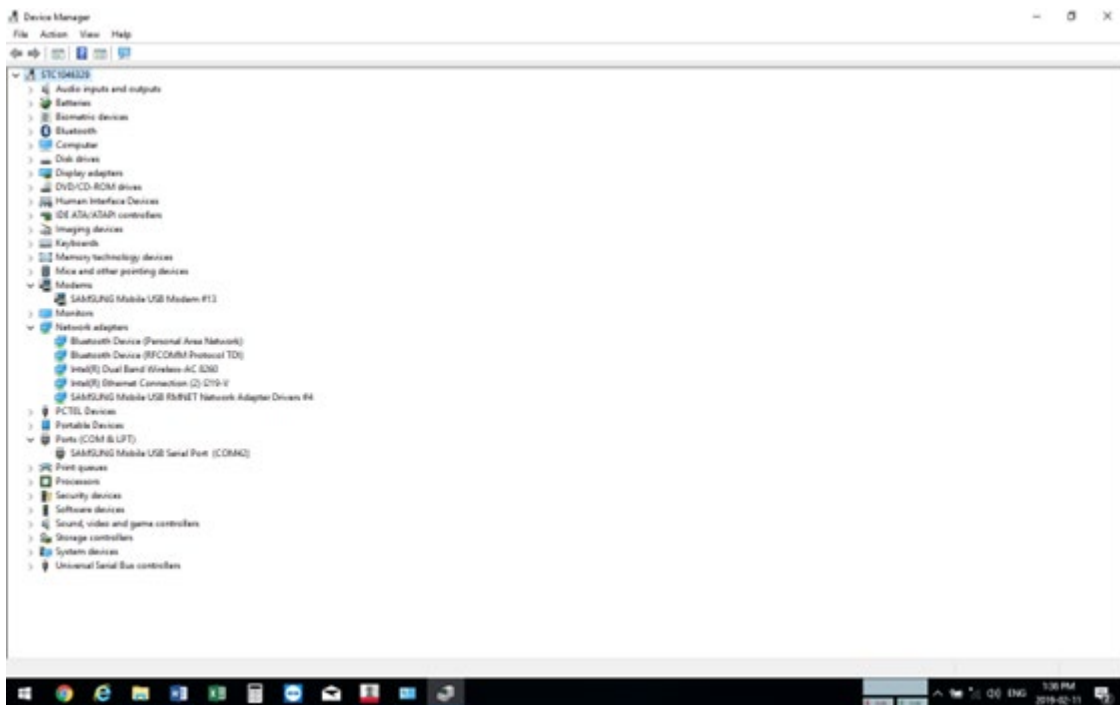
NOTE: Before setting up a device in NEMO, you must be sure that it is first setup properly in Windows.

This may involve:

- loading device specific drivers
- configuring devices such as phones to enable certain hidden or locked features
- loading special software on the device

Install the Windows driver for the device before plugging it into the laptop.

Once the drivers have been installed, plug the device into a USB port and make sure its sets up properly in the Windows Device Manager.

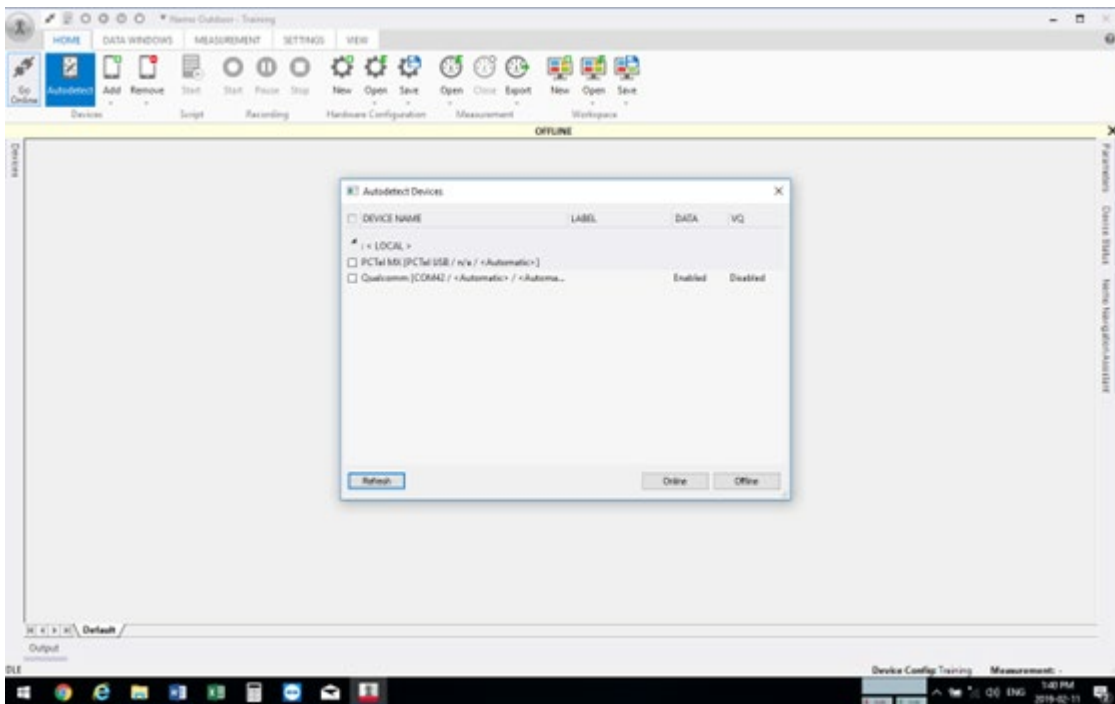


On a Samsung device, enable developer options by going into "settings", selecting "More", scroll down to "About device" then scroll down and tap on "Build number" 6 times to enable the Developer Mode.

Samsung devices also need special USB Settings configured to allow NEMO to communicate properly with the device. This menu is accessed by pressing *#0808# in the dialer of the Samsung phone. Once this USB Settings menu comes up, select the following setting - RMNET + DM + MODEM + ADPL + ADB.



Once the device has successfully been added to Windows, open NEMO Outdoor. Go to the Home Screen of NEMO and select "Autodetect". You should see the following screen appear.




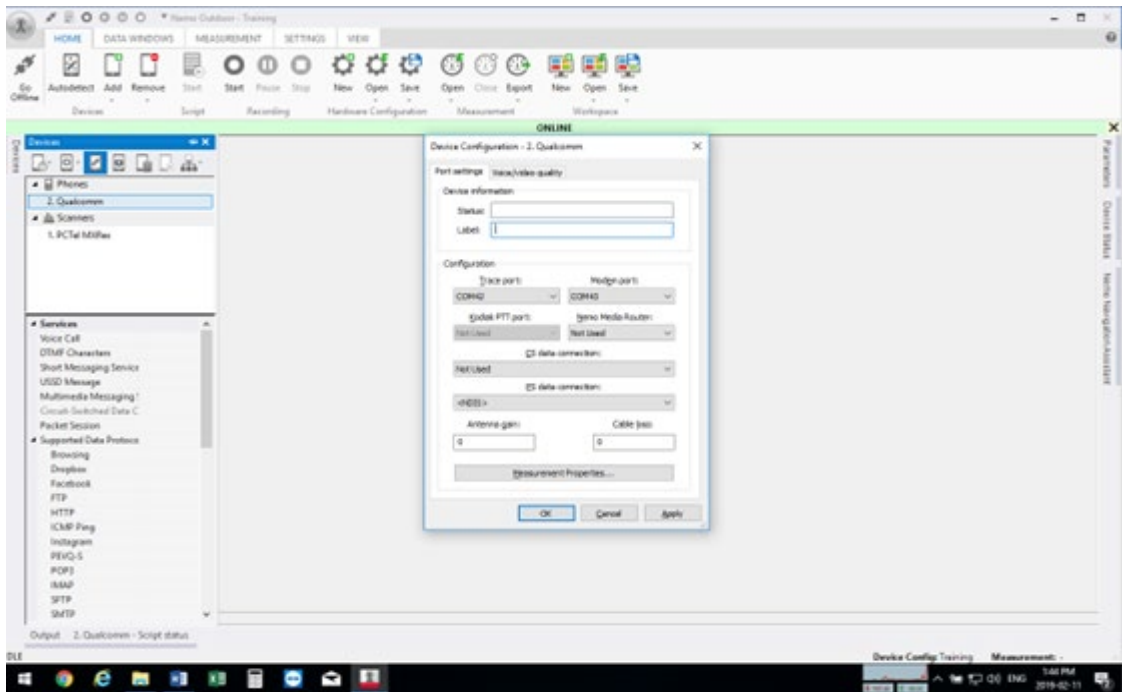
Select the new phone device, in this case "Qualcomm [COM42/<Automatic>/Automa..", and check the box beside it.

Now select "Online"

If everything was setup properly, you should automatically return to the NEMO home screen.

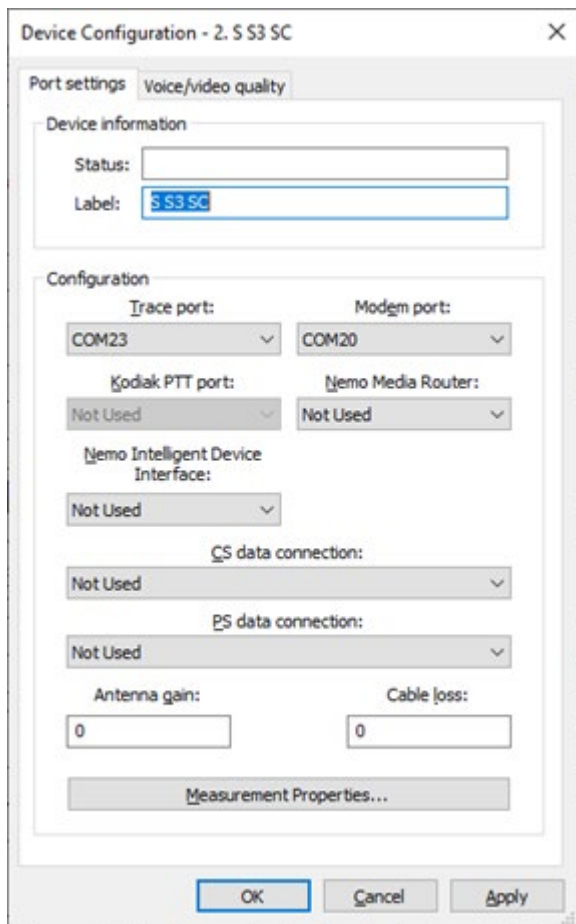
Select the Device tab and you should now have the "Qualcomm" device added.

Now click once on "2. Qualcomm" to highlight it and then click on the connections icon  as seen below and a screen should open as shown.

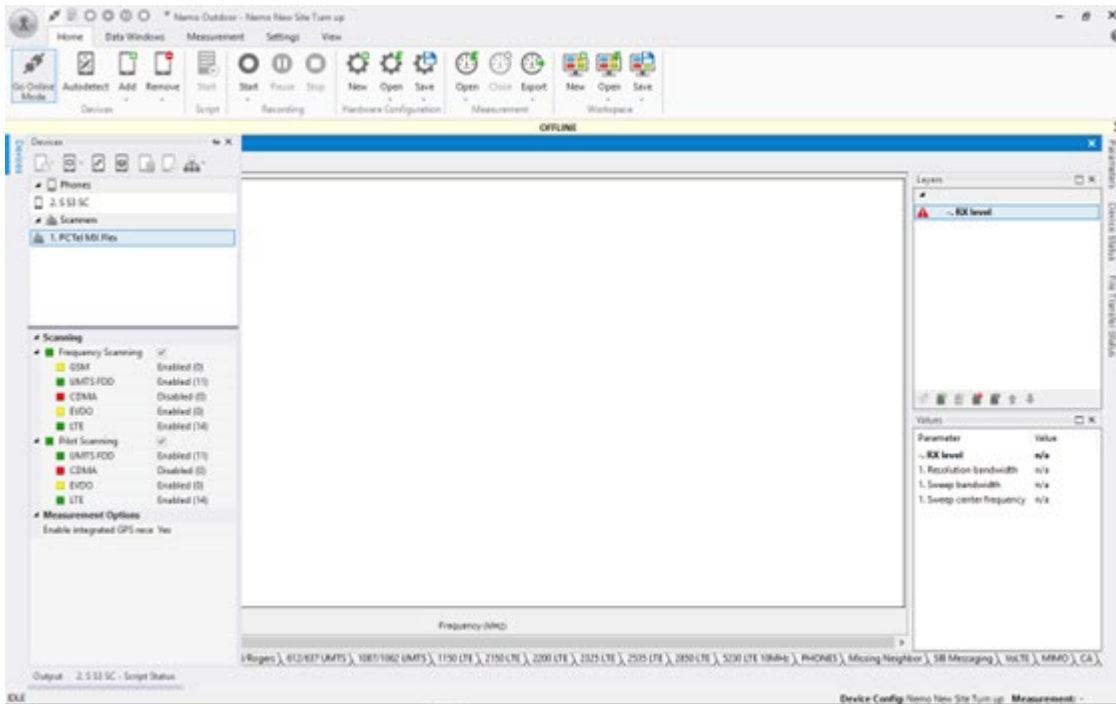


Make sure that all boxes (other than Com ports) match as per above.

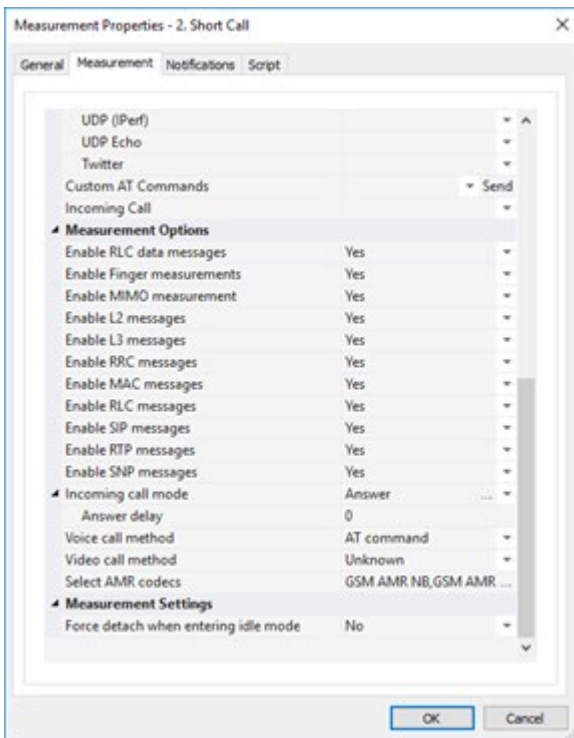
Name your device and click "OK"



Now go under the "Devices" tab and double click on the newly added device.



You will see the following Window



Open the "Measurement" tab.

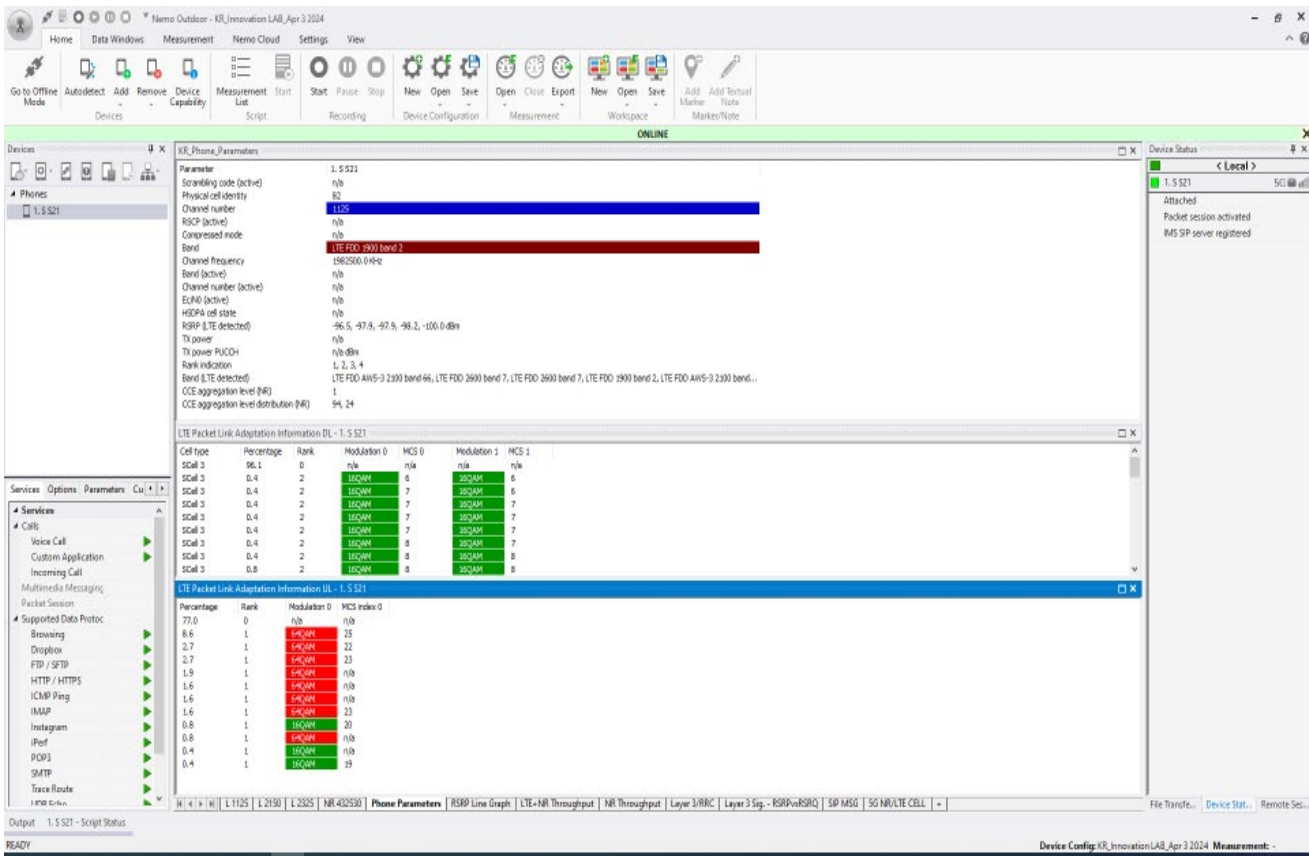
Set all "Measurement Options" to "Yes" and select "OK".

Your device should now be successfully added to NEMO.

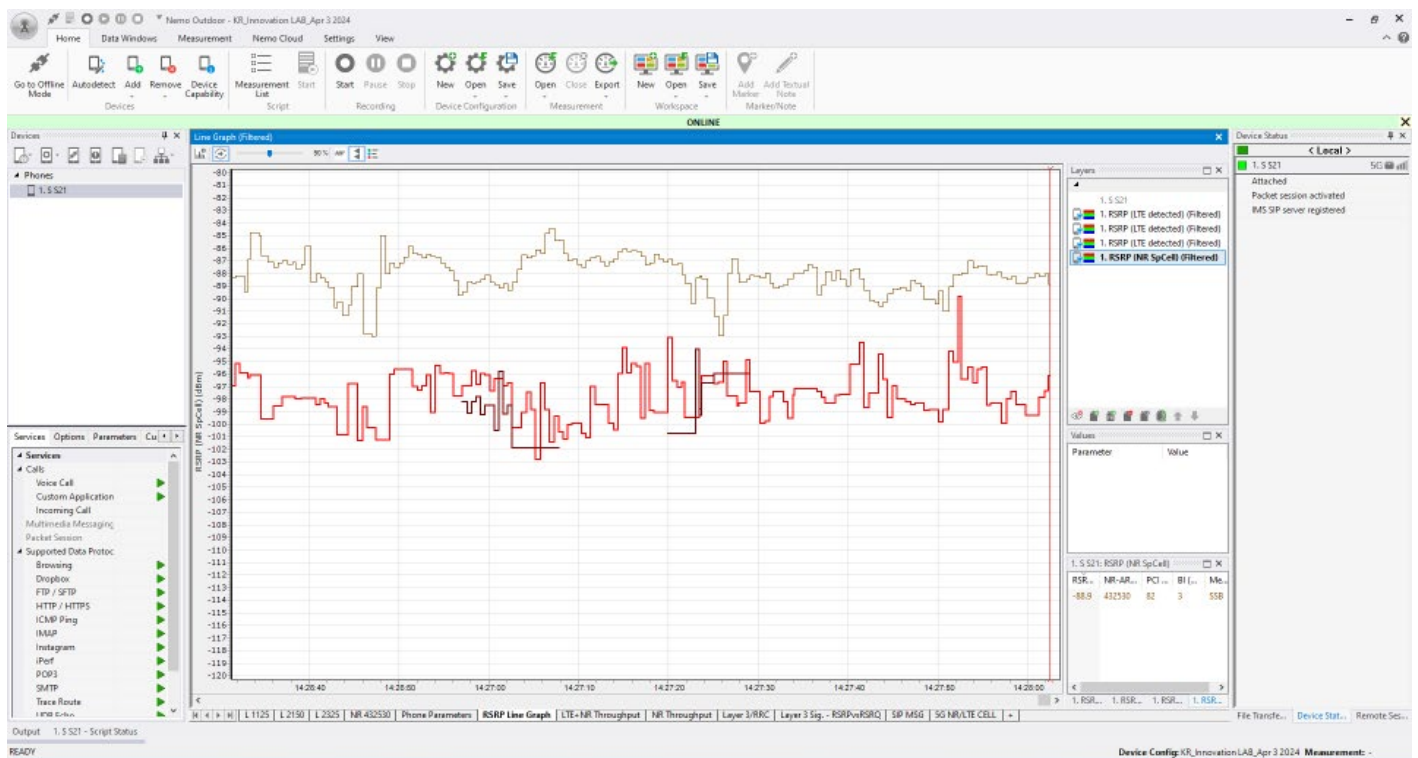
When you add new devices into NEMO Outdoor they should automatically start displaying data in the following work place tabs.

Workspaces:

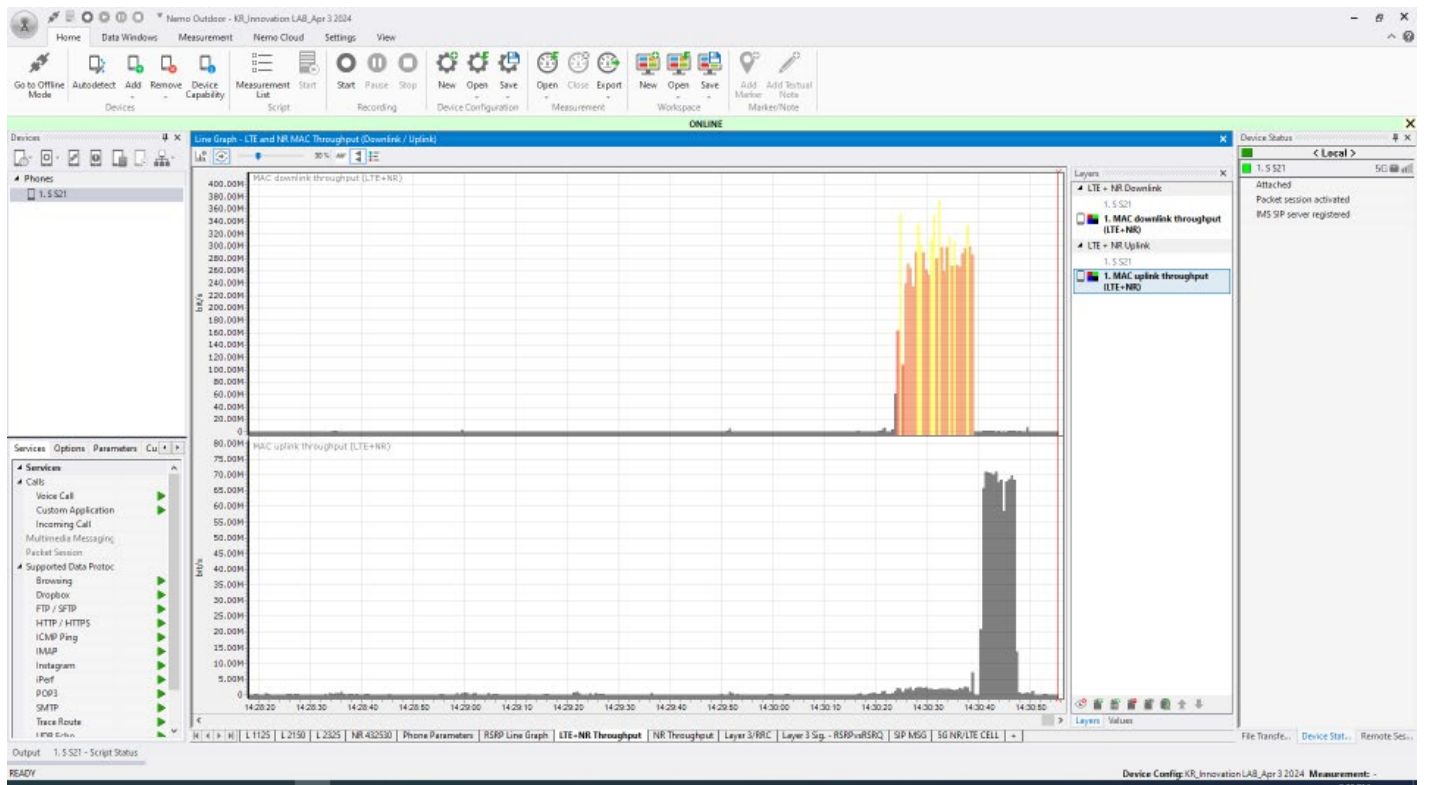
LTE Phone Parameters/Measurements



RSRP (Reference Signal Received Power) Line Graph



LTE Throughput Line Graph (Mbps)



NR Throughput Line Graph (Mbps)



Layer 3/RRC Messages

Layer 3/RRC Messages - 1.5 S21

EventId	Time	RRC subc.	RRC dir.	RRC message name	RRC data
RRCM	14:30:06.321	PCOH	Downlink	Paging	40:09 BC 19 3B BC F0
RRCM	14:30:05.601	PCOH	Downlink	Paging	40:09 9C 7F C6 8A 80
RRCM	14:30:10.881	PCOH	Downlink	Paging	40:0A 3F 3E AC 06 60
RRCM	14:30:13.441	PCOH	Downlink	Paging	40:8A 2F 3E AC 06 60 F0 D4 45 00 15 00 00 00 00 00
RRCM	14:30:16.966	DCOH	Uplink	MeasurementReport	08 21 31 24 3E 00 00 00 00 42 91 SE 32 4E 40 80 80
RRCM	14:30:21.122	PCOH	Downlink	Paging	41:09 BE 19 80 81 00 A2 F0 9C F8 80 08 0C 3F 34 80 30
RRCM	14:30:26.242	PCOH	Downlink	Paging	40:88 0C 43 50 01 40 A1 D7 E9 00 8C 00 00 00 00 00 00
RRCM	14:30:27.206	DCOH	Uplink	MeasurementReport	08 21 2D 14 3E 00 08 00 42 91 62 42 4E 40 80 80
RRCM	14:30:27.272	DCOH	Downlink	RRCConnectionConfiguration	2402 85 47 13 00 00 CD 40 01 89 00 03 10 00 40 02 08 30 49 41 04 30 74 0F FC 44 0F E2 F0 3B EA A8 C6 5B 60 30 B1 0...
RRCM	14:30:27.272	DCOH	Downlink	RRCConnectionConfiguration message	88 81 FC 1C 5F A7 7D 55 18 CB 6C 02 10 20 08 83 CE 52 30 68 55 13 60 59 30 80 63 94 F2 B4 22 6E 08 04 00 20 10 03 7...
RRCM	14:30:27.304	DCOH	Uplink	RRCConnectionConfigurationComplete message	16 45 46 01 80
RRCM	14:30:30.081	PCOH	Downlink	Paging	40:89 3F 3E 0B 40 80 ED 08 08 09 00 00 00 00 00 00 00
RRCM	14:30:30.859	DCOH	Downlink	RRCConnectionConfiguration	25 02 85 47 13 00 00 CD 40 01 89 00 03 10 00 40 02 08 30 49 41 04 30 74 0F FC 44 0F E2 F0 3B EA A8 C6 5B 60 10 81 0...
RRCM	14:30:30.859	DCOH	Downlink	RRCConnectionConfiguration message	C8 B1 FC 3C 5F A7 7D 55 18 CB 6C 02 10 20 08 83 CE 52 30 68 55 13 60 59 30 80 63 94 F2 B4 22 6E 08 04 00 20 10 03 7...
RRCM	14:30:30.886	DCOH	Uplink	RRCConnectionConfigurationComplete message	16 45 46 01 C0
RRCM	14:30:30.886	DCOH	Uplink	RRCConnectionConfigurationComplete message	C3
RRCM	14:30:31.361	PCOH	Downlink	Paging	40:0F 3C 65 62 F0
RRCM	14:30:32.641	PCOH	Downlink	Paging	40:8F 0D 30 15 82 ED 80 E8 00 F0 10 00 00 00 00 00 00
RRCM	14:30:33.920	PCOH	Downlink	Paging	40:0F 0C 6E 84 62 80
RRCM	14:30:36.481	PCOH	Downlink	Paging	40:09 9E 8F A2 81 00
RRCM	14:30:37.445	DCOH	Uplink	MeasurementReport	08 21 32 30 3E 00 08 00 42 91 SE 32 4E 4E 40 80 80
RRCM	14:30:38.090	PCOH	Downlink	Paging	40:0A 2D 3E 84 80 60
RRCM	14:30:41.600	PCOH	Downlink	Paging	40:8A 2D 3E 84 80 C0 F0 CC 64 90 2D 00 00 00 00 00 00
RRCM	14:30:57.825	DCOH	Uplink	MeasurementReport	40:0F 86 50 81 90
RRCM	14:30:58.240	PCOH	Downlink	Paging	40:8A 2D 4E 4F 89 80 EC F1 F9 05 00 00 00 00 00 00 00
RRCM	14:31:02.080	PCOH	Downlink	Paging	40:8A 2C 79 4D 09 80 A2 C7 84 D0 39 00 00 00 00 00 00
RRCM	14:31:08.178	DCOH	Uplink	MeasurementReport	08 21 32 3E 00 08 00 42 91 SE 3A 4C 39 4D 61 20
RRCM	14:31:11.040	PCOH	Downlink	Paging	40:88 0C 03 7C 02 50
RRCM	14:31:14.880	PCOH	Downlink	Paging	41:0A 2C 3F 39 15 18 A1 C3 F3 89 51 0F 0C 21 A8 00 C0
RRCM	14:31:18.425	DCOH	Uplink	MeasurementReport	08 21 32 3E 00 08 00 42 91 SE 3C 4C 4E 40 80 80
RRCM	14:31:18.720	PCOH	Downlink	Paging	40:0F 0C 18 BE 81 C0
RRCM	14:31:20.000	PCOH	Downlink	Paging	40:08 0F 78 47 01 F0
RRCM	14:31:21.280	PCOH	Downlink	Paging	40:0F DE B1 C7 80 D0
RRCM	14:31:23.840	PCOH	Downlink	Paging	40:0F 0E AD BE 80 F0
RRCM	14:31:26.400	PCOH	Downlink	Paging	40:89 BE E7 84 AD 86 EE 9A 78 46 00 00 00 00 00 00 00
RRCM	14:31:27.880	PCOH	Downlink	Paging	40:09 BE E7 84 AD
RRCM	14:31:28.941	DCOH	Uplink	MeasurementReport	08 21 32 38 3E 01 08 00 42 91 SE 8A 4C 31 4D 6A 60
RRCM	14:31:28.960	PCOH	Downlink	Paging	40:09 BE E7 84 AD
RRCM	14:31:30.240	PCOH	Downlink	Paging	40:09 BE E7 84 AD
RRCM	14:31:31.520	PCOH	Downlink	Paging	40:09 DE 08 A4 02 30

Layer 3 Messages

Layer 3 Messages - 1.5 S21

EventId	Time	Subchannel	Direction	Message	Data
L3M	14:30:04.977		Downlink	ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST	62 00 C5 05 01 08 39 22 30 30 09 10 00 00 00 00 00 00 11 31 09 10 00 00 00 00 00 00 50 01 ...
L3M	14:30:04.980		Uplink	ATTACH_COMPLETE	07 83 00 03 52 00 C2
L3M	14:30:04.983		Uplink	ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_ACCEPT	62 00 C2
L3M	14:30:04.999		Uplink	ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_ACCEPT	62 00 C6
L3M	14:30:05.000		Downlink	EMM_INFORMATION	07 61 40 08 07 03 69 24 49 2D 32 01 45 08 07 03 69 24 49 2D 32 01 47 42 40 02 23 50 4A 49 01 00
L3M	14:30:05.169		Uplink	RRM_CONNECTIVITY_REQUEST	02 03 00 31 28 04 03 69 4D 73 27 39 80 80 21 01 01 00 00 30 81 06 00 00 00 83 06 00 00 00 00 00 00 00
L3M	14:30:05.262		Downlink	ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST	72 05 C1 01 05 17 03 69 4D 73 06 40 6E 63 37 38 30 06 40 43 63 33 30 04 67 70 72 73 05 01 0A 34 D3 ...
L3M	14:30:05.266		Uplink	ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_ACCEPT	72 99 C2

Scatter Graph - LTE RS Received Power (serv) vs RS Received Quality (serv)

The scatter plot shows RSRP (LTE pow) (dBm) on the y-axis (ranging from -140 to 0) and RSRQ (LTE pow) (dB) on the x-axis (ranging from -14 to 14). The data points are clustered between -100 and -110 dBm RSRP and -10 and 0 dB RSRQ.

SIP Messages

SIP Messages - 1.5 S21

Time	EventId	Direction	Message
14:30:00.155	SIPM	Uplink	REGISTER
14:30:00.707	SIPM	Downlink	NOTIFY
14:30:00.717	SIPM	SIPM	200 OK
14:30:00.733	SIPM	Downlink	200 OK
14:30:05.578	SIPM	Uplink	REGISTER
14:30:05.705	SIPM	Downlink	401 Unauthorized
14:30:05.849	SIPM	Uplink	REGISTER
14:30:05.940	SIPM	SIPM	200 OK
14:30:06.363	SIPM	SIPM	SUBSCRIBE
14:30:06.419	SIPM	SIPM	200 OK
14:30:06.453	SIPM	Downlink	NOTIFY
14:30:06.464	SIPM	Uplink	200 OK

Automatic Decoder

SIP SIGNALING MESSAGE
Time: 14:30:06.464
Via: SIP/2.0/UDP 172.28.154.228:5061;branch=65624830a77210e42ef4776a000000.1
Max-Forwards: 70
Contact: <tel:+13863233856@13.32.209.215:8000>;+app.instance="+urn:uuid:3518877f-12581-0">;+q.3app.ref="+urn:uuid:793a3app-service.insulin.mntf"+q.3app.mmp
To: <sip:+13863233856@ins.sasktel.com>;+q.3app
From: <sip:+13863233856@ins.sasktel.com>;tag=50648999-8928e9fed31034949a000002
Call-ID: SessionCallId20yqgqENHGW_811132.289.215
CSeq: 2 NOTIFY
User-Agent: SIP-GRANDRAVIA/LSR/MS Samsung DTS 5.0
P-Access-Network-Info: SIPF-E-UTRAN-FDO;utran-cell-id-3gpp=382700000e07d668
Content-Length: 0

Device Status

1.5 S21 5G
Attached
Packet session activated
IMS SIP server registered

LTE/5G Parameters

5G NR Key Parameters

Parameter	Value
Network operator	SaskTel Mobility
Band (NR SpCell)	NR n66 FDD
Packet technology	5G-DC
RRC state (NR)	n/a
MAC downlink scheduled throughput (NR)	0.0 Mbps
MAC downlink throughput (NR)	0.0 Mbps
NR MAC downlink throughput measurement average	0.3 Mbps
MAC downlink BLER (NR)	0.00 %
MAC uplink throughput (NR)	0.0 Mbps
NR MAC uplink throughput measurement average	0.3 Mbps
MAC uplink retransmission rate (NR)	0.00 %
FD-SCH modulation CWI (NR)	n/a
FD-SCH MCS CWI (NR)	n/a
FD-SCH rank (NR)	n/a
FD-SCH BWP-ID (NR)	n/a
FD-SCH PRBs (NR)	n/a
FD-SCH modulation CWI (NR)	n/a
FD-SCH MCS CWI (NR)	n/a
FD-SCH BWP-ID (NR)	n/a
FD-SCH PRBs (NR)	n/a

LTE Serving Cell Information - 1.5 S21

Band (LTE pcell)	Ch (LTE pcell)	PCI (LTE pcell)	BTS cell name (serving)	RSRP (LTE pcell)	RSRQ (LTE pcell)	RSSE (L...
LTE FDD 700 band 13	5130	82	n/a	-79.6	-14.6	-94.0

LTE Cell Information

Parameter	Value
Band	LTE FDD 700 band 13
Cell identification	13889544
Channel number	5230
Physical cell identity	82
MME code	128
MME group ID	65001
PCell bandwidth	10 MHz
Service info status	Service received
EMM state	Registered
EMM substate	Registered, normal service
Mobile country code	302
Mobile network code	780
Tracking area code	10
Network operator	SaskTel Mobility
RRC state	Connected
Transmission mode	TM4 closed BH
Timing advance	n/a

Device Status

1.5 S21 5G
Attached
Packet session activated
IMS SIP server registered