HEAD acoustics

APPLICATION NOTE

ACQUA

Establish LTE & 2G/3G connections to *lab*CORE via Anritsu MD8475B

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Establish LTE & 2G / 3G connections to *lab*CORE via Anritsu MD8475B

Revision 0

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Table of contents

1 Introduction

1.1 Brief description

This application note approaches the connection establishment between the Anritsu radio communication tester MD8475B, HEAD acoustics equipment and the DUT. The presented configurations intend testing mobile devices with current mobile communication standards (LTE, 3G, 2G).

The document consists of three main chapters. One for the LTE connection and the others for 2G or 3G connection. The structure of the main chapters is similar. The first sub-chapter illustrates the interconnection of all necessary hardware. Afterwards, the next sub-chapter guides step by step through the procedure for a successful connection establishment.

The application requires an advanced user knowledge of HEAD acoustics equipment as well as Anritsu MD8475B. HEAD acoustics will not respond to support requests concerning general handling and technical configuration of Anritsu MD8475B.

1.2 Reference documentation

Document name
*lab*CORE Manual
HMS II Manual
ACQUA Online Help
Anritsu MD8475B User Manual

1.3 Acronyms and abbreviations

Acronym / Abbreviation	**Description**
ACQUA	Advanced Communication Quality Analysis
AES	Audio Engineering Society
AMR	Adaptive multi-rate
APN	Access point name
BNC	Bayonet Neill Concelman
DUT	Device under test
GSM / GPRS	Global System for Mobile Communications / General Packet Radio Service
HHP	HEAD handset positioner
HMS	HEAD measurement system
IMS	IP multimedia subsytem
IPsec	Internet protocol security
IPv4	Internet protocol version 4
IPv6	Internet protocol version 6
LED	Light-emitting diode
LTE	Long Term Evolution
MCC	Mobile county code
MNC	Mobile network code
PDN	Packet data network
QCI	QoS class identifier
RF	Radio frequency
RTP	Real-time transport protocol

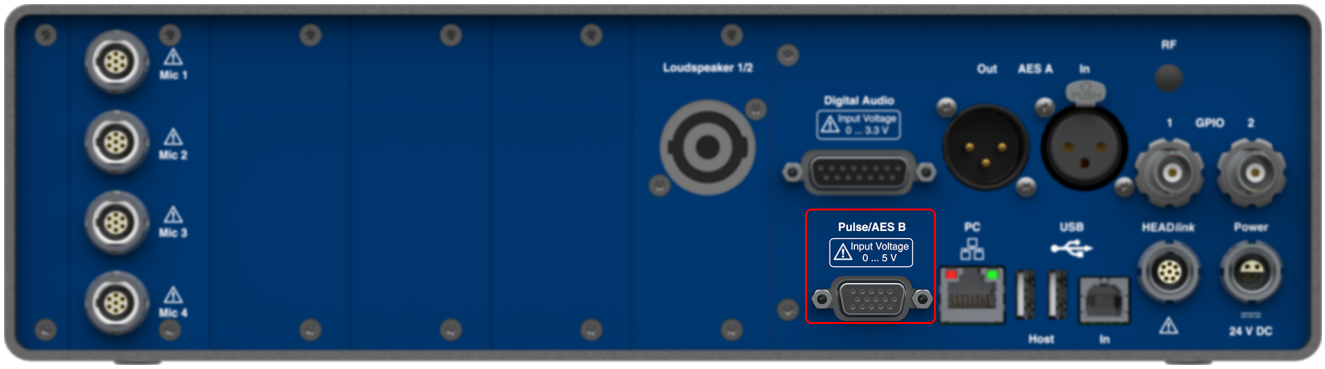
SIM	Subscriber identity module
SIP	Session initiation protocol
UIM	User identity module
VoIP	Voice over internet protocol
W-CDMA	Wideband Code Division Multiple Access
XLR	Ground - left - right

1.4 Applied interfaces at *lab*CORE and & Anritsu MD8475B

1.4.1 *lab*CORE interfaces front panel

Ethernet interface (RJ45) for measuring IP-based communication

1.4.2 *lab*CORE interfaces back panel



D-Sub (DE-15) Pulse interface

1.4.3 Anritsu MD8475B interfaces front panel

Type N RF antenna connector

1.4.4 Anritsu MD8475B interfaces back panel

- CallProc Ethernet I/O socket (RJ45)
- Ethernet 0 socket (RJ45)
- Trigger output socket (BNC)

2 LTE connection

2.1 Equipment list

2.1.1 HEAD acoustics equipment

Required

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*BUS (Code 7710), I/O bus mainboard
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*IP (Code 7770), VoIP software extension with at least one of the following voice codecs
    - ► *core*IP-AMR (Code 7772), AMR extension
    - ► *core*IP-EVS (Code 7773), EVS extension
- ACQUA (Code 6810), Advanced Communication Quality Analysis software
- HMS II.3 (Code 1230), HEAD measurement system with ear simulator and artificial mouth

Optional

- *lab*CORE extensions depending on device under test and/or application case
  - *core*IP-IMP (Code 7771), VoIP impairment extension
  - *core*BEQ (Code 7741), Binaural equalization
- Any HEAD acoustics handset positioner
  - HHP IV (Code 1406), Motorized handset positioner
  - HHP III.1 (Code 1403), Handset positioner

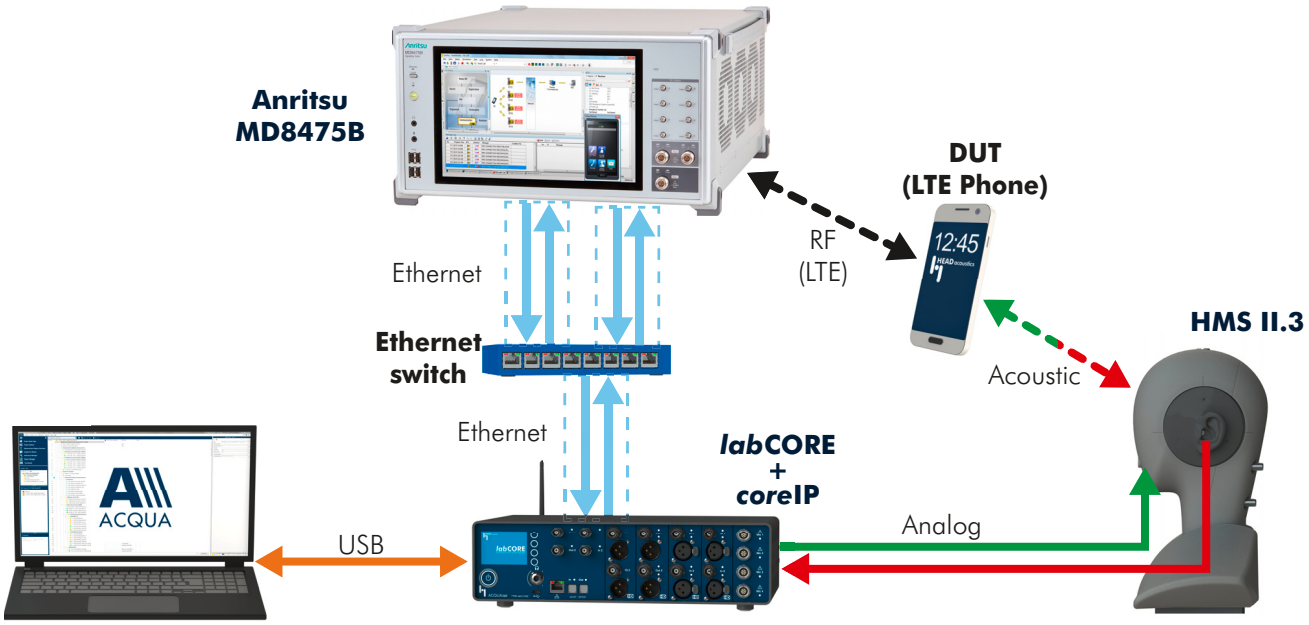
2.1.2 Anritsu equipment

- Anritsu MD8475B Signalling Tester
- Enhanced Multi-signaling Unit
- SmartStudio©
- LTE FDD Option
- Extended CSCF Option
- LTE Simulation Software
- 1 Year Support Service

2.1.3 Third party equipment

- Ethernet switch
- 3 x Ethernet cable
- RF antenna
- PC for ACQUA software
- DUT
- Test SIM card

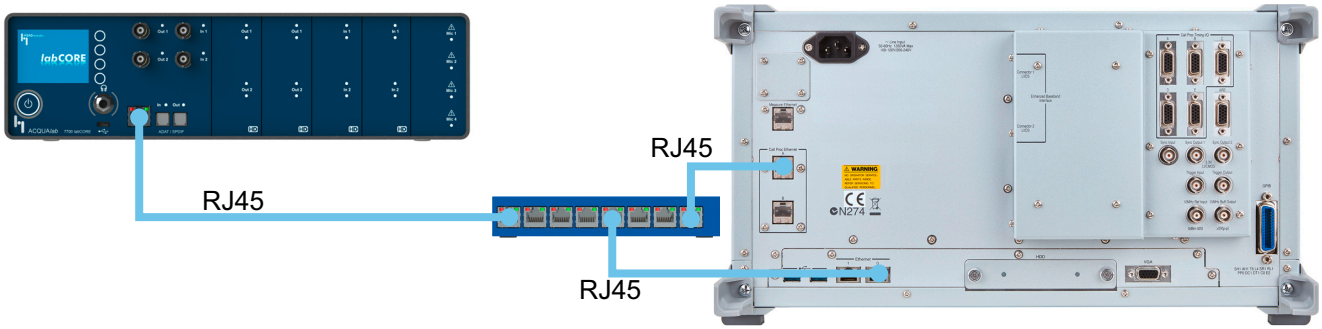
2.2 Configuration example (exemplary)



2.3 Cabling

2.3.1 Antenna

2.3.2 *lab*CORE to Anritsu MD8475B



2.4 LTE connection establishment

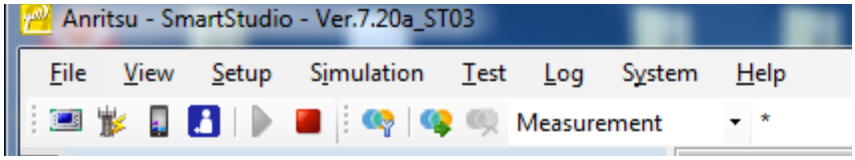
2.4.1 Preparations

- Interconnect the hardware according to chapter 2.2 and chapter 2.3
- Boot up Anritsu MD8475B
- Open SmartStudio© on Anritsu MD8475B
- Boot up PC and start ACQUA
- Boot up *lab*CORE
- Insert test SIM card into DUT and boot up DUT

2.4.2 Connection procedure

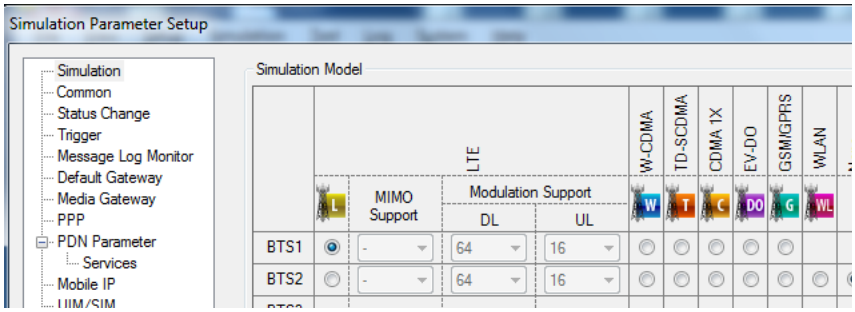
Anritsu MD8475B: Simulation parameter setup

1. Open SmartStudio© on Anritsu MD8475B.
2. Select to open simulation parameter setup.

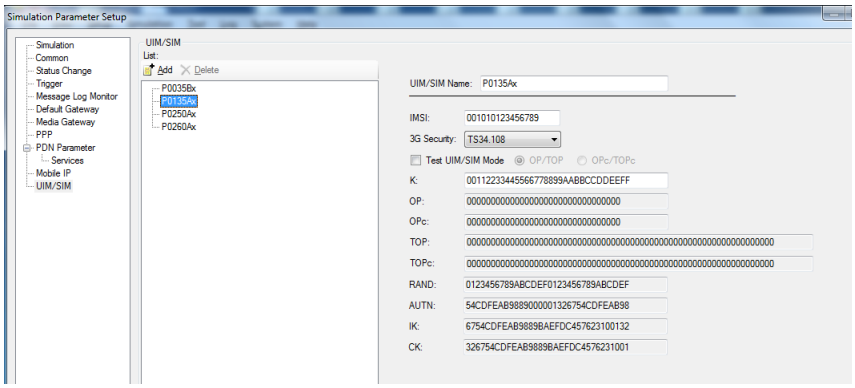


3. If available, load existing simulation parameter setup by selecting Load... .

4. Select Simulation.
5. Set Simulation Model to LTE.
6. Select UIM/SIM.

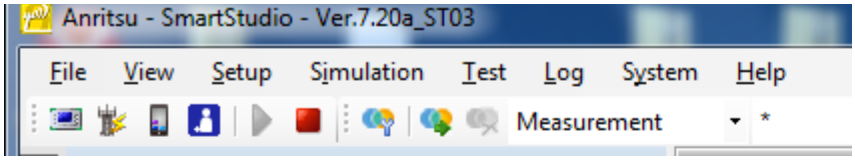


7. Check if the UIM/SIM settings apply to the SIM card of the DUT.
8. If desired, save the simulation parameter setup by selecting Save... .
9. Confirm simulation parameter setup with by selecting OK .

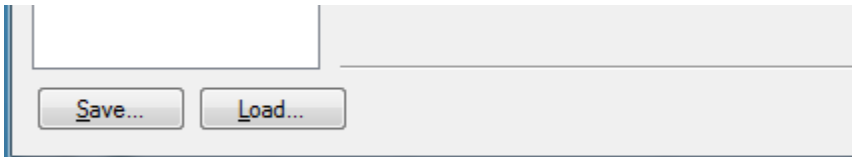


Anritsu MD8475B: Cell parameter setup

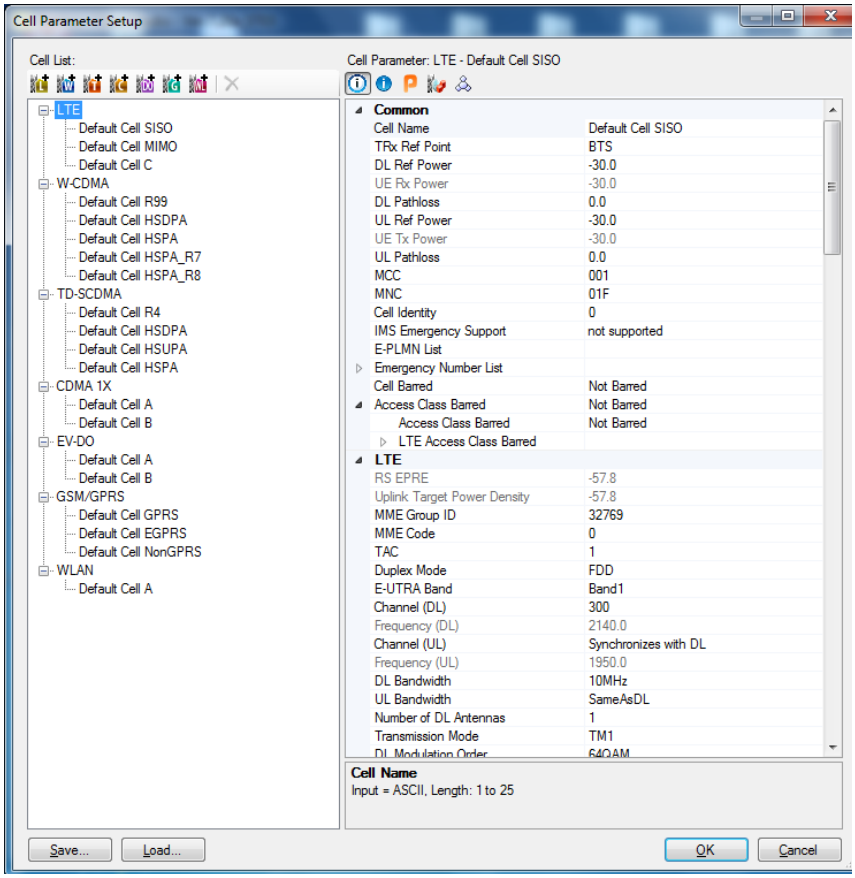
1. Select to open cell parameter setup.



2. If available, load existing cell parameter setup by selecting Load... .

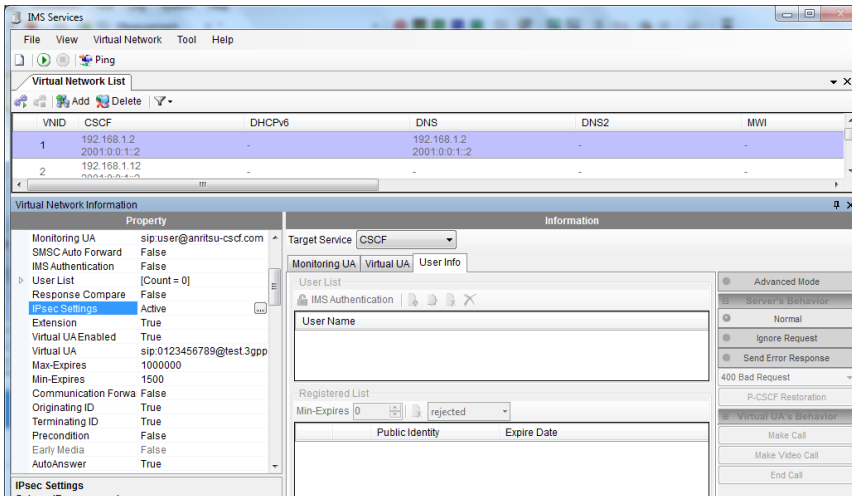


3. Select LTE from Cell list.
4. Unfold Common in Cell parameter.
5. Set the external attenuation (DL Ref Power and UL Ref Power). It shall match the attenuation of the RF antenna and the antenna cable.
6. Set the operating band (E-UTRA Band) according to the DUT.
7. Set the network identity MCC according to SIM card preferences.
8. Set the network identity MNC according to SIM card preferences.
9. If desired, save the simulation parameter setup by selecting Save... .
10. Confirm cell parameter setup by selecting OK .

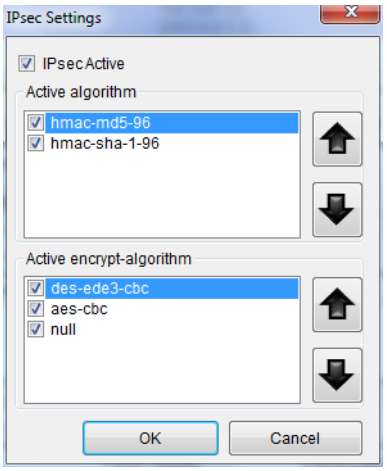


Anritsu MD8475B: IPsec and authentication settings

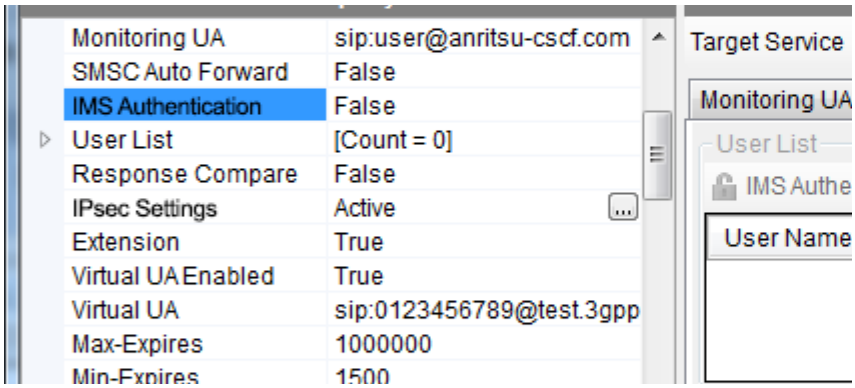
1. Select  from the windows task bar to open IMS services.
2. Highlight IPsec settings from the Property list.
3. Select  to edit IPsec settings.



4. Check the IPsec active box and edit the settings according to the DUT.
   or
   Uncheck the IPsec active box to deactivate IPsec.
5. Select OK to confirm IPsec settings.

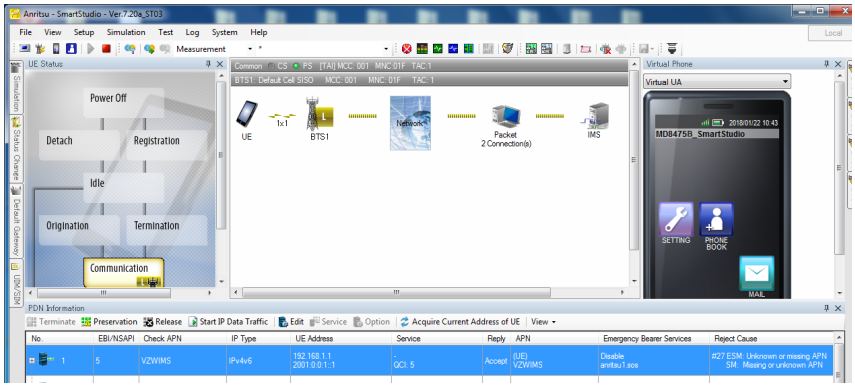


6. Set IMS authentication to either True or False according to the DUT.

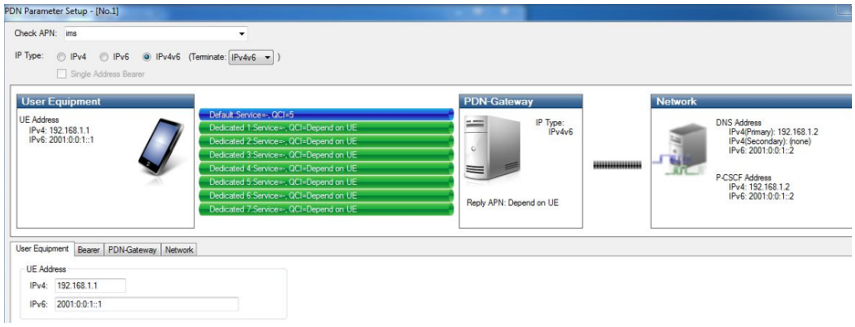


Anritsu MD8475B: PDN parameter setup

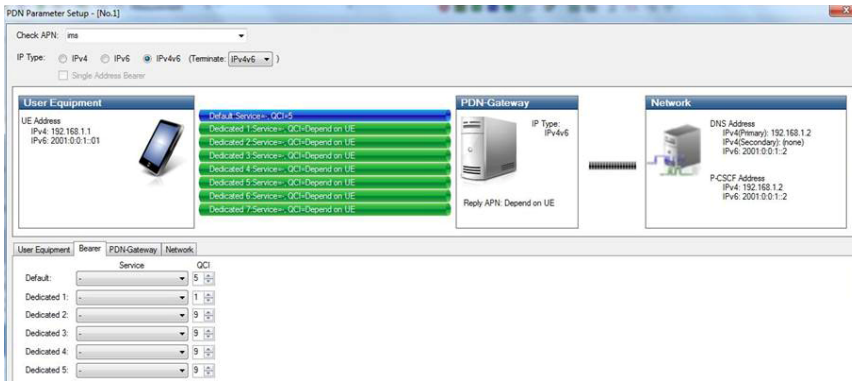
1. Select from the windows task bar to switch back to SmartStudio© main screen.
2. Select the Packet icon to display the PDN information window.
3. Double-click on the row of the DUT that is connected via LTE connection to the radio tester. The PDN Parameter Setup of the DUT pops up.



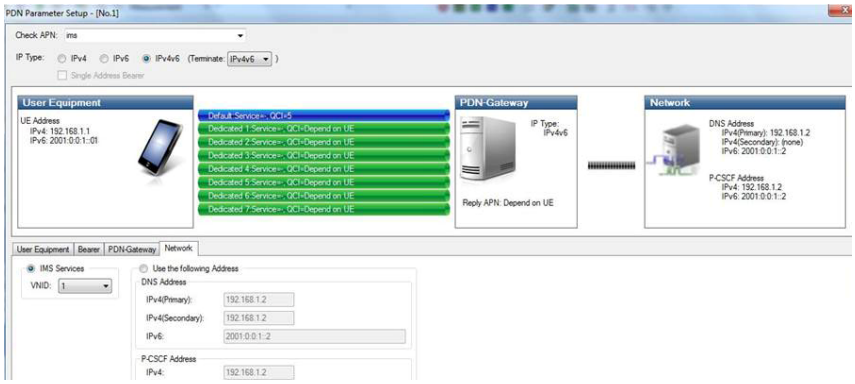
4. Confirm the APN name at Check APN. Change it if necessary.
5. Confirm the IP type. Change if necessary.
6. Select the tab User equipment. Check and confirm the IPv6 address of the DUT.



7. Select the tab Bearer.
8. Confirm the value 5 for the QCI of the default service.

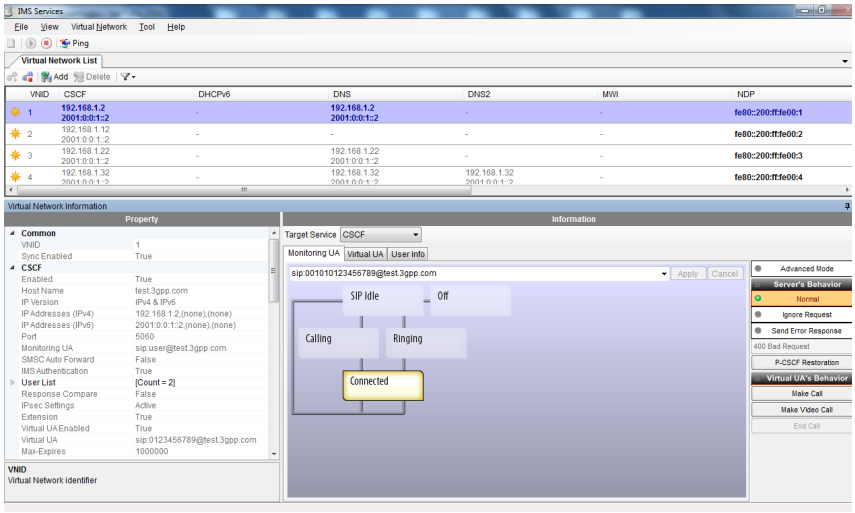


9. Select the tab Network.
10. The default settings apply.
11. Select OK to confirm and finish PDN Parameter Setup.
12. Select ▶ to start the simulation.

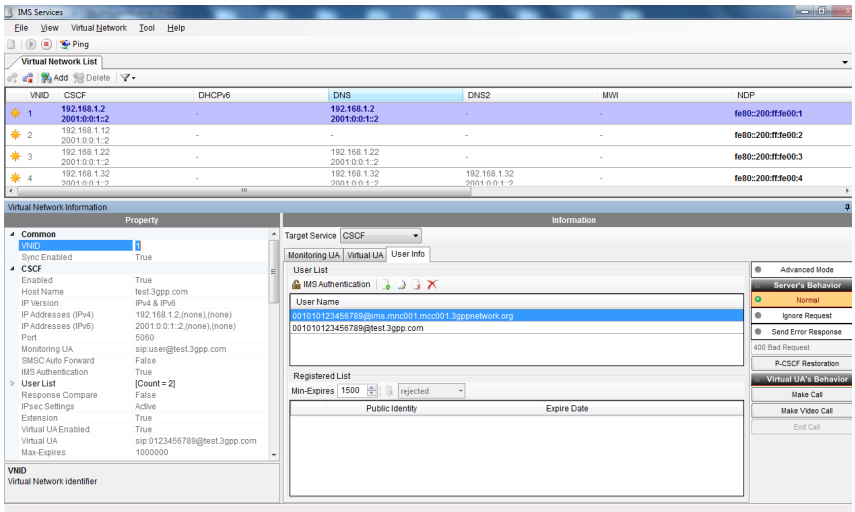


Anritsu MD8475B: IMS server

1. Select  from the windows task bar to open IMS services.
2. Set the DUT in offline mode / airplane mode.

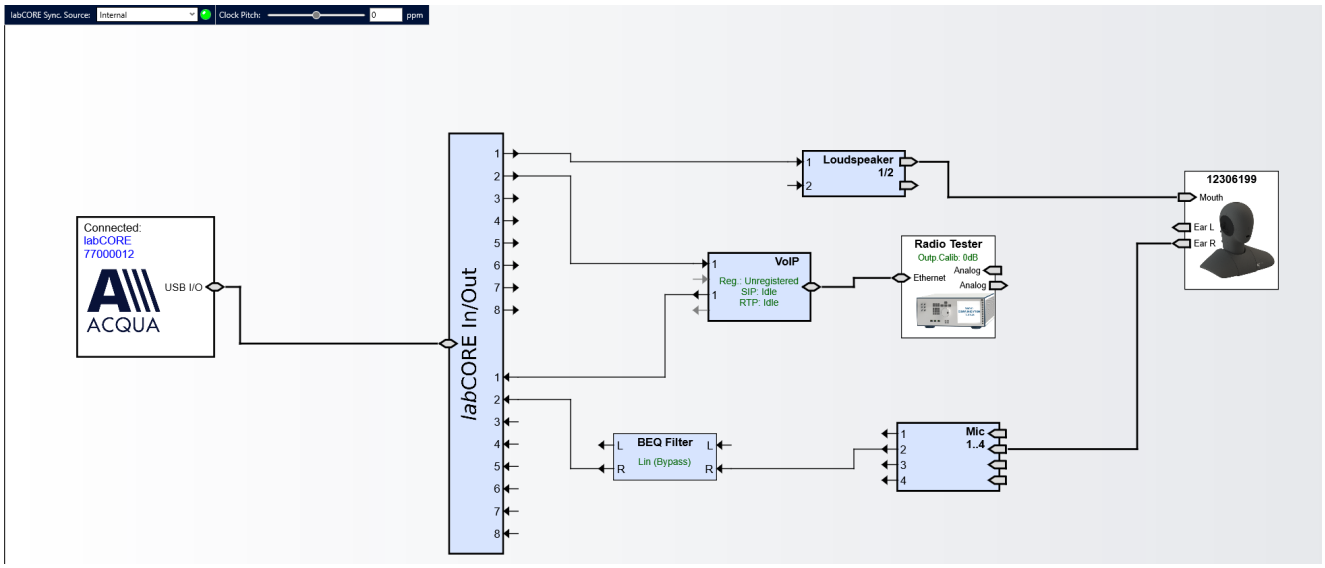


3. Select the User Info tab.
4. Select IMS Authentication to unlock IMS authentication.

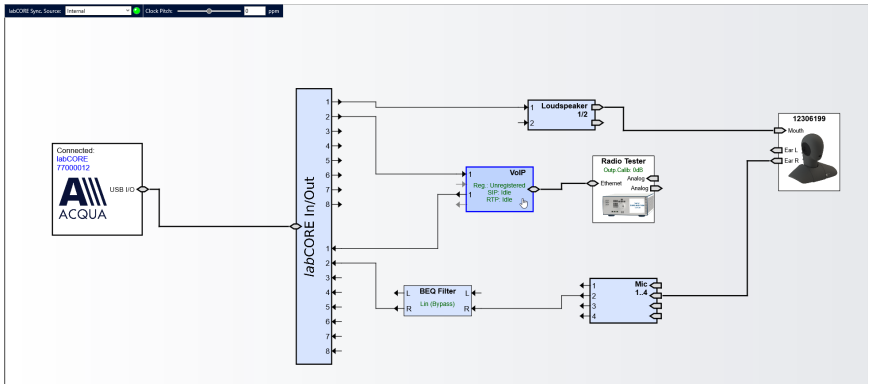


ACQUA PC: Hardware configuration & radio tester wizard

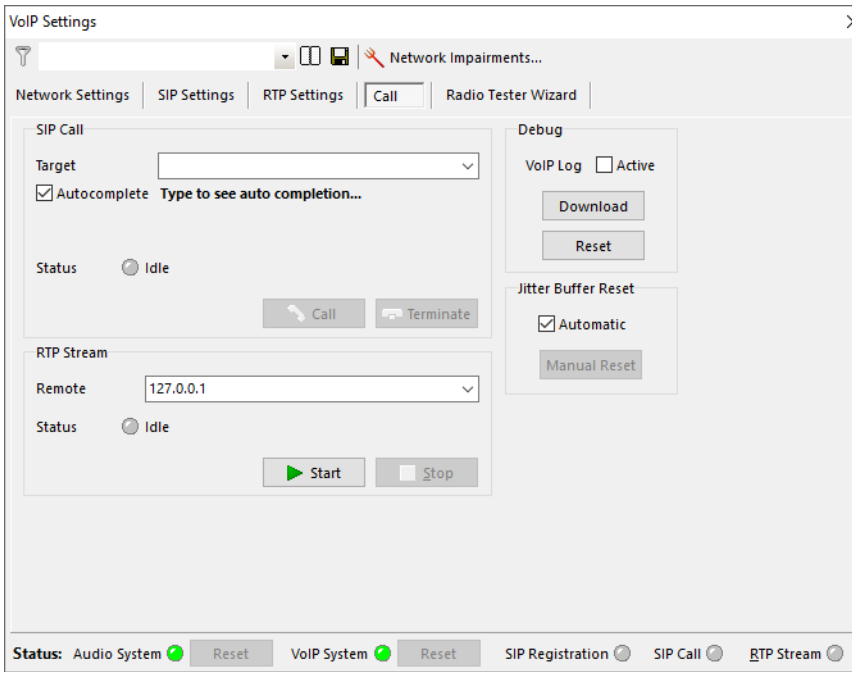
1. Start Hardware Configuration.
2. Select *lab*CORE and build the configuration.



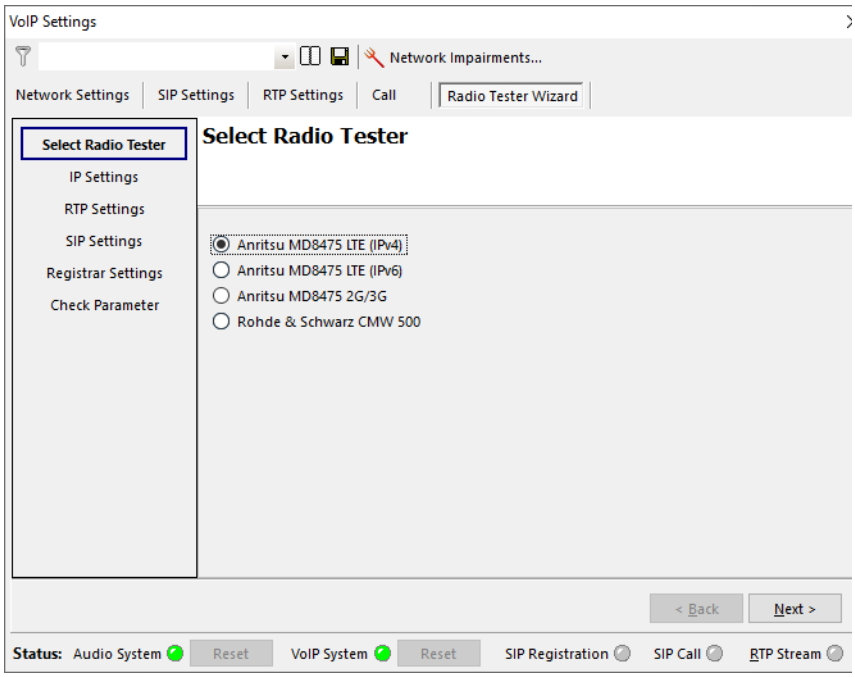
3. Select the block VoIP.



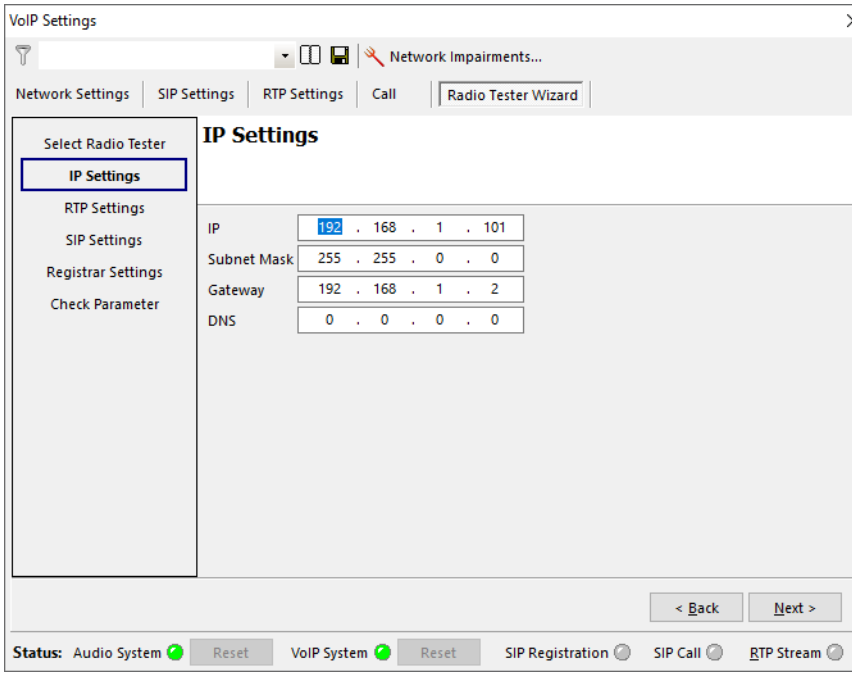
4. Select the tab Call.
5. Enable Automatic for Jitter Buffer Reset.
6. Select Radio tester wizard.



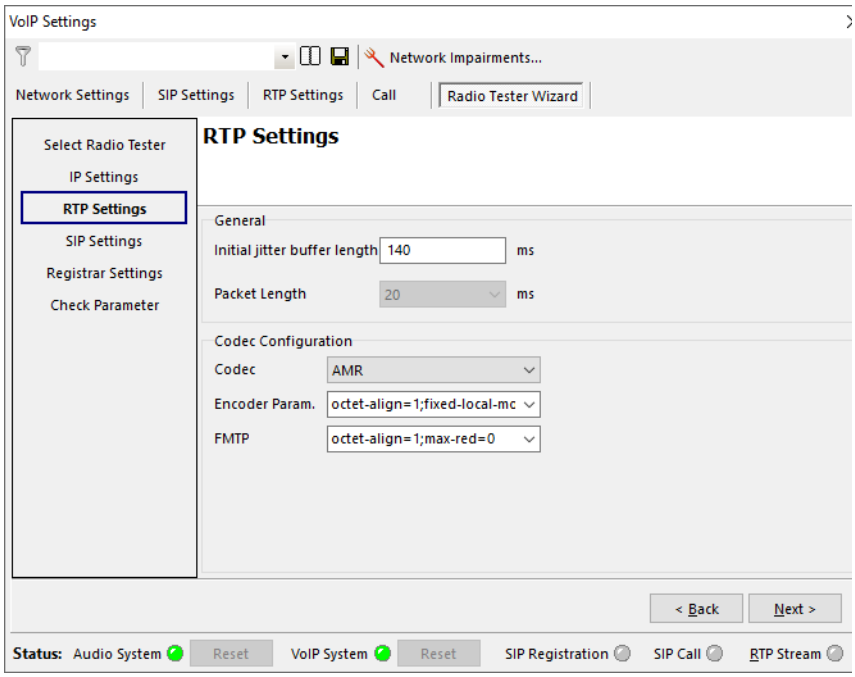
7. Select the Anritsu MD8475B. The Internet protocol (IPv4, IPv6) depends on the DUT.



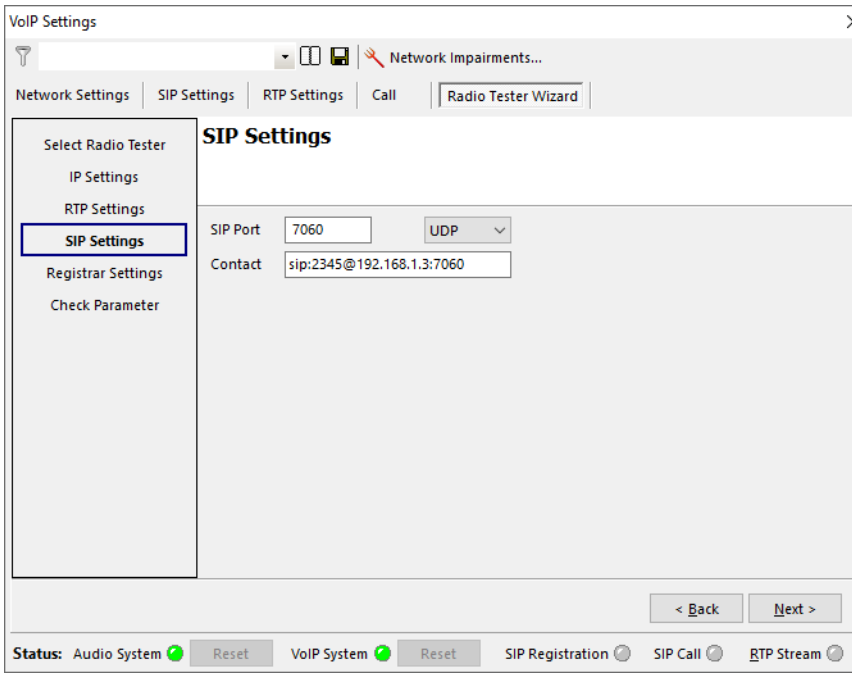
8. Select IP Settings.
9. Enter / verify the IP settings.



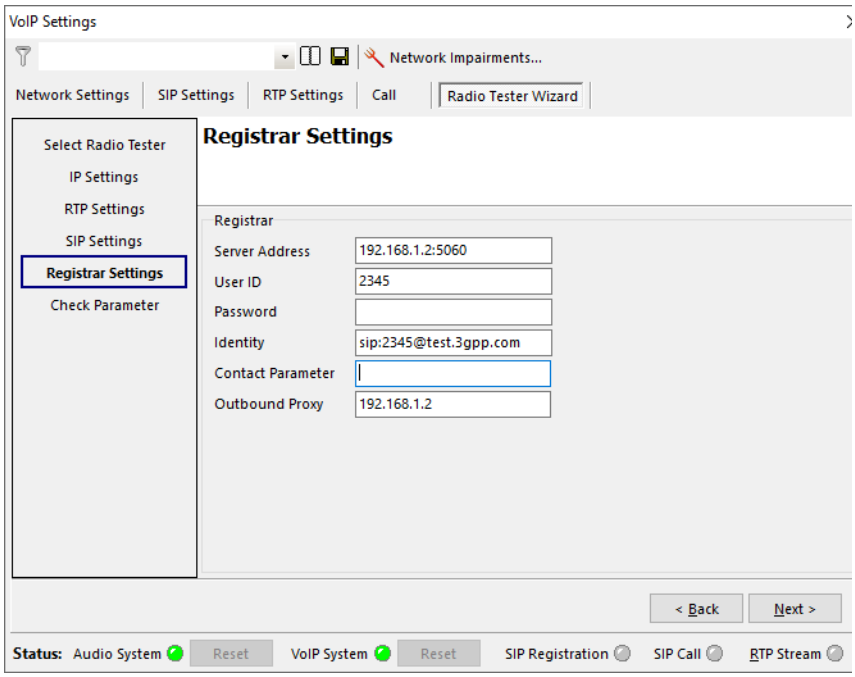
10. Select RTP Settings.
11. Enter a suitable initial jitter buffer length. Default setting is 140 ms.
12. Select the desired voice codec.



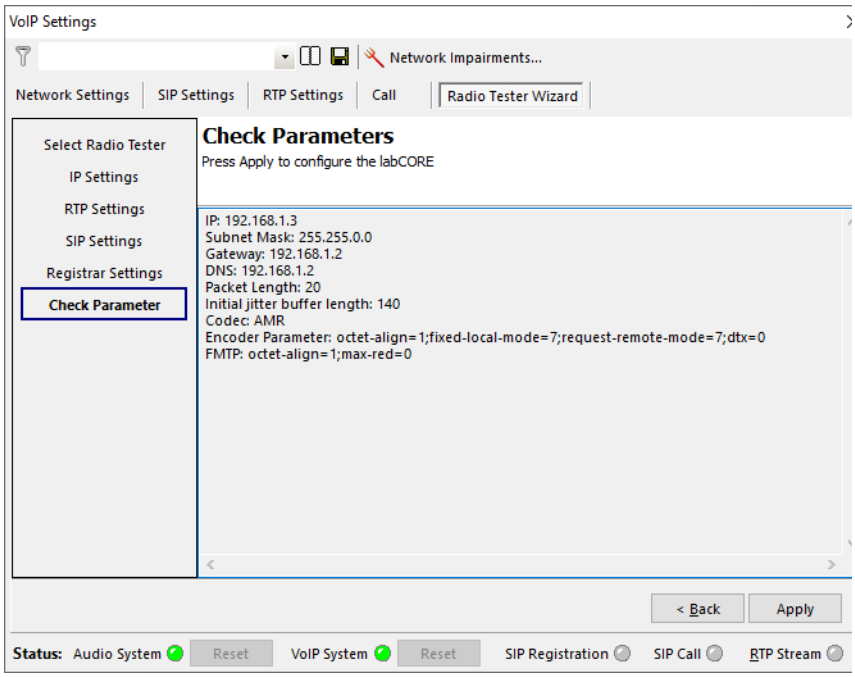
13. Select SIP Settings.
14. Enter / verify the SIP settings.



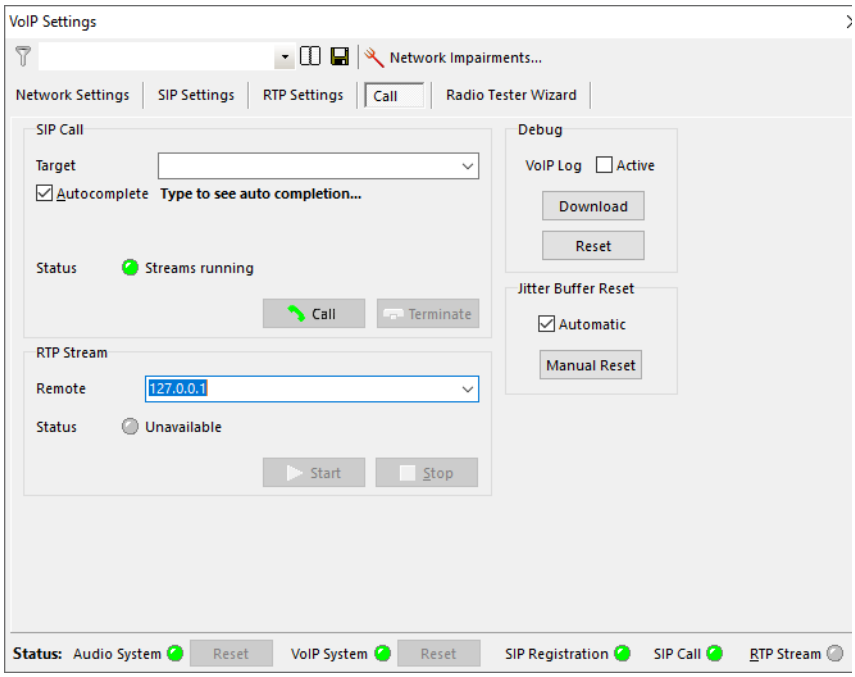
15. Select Registrar Settings.
16. Enter / verify the Registrar settings.



17. Select Check parameters.
18. Verify all set parameters.
19. Select Apply to register the *lab*CORE at Anritsu MD8475B.

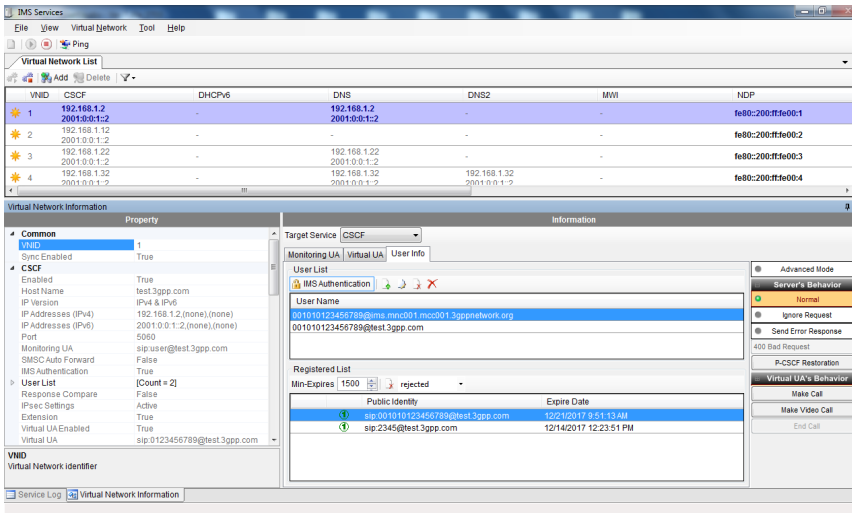


20. The green LED at the bottom confirms the successful SIP registration.
21. The SIP address of *lab*CORE appears in the Registered List on Anritsu MD8475B.



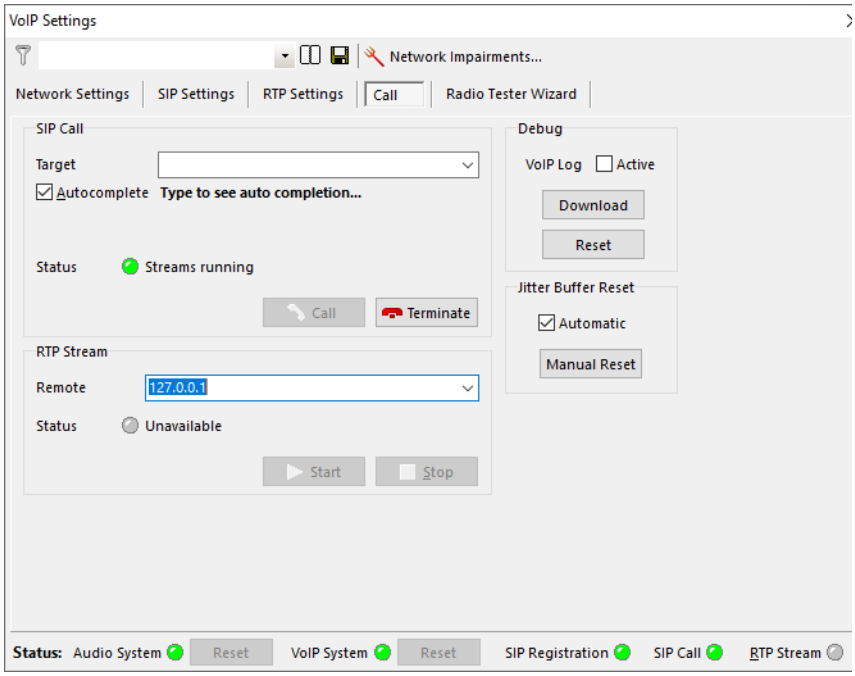
Anritsu MD8475B: IMS server

1. Set the DUT back online and let it register at the IMS server.
2. The SIP address of the DUT appears in the Registered List on Anritsu MD8475B.
3. If IPsec is active at Anritsu MD8475B: Select IMS Authentication to lock IMS authentication.
   Do not lock IMS authentication if IPsec is inactive at Anritsu MD8475B and not required by the DUT.
4. Check if DUT and *lab*CORE have the same public identity address (example@test3gpp.com) in the Registered List.



ACQUA PC: Call execution

1. Enter the SIP address of the DUT in ACQUA and select Call to connect DUT and *lab*CORE.
2. The connection throughout the configuration is established.



3 2G connection

3.1 Equipment list

3.1.1 HEAD acoustics equipment

Required

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*BUS (Code 7710), I/O bus mainboard
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*IP (Code 7770), VoIP software extension with codec
- ACQUA (Code 6810), Advanced Communication Analysis software
- HMS II.3 (Code 1230), HEAD measurement system with ear simulator and artificial mouth
- CDM V (Code 1637), Cable D-Sub 15-pin 2 x XLR (AES/EBU in/out) + 2 x BNC (pulse in/out)

Optional

- *lab*CORE extensions depending on device under test and/or application case
  - *core*IP-IMP (Code 7771), VoIP impairment extension
  - *core*IP-AMR (Code 7772), AMR extension
  - *core*BEQ (Code 7741), Binaural equalization
- Any HEAD acoustics handset positioner
  - HHP IV (Code 1406), Motorized handset positioner
  - HHP III.1 (Code 1403), Handset positioner

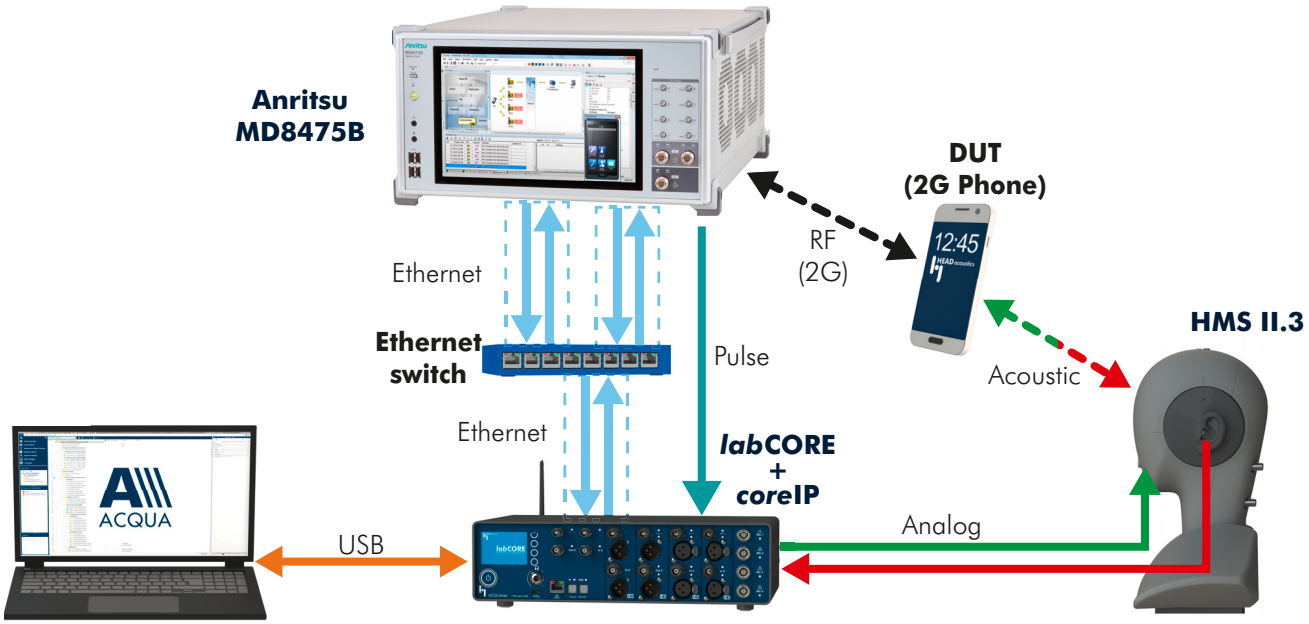
3.1.2 Anritsu equipment

- Anritsu MD8475B Signalling Tester
- SmartStudio©
- GSM Option
- GSM/GPRS Simulation Software
- GSM Signalling Unit
- 1 Year Support Service
- SIPviaMD8475

3.1.3 Third party equipment

- Ethernet switch
- 3 x Ethernet cable
- BNC cable
- RF antenna
- PC for ACQUA software
- DUT
- Test SIM card

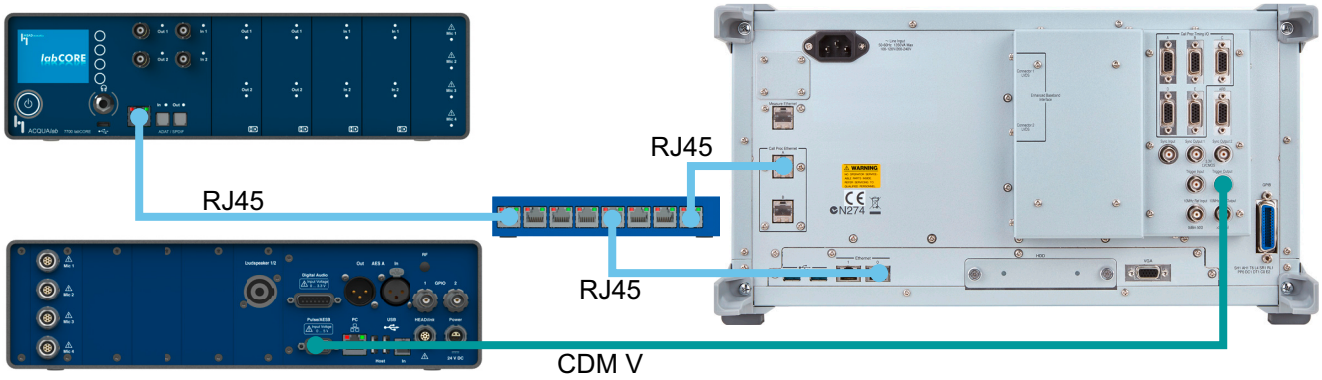
3.2 Configuration example (exemplary)



3.3 Cabling

3.3.1 Antenna

3.3.2 *lab*CORE to Anritsu MD8475B



3.4 2G connection establishment

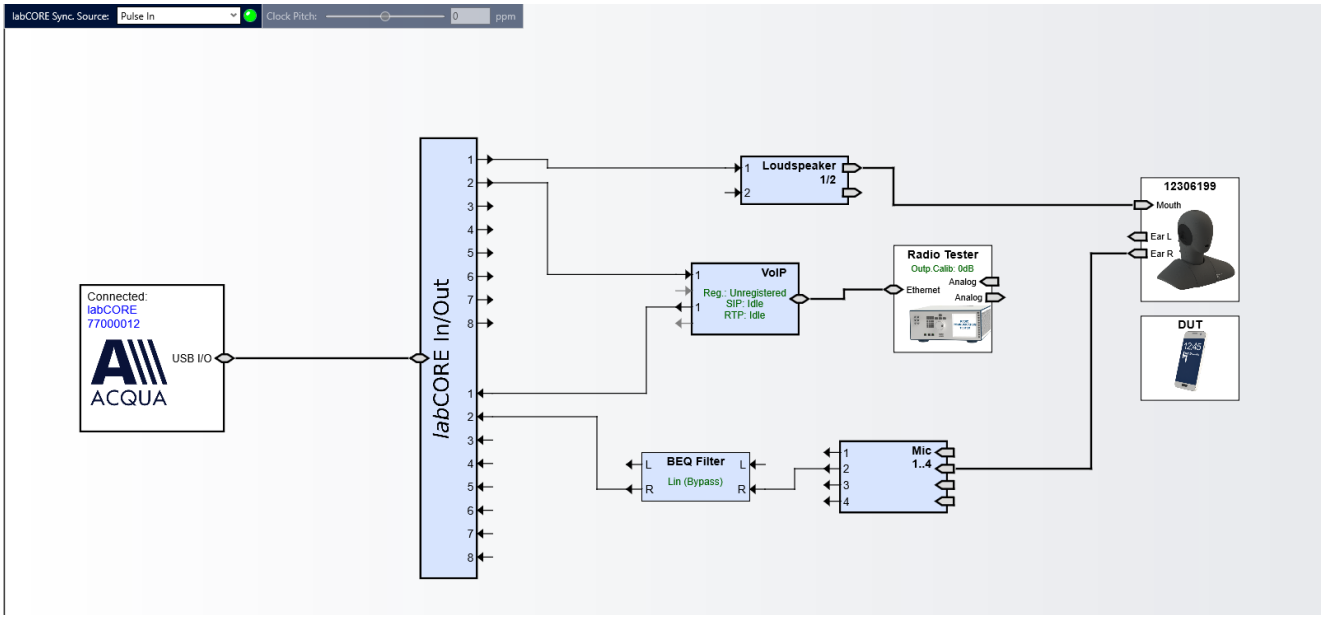
3.4.1 Preparation

- Interconnect the hardware according to chapter 3.2 and chapter 3.3
- Boot up Anritsu MD8475B
- Open SmartStudio© on Anritsu MD8475B
- Boot up PC and start ACQUA
- Boot up *lab*CORE
- Insert test SIM card into DUT and boot up DUT

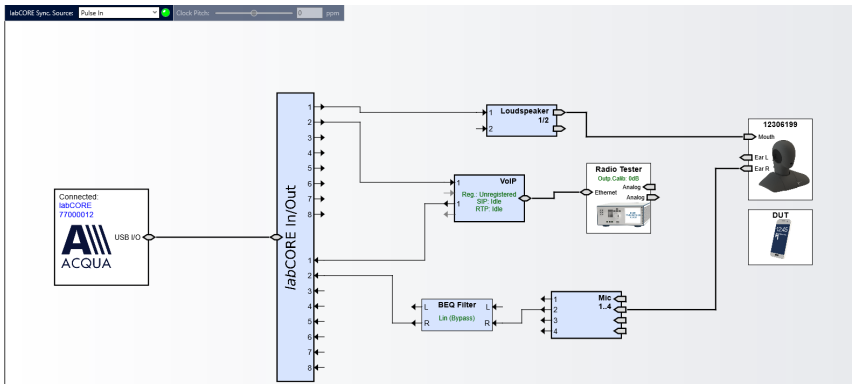
3.4.2 Connection procedure

ACQUA PC: Hardware configuration

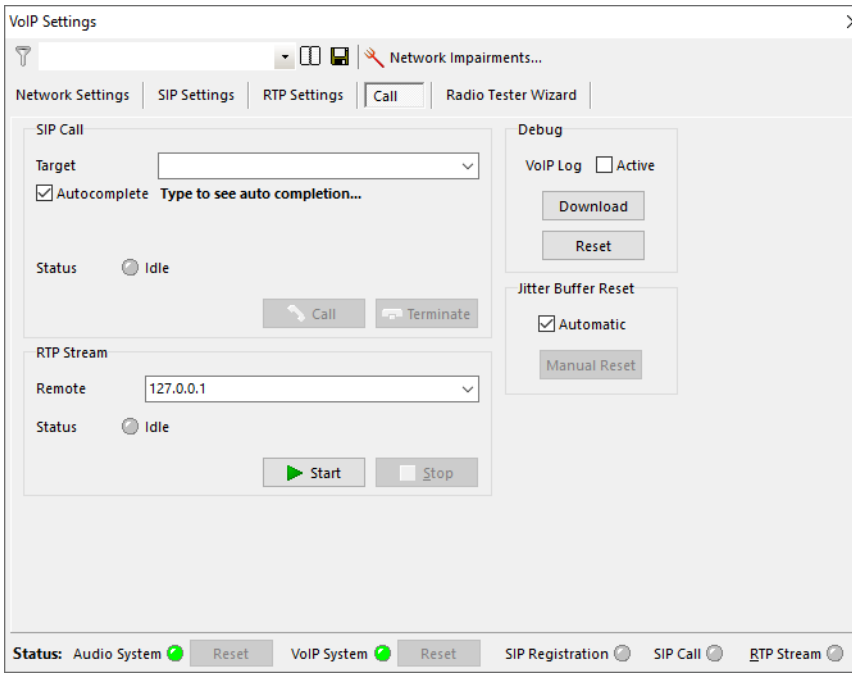
1. Start Hardware Configuration.
2. Select *lab*CORE and build the configuration.



3. Select the block VoIP.

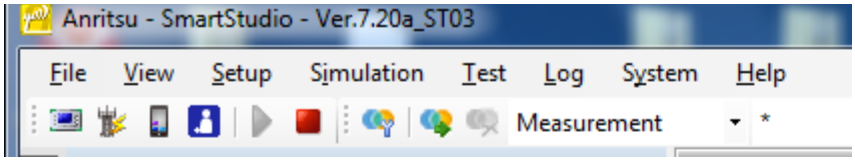


4. Select the tab Call.
5. Enable Automatic for Jitter Buffer Reset.

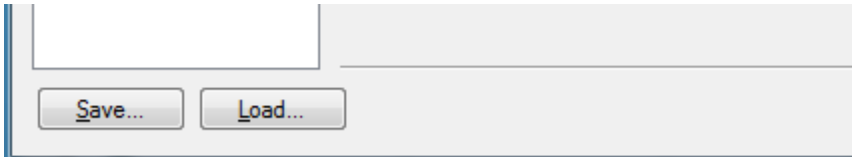


Anritsu MD8475B: Connection parameters

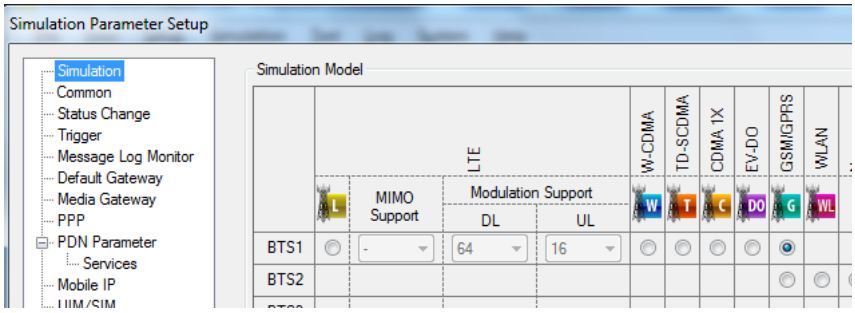
1. Open SmartStudio© on Anritsu MD8475B.
2. Select to open simulation parameter setup.



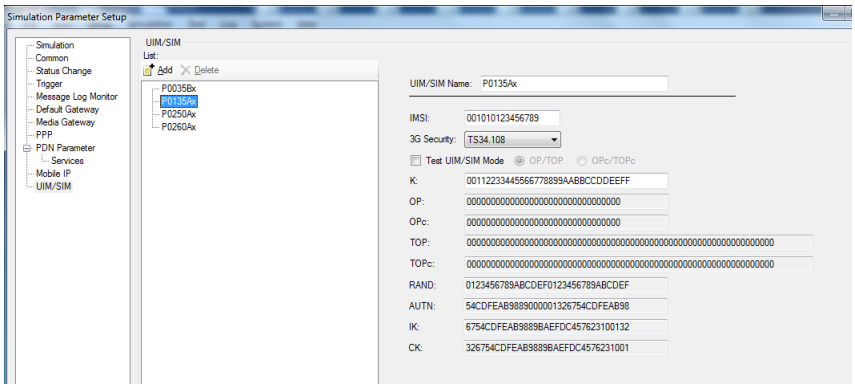
3. If available, load existing simulation parameter setup by selecting Load... .



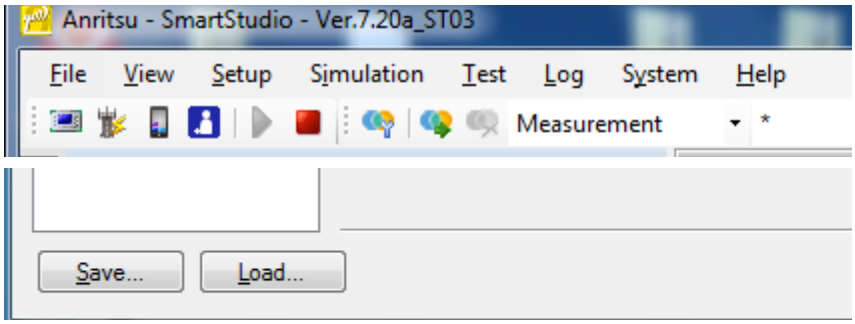
4. Select Simulation.
5. Set Simulation Model to GSM/GPRS.
6. Select UIM/SIM.



7. Check if the UIM/SIM settings apply to the SIM card of the DUT.
8. If desired, save the simulation parameter setup by selecting Save... .
9. Confirm simulation parameter setup with by selecting OK .

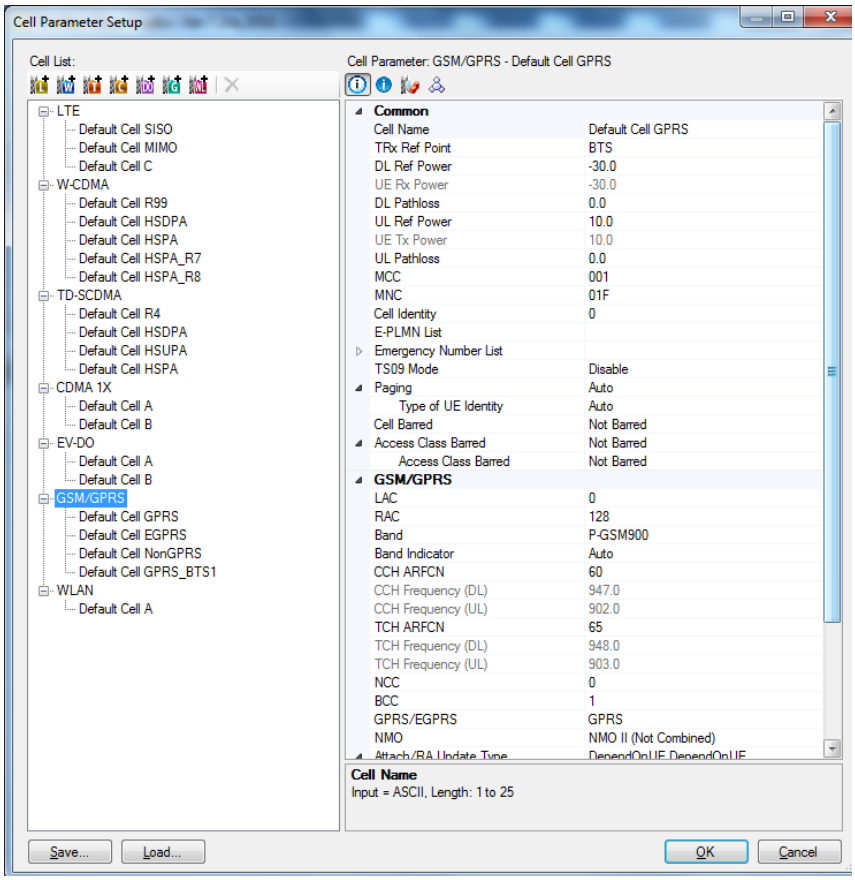


10. Select to open cell parameter setup.

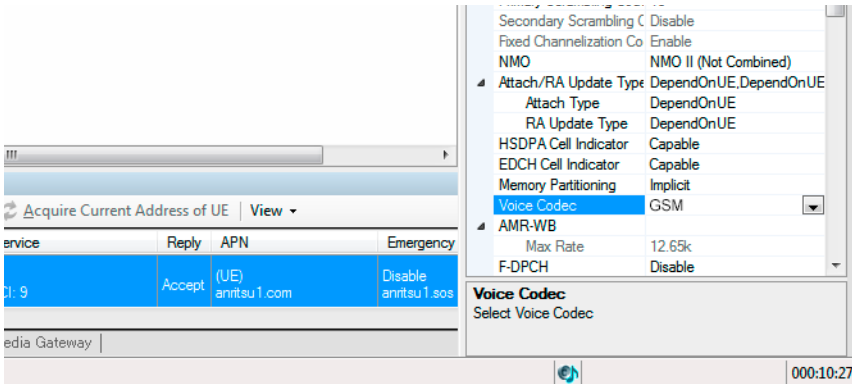


11. If available, load existing cell parameter setup by selecting Load....

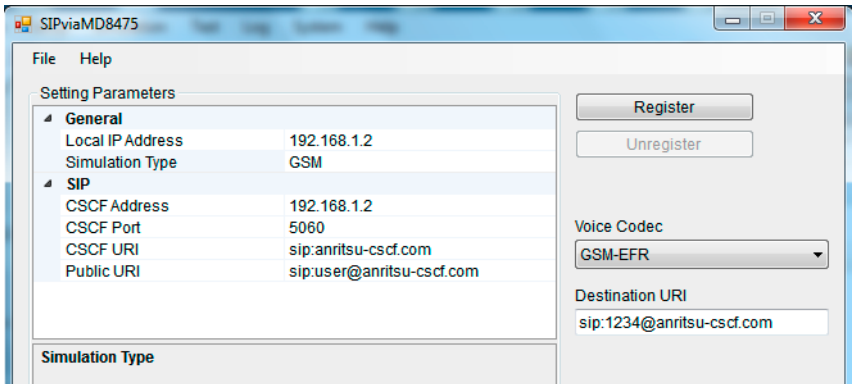
12. Select GSM/GPRS from the Cell list.
13. Unfold Common in Cell parameter.
14. Set the external attenuation (DL Ref Power and UL Ref Power). It shall match the attenuation of the RF antenna and the antenna cable.
15. Set the network identity MCC according to SIM card preferences.
16. Set the network identity MNC according to SIM card preferences.
17. If desired, save the simulation parameter setup by selecting Save....
18. Confirm cell parameter setup by selecting OK.



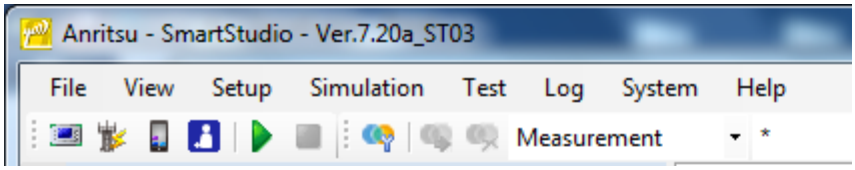
19. Select the desired GSM voice codec in SmartStudio©.



20. Open SIPviaMD8475.
21. Set GSM as Simulation Type.
22. Set desired codec as Voice Codec consistent to SmartStudio©.
23. Select Register.

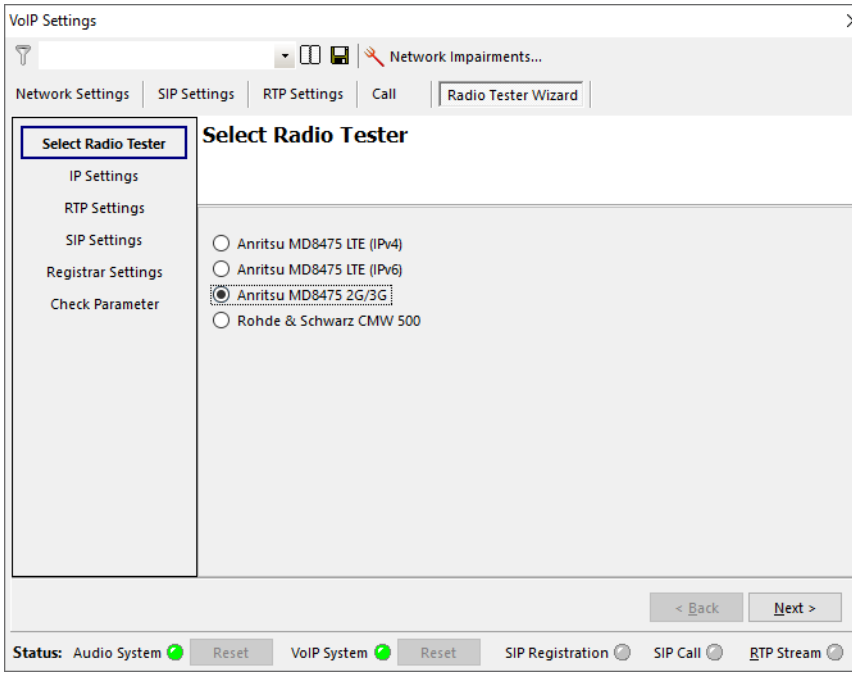


24. Go to SmartStudio©.
25. Select ▶ to start the simulation.

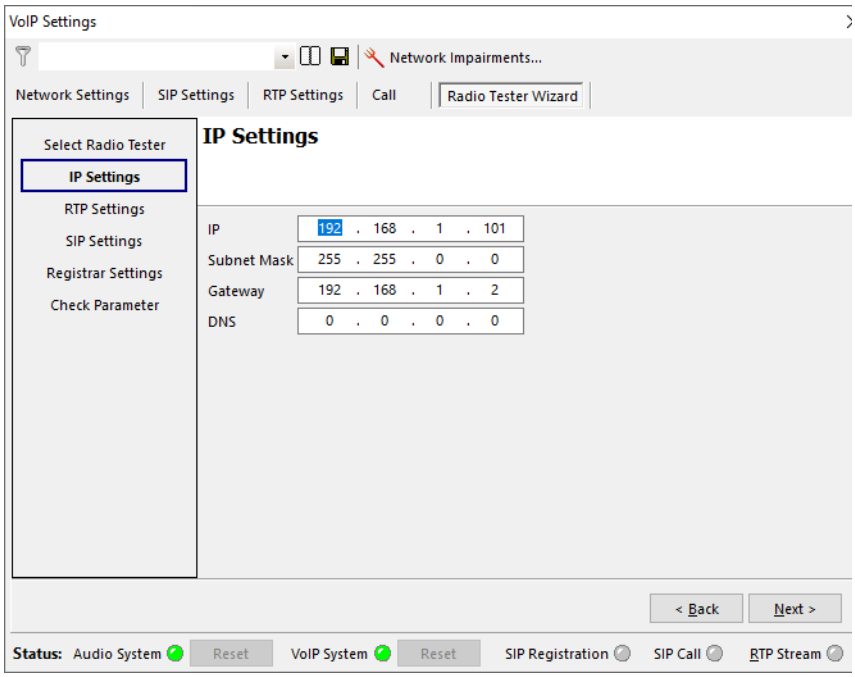


ACQUA PC: Radio tester wizard

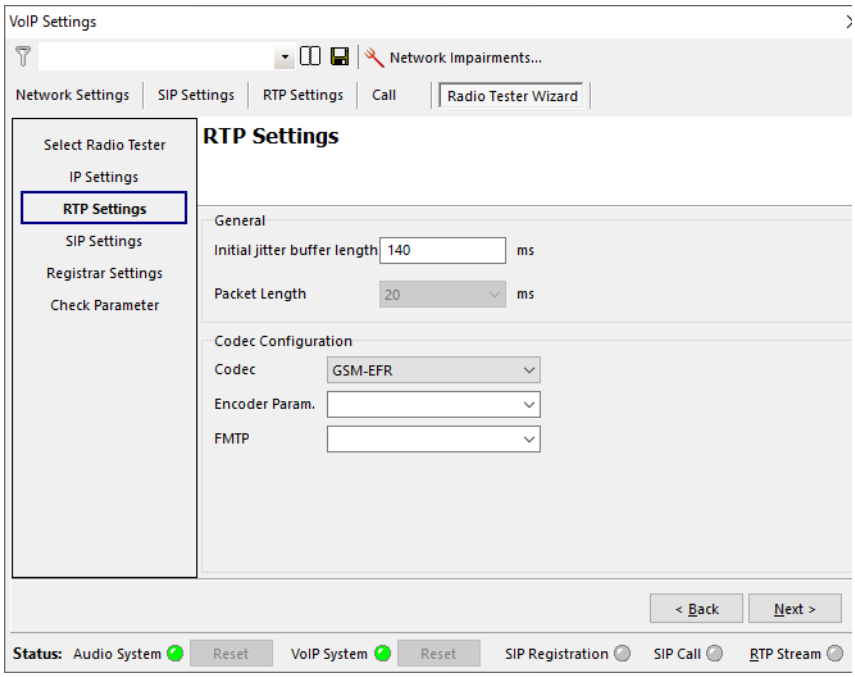
1. Select the tab Radio tester wizard.
2. Select Anritsu MD8475 2G/3G.



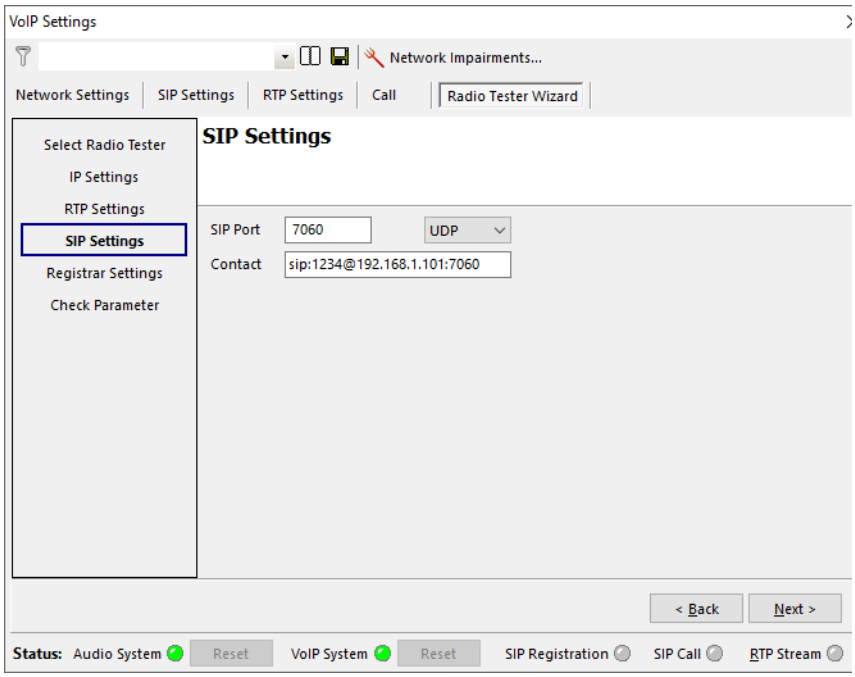
3. Select IP Settings.
4. Enter / verify the IP settings.



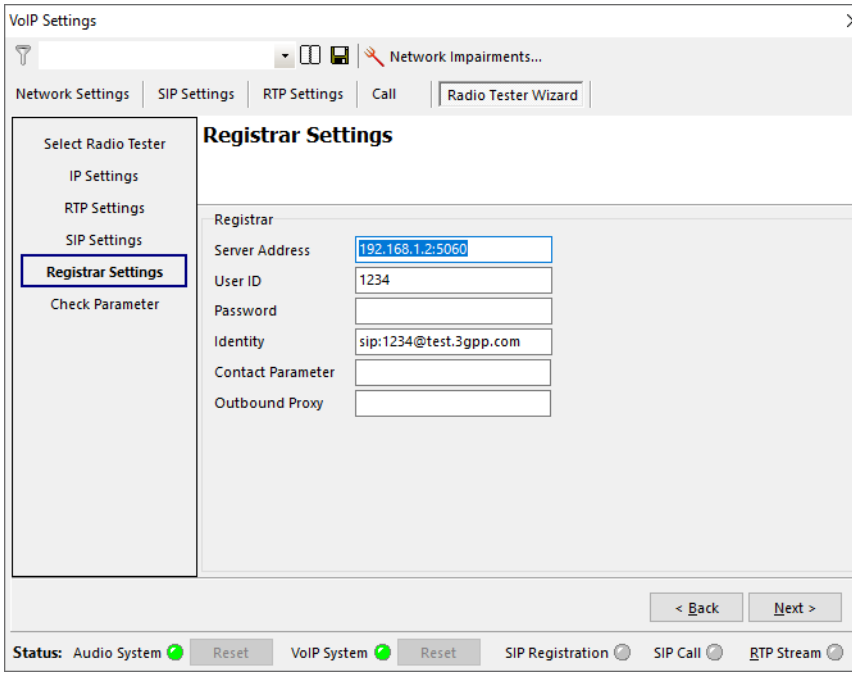
5. Select RTP settings.
6. Enter a suitable initial jitter buffer length. Default setting is 140 ms.
7. Select the voice codec in accordance with SIPviaMD8475.



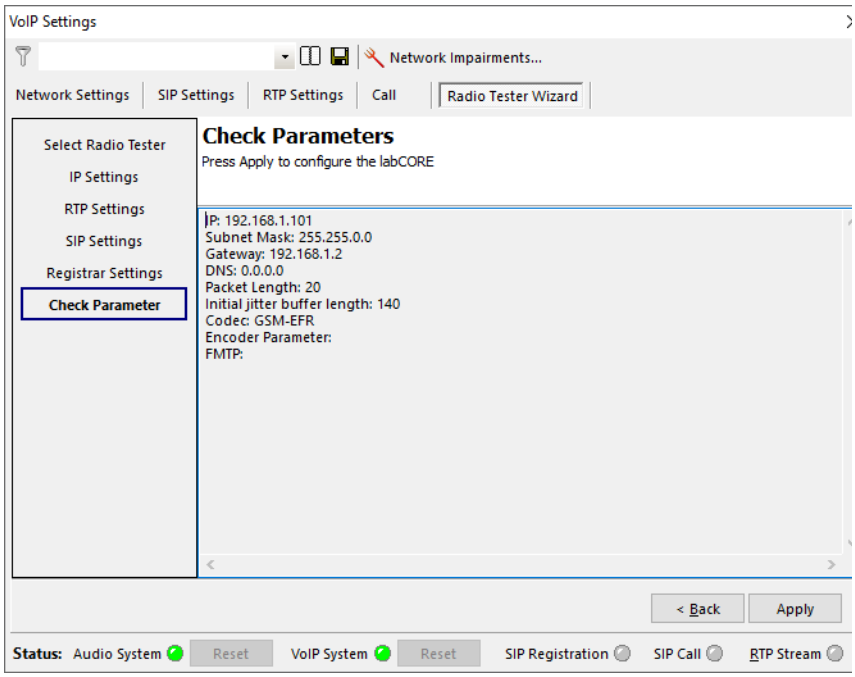
8. Select SIP Settings.
9. Enter / verify the SIP settings.



10. Select Registrar Settings.
11. Enter / verify the Registrar settings.

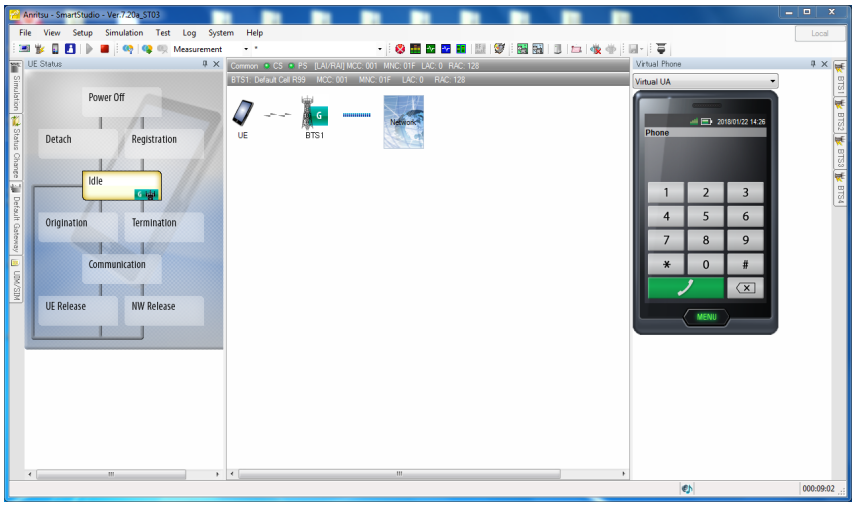


12. Select Check Parameter.
13. Verify all set parameters.
14. Select Apply to register the *lab*CORE at Anritsu MD8475B.



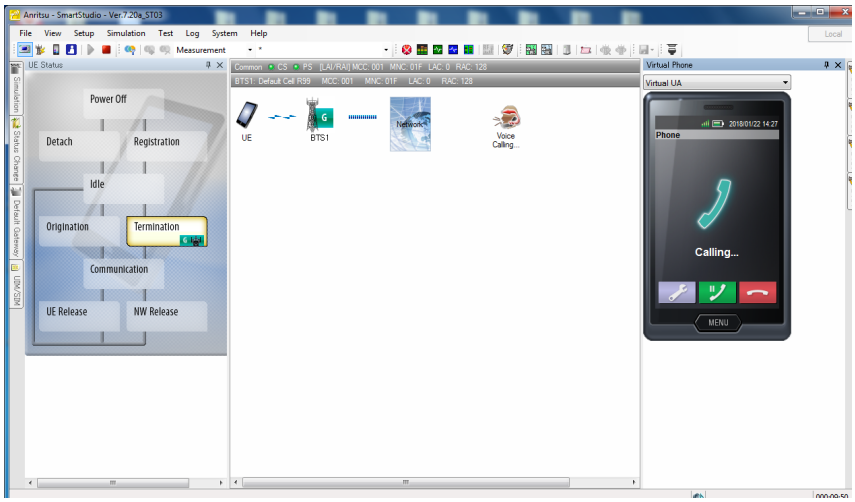
Anritsu MD8475B: Call execution

1. Go to SmartStudio© main screen. The status of the DUT (UE status) is idle.



2. Enter any number (e.g. 123) on the keypad of the virtual phone on the screen.
3. Select the green call button to initiate call. The radio tester waits for the call acceptance of the DUT.

4. Accept the call at the DUT.
5. The status of the DUT switches from Termination to Communication.



4 3G connection

4.1 Equipment list

4.1.1 HEAD acoustics equipment

Required

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*BUS (Code 7710), I/O bus mainboard
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*IP (Code 7770), VoIP software extension with codec
  - *core*IP-AMR (Code 7772), AMR extension
- ACQUA (Code 6810), Advanced Communication Analysis software
- HMS II.3 (Code 1230), HEAD measurement system with ear simulator and artificial mouth
- CDM V (Code 1637), Cable D-Sub 15-pin 2 x XLR (AES/EBU in/out) + 2 x BNC (pulse in/out)

Optional

- *lab*CORE extensions depending on device under test and/or application case
  - *core*IP-IMP (Code 7771), VoIP impairment extension
  - *core*BEQ (Code 7741), Binaural equalization
- Any HEAD acoustics handset positioner
  - HHP IV (Code 1406), Motorized handset positioner
  - HHP III.1 (Code 1403), Handset positioner

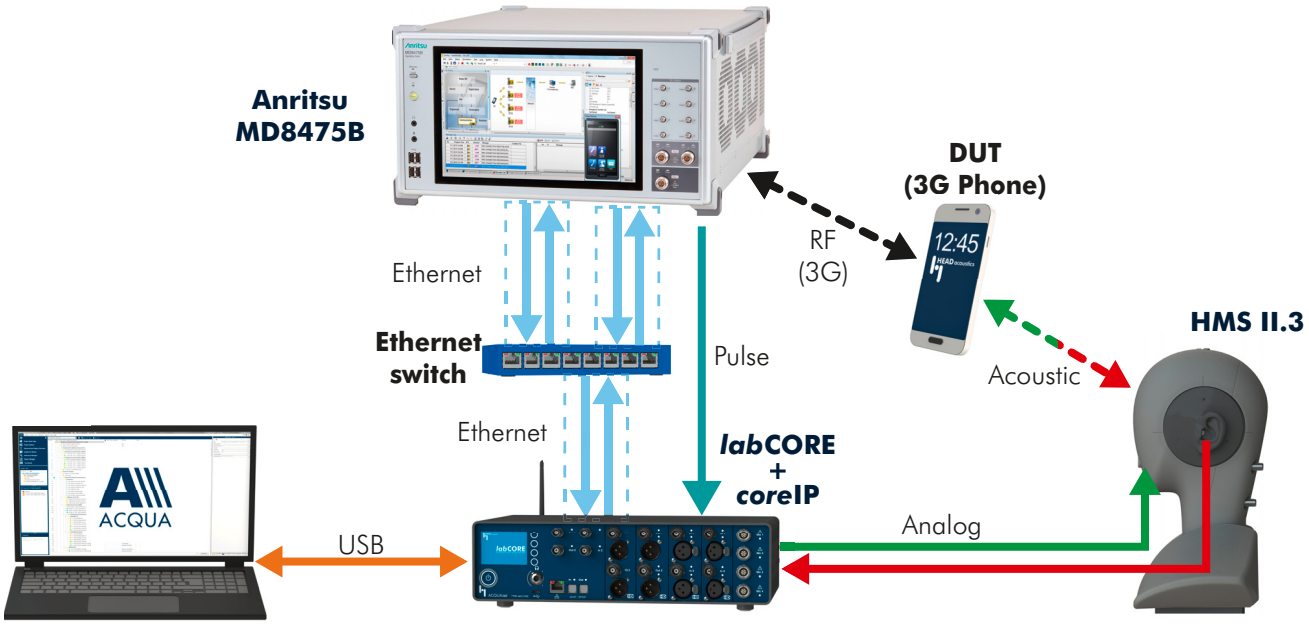
4.1.2 Anritsu equipment

- Anritsu MD8475B Signalling Tester
- SmartStudio©
- W-CDMA Option
- Enhanced Multi-signalling Unit
- W-CDMA Simulation Software
- 1 Year Support Service
- SIPviaMD8475

4.1.3 Third party equipment

- Ethernet switch
- 3 x Ethernet cable
- BNC cable
- RF antenna
- PC for ACQUA software
- DUT
- Test SIM card

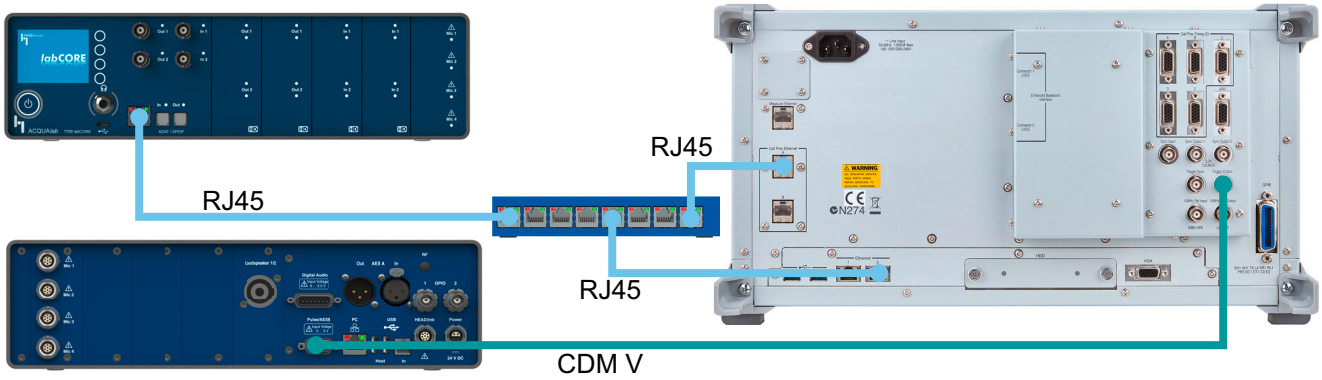
4.2 Configuration example (exemplary)



4.3 Cabling

4.3.1 Antenna

4.3.2 *lab*CORE to Anritsu MD8475B



4.4 3G connection establishment

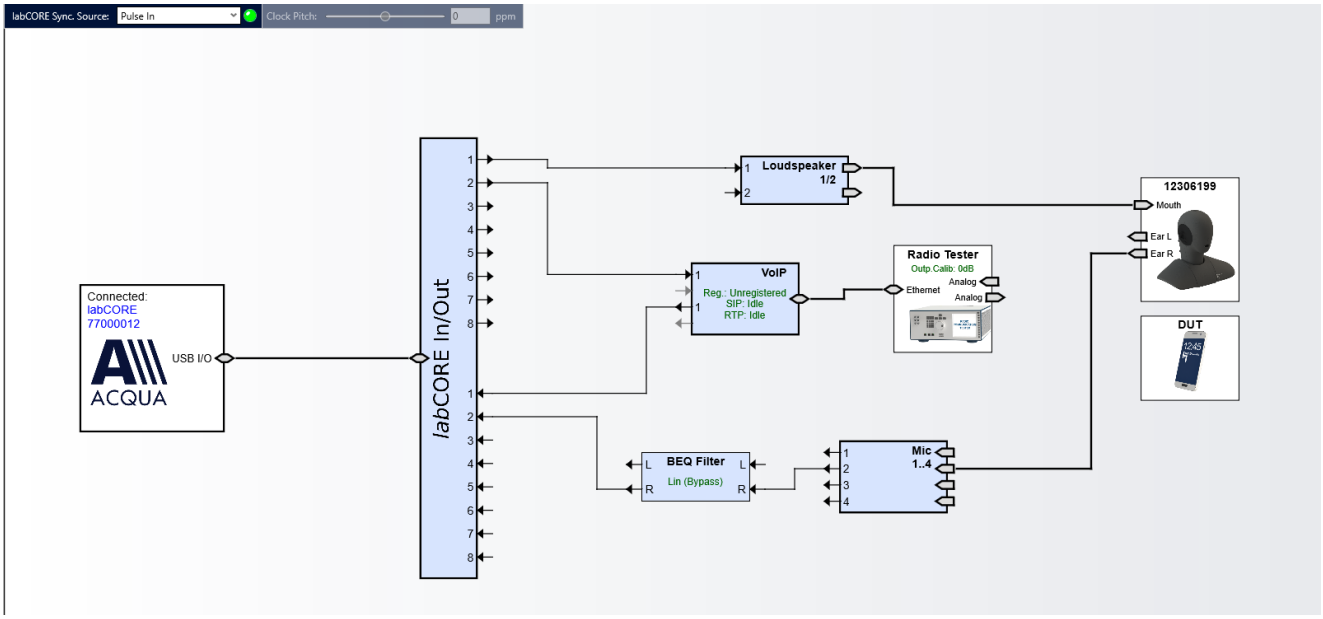
4.4.1 Preparation

- Interconnect the hardware according to chapter 4.2 and chapter 4.3
- Boot up Anritsu MD8475B
- Open SmartStudio© on Anritsu MD8475B
- Boot up PC and start ACQUA
- Boot up *lab*CORE
- Insert SIM card into DUT and boot up DUT

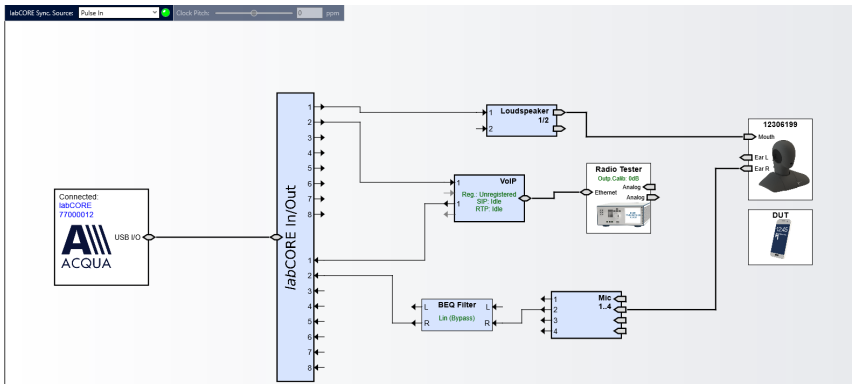
4.4.2 Connection procedure

ACQUA PC: Hardware configuration

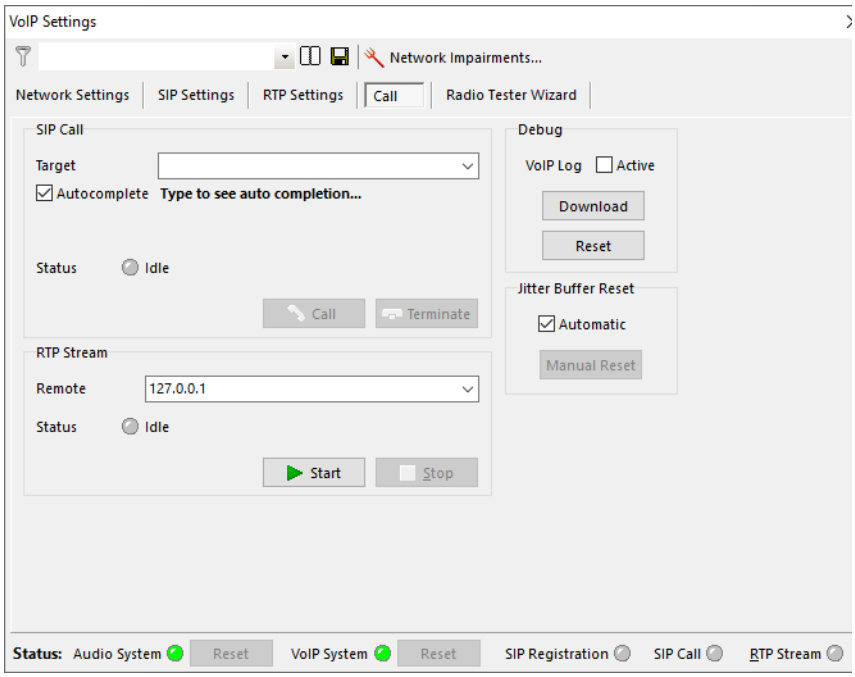
1. Start Hardware Configuration.
2. Select *lab*CORE and build the configuration.



3. Select the block VoIP.

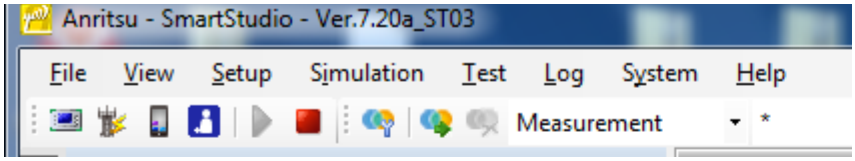


4. Select the tab Call.
5. Enable Automatic for Jitter Buffer Reset.

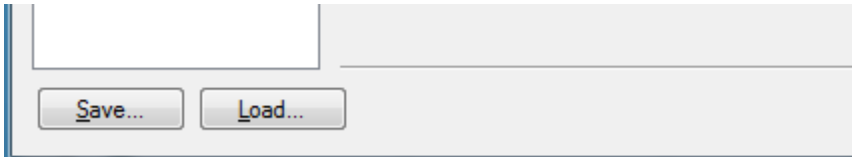


Anritsu MD8475B: Connection parameters

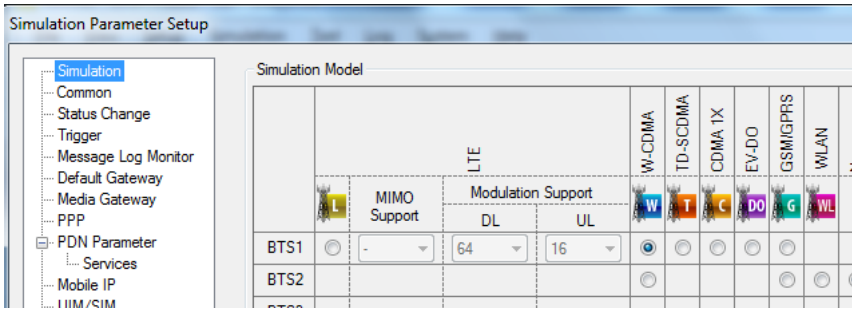
1. Open SmartStudio© on Anritsu MD8475B.
2. Select to open simulation parameter setup.



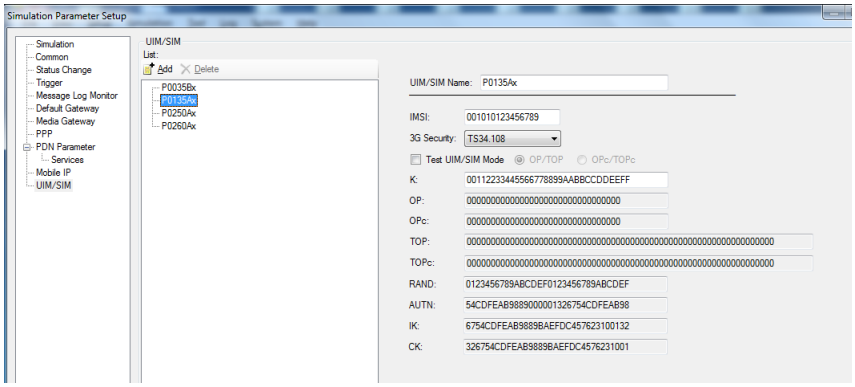
3. If available, load existing simulation parameter setup by selecting Load... .



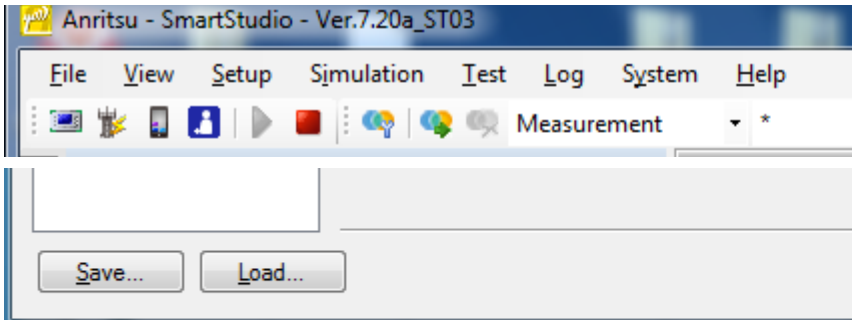
4. Select Simulation.
5. Set Simulation Model to W-CDMA.
6. Select UIM/SIM.



7. Check if the UIM/SIM settings apply to the SIM card of the DUT.
8. If desired, save the simulation parameter setup by selecting Save... .
9. Confirm simulation parameter setup with by selecting OK .

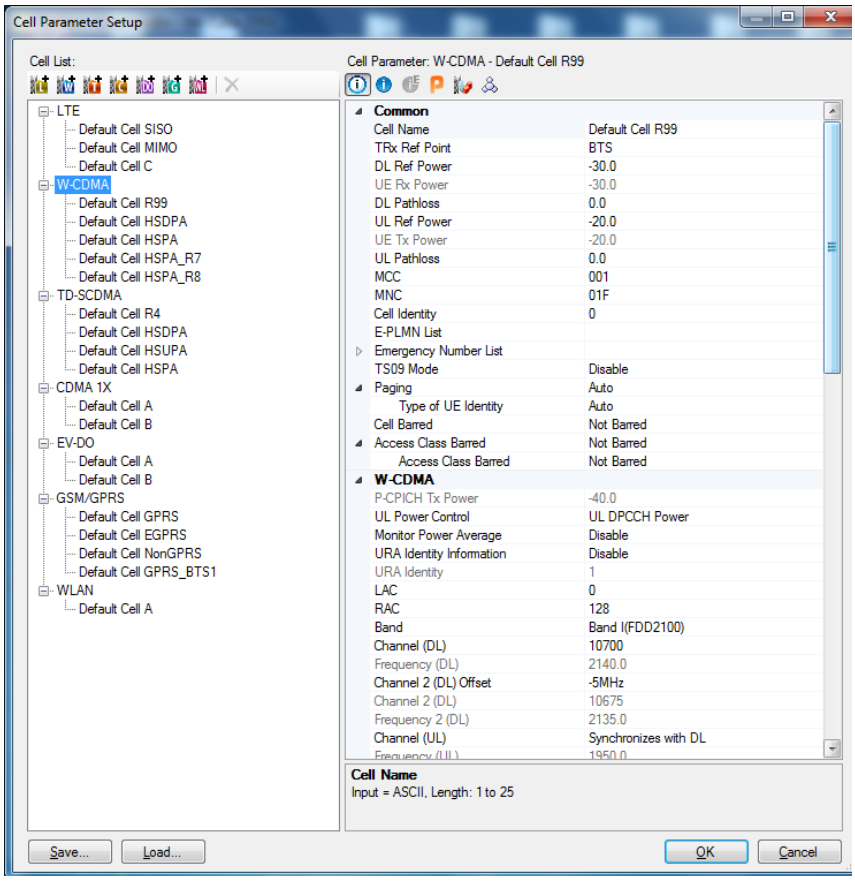


10. Select  to open cell parameter setup.

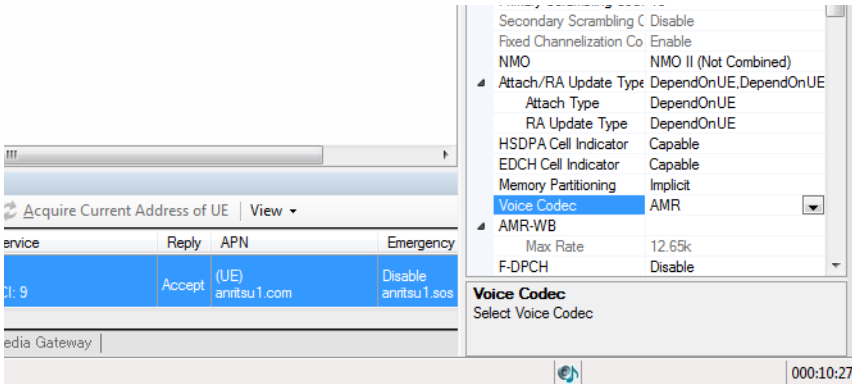


11. If available, load existing cell parameter setup by selecting Load....

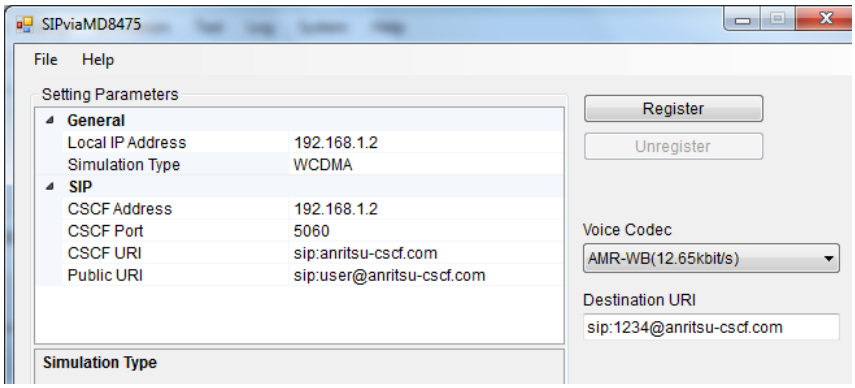
12. Select W-CDMA from the Cell list.
13. Unfold Common in Cell parameter.
14. Set the external attenuation (DL Ref Power and UL Ref Power). It shall match the attenuation of the RF antenna and the antenna cable.
15. Set the network identity MCC according to SIM card preferences.
16. Set the network identity MNC according to SIM card preferences.
17. If desired, save the simulation parameter setup by selecting Save....
18. Confirm cell parameter setup by selecting OK.



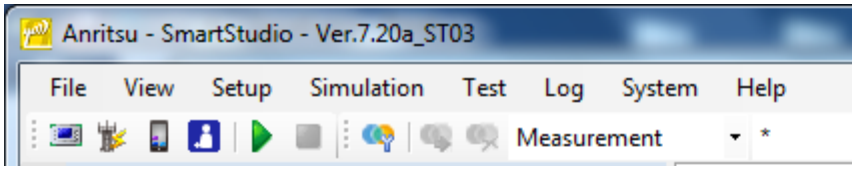
19. Select the desired GSM voice codec in SmartStudio©.



20. Open SIPviaMD8475.
21. Set WCDMA as Simulation Type.
22. Set desired codec as Voice Codec consistent to SmartStudio©.
23. Select Register.

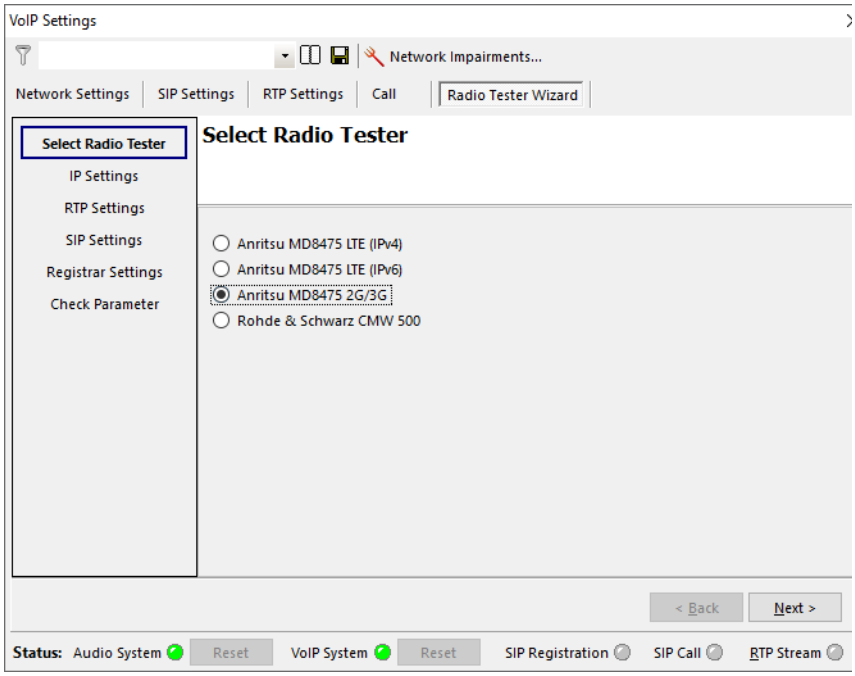


24. Go to SmartStudio©.
25. Select ▶ to start the simulation.

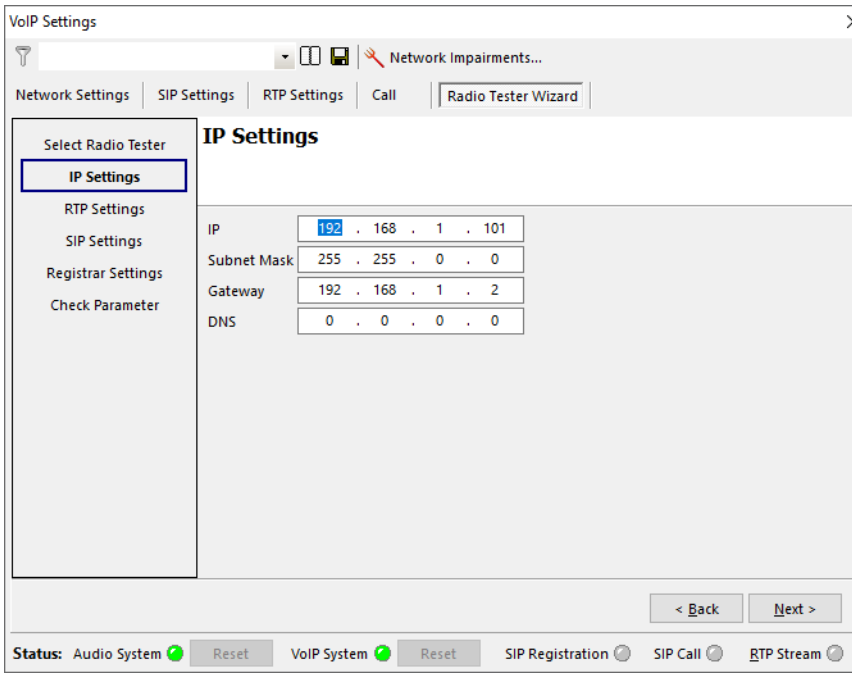


ACQUA PC: Radio tester wizard

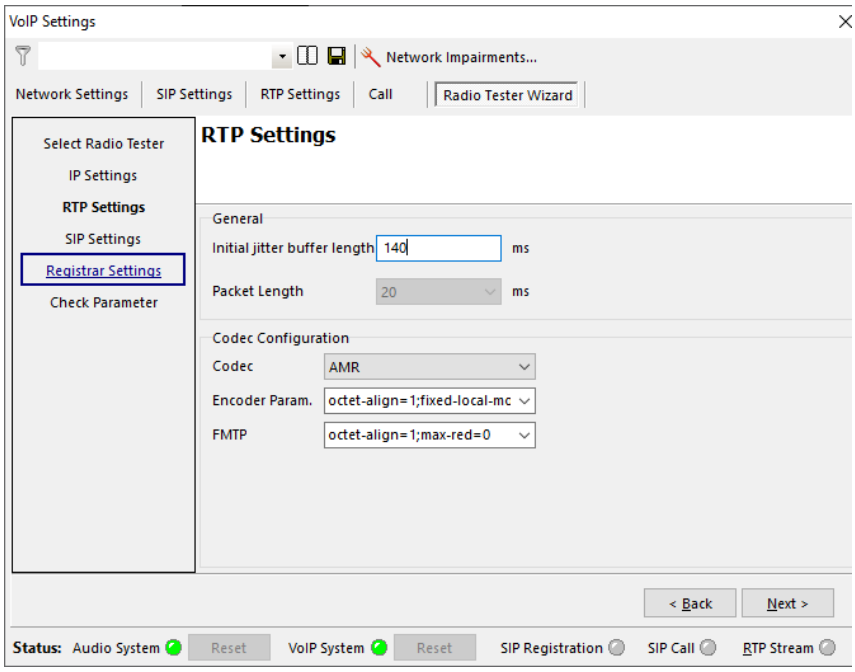
1. Select the tab Radio tester wizard.
2. Select Anritsu MD8475 2G/3G.



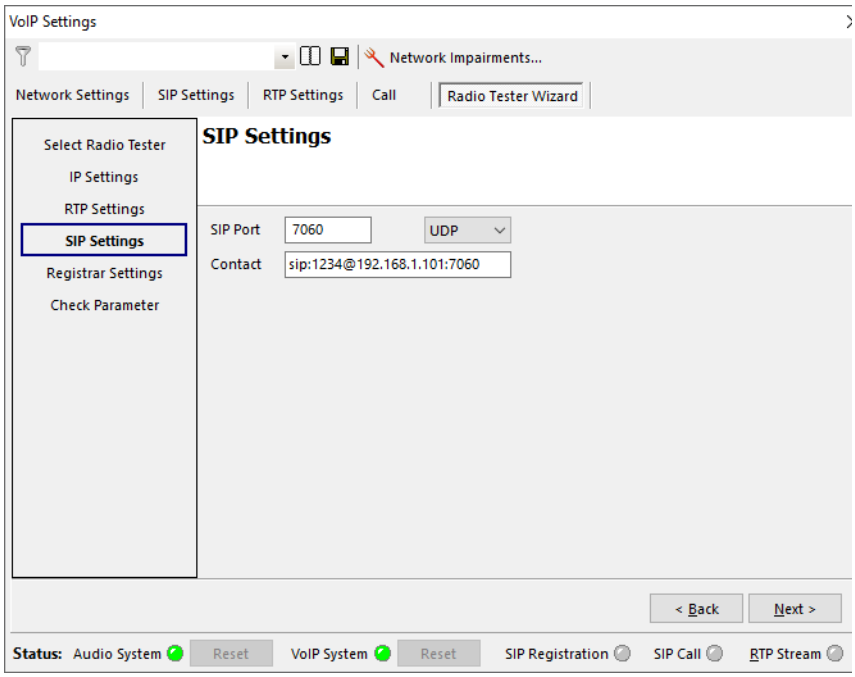
3. Select IP Settings.
4. Enter / verify the IP settings.



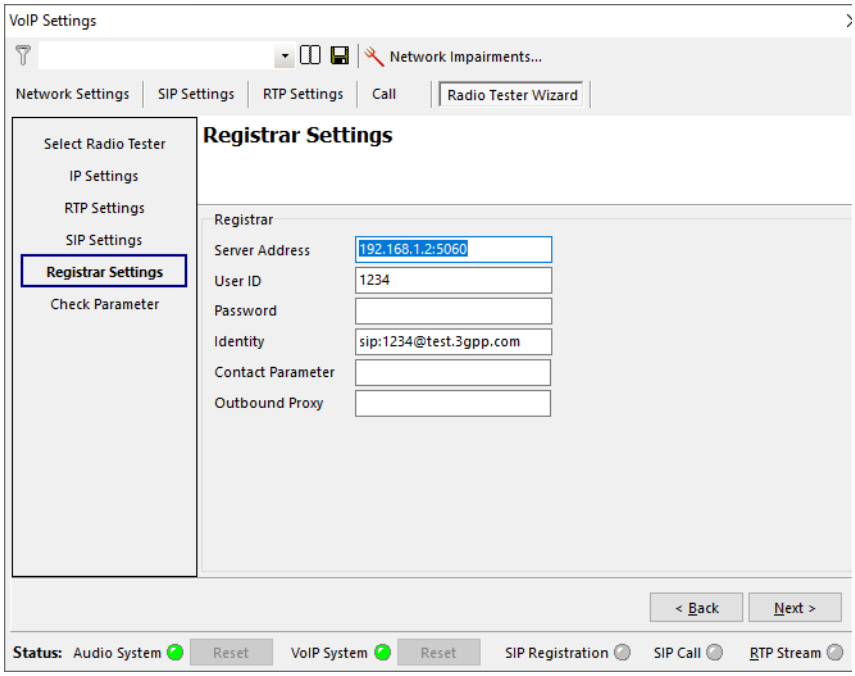
5. Select RTP settings.
6. Enter a suitable initial jitter buffer length. Default setting is 140 ms.
7. Select the voice codec in accordance with SIPviaMD8475.



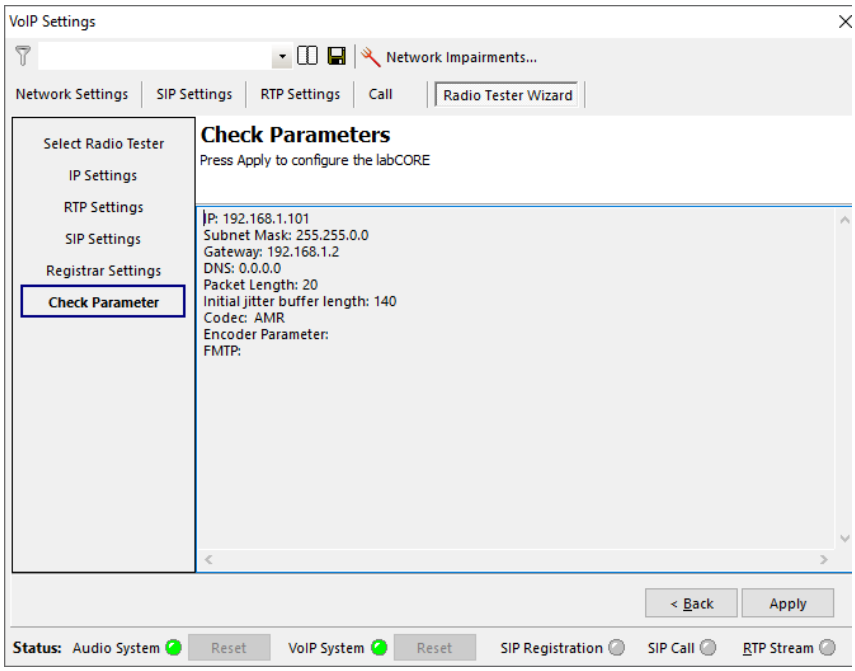
8. Select SIP Settings.
9. Enter / verify the SIP settings.



10. Select Registrar Settings.
11. Enter / verify the Registrar settings.

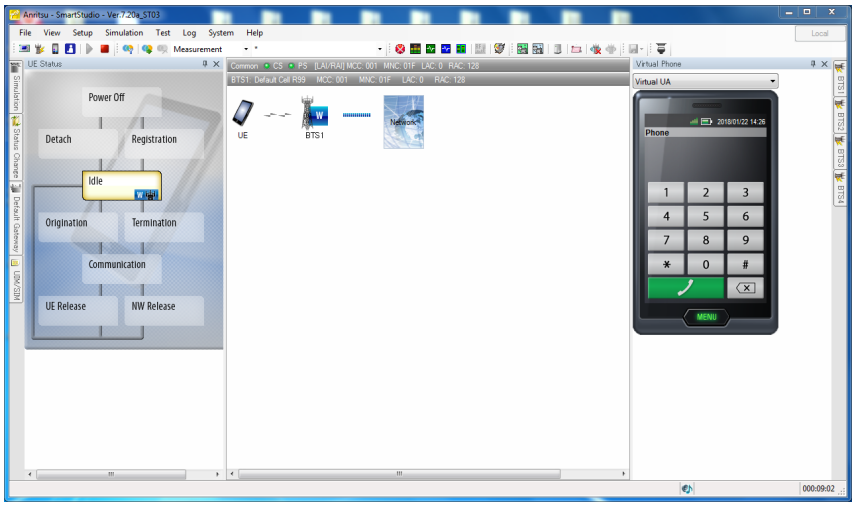


12. Select Check Parameter.
13. Verify all set parameters.
14. Select Apply to register the *lab*CORE at Anritsu MD8475B.



Anritsu MD8475B: Call execution

1. Go to SmartStudio© main screen. The status of the DUT (UE status) is idle.



2. Enter any number (e.g. 123) on the keypad of the virtual phone on the screen.
3. Select the green call button to initiate call. The radio tester waits for the call acceptance of the DUT.

4. Accept the call at the DUT.
5. The status of the DUT switches from Termination to Communication.