

APPLICATION NOTE





Establish 5G/4G connection to labCORE via Anritsu MT8000A

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Revision 1

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Table of contents

1	Intro	oduction	5
	1.1	Brief Description	5
	1.2	Reference Documentation	5
	1.3	Acronyms and Abbreviations	5
	1.4	Applied Interfaces at <i>lab</i> CORE and Anritsu MT8000A	6
		1.4.1 <i>lab</i> CORE Interfaces Front Panel	6
		1.4.2 Anritsu MT8000A Interfaces for 5G	7
		1.4.3 Anritsu MT8000A Interfaces for 4G	8
	1.5	Equipment List	9
		1.5.1 HEAD acoustics Equipment	9
		1.5.2 Anritsu Equipment	9
		1.5.3 Third Party Equipment	10
	1.6	Configuration Example	10
	1.7	Cabling	11
		1.7.1 Antenna 5G Connections	11
		1.7.2 Antenna 4G Connections	12
		1.7.3 <i>lab</i> CORE to Anritsu MT8000A	13
	1.8	Installation of Control Computer for Anritsu MT8000A	13
	1.9	Anritsu MT8000A Delays	13
2	Anr	itsu MT8000A Configuration	14
	2.1	5G NR Connection Establishment	14
		2.1.1 Preparations	14
		2.1.2 5G NR Connection Procedure	14
	2.2	4G LTE Connection Establishment	19
		2.2.1 Preparations	19
		2.2.2 4G LTE Connection Procedure	19
3	AC	QUA Configuration	25
	3.1	General Settings	25
	3.2	labCORE Settings	25
	3.3	Call Establishment	27

1 Introduction

1.1 Brief Description

This application note describes the procedure to establish a voice call in a 5G SA network (VoNR) or a 4G network (VoLTE) from the *lab*CORE hardware platform to a 5G/4G compatible device under test via the Anritsu MT8000A radio tester. The device under test registers via 5G SA network/4G network at the IMS server of Anritsu MT8000A. *lab*CORE connects to Anritsu MT8000A via wired Ethernet and also registers at its IMS server. Then, the ACQUA analysis software establishes a voice call between *lab*CORE and the device under test.

The application requires advanced knowledge HEAD acoustics equipment, Anritsu MT8000A, and Anritsu Smart-Studio NR. HEAD acoustics will not respond to support requests concerning general handling and technical configuration of Anritsu MT8000A and Anritsu SmartStudio NR.

All screenshots are exemplary and may differ from customer experience.

1.2 Reference Documentation

Document name	
<i>lab</i> CORE Manual	
HMS II Series Manual	
ACQUA Online Help	
Anritsu MX800070A SmartStudio NR Operation Manual	

1.3 Acronyms and Abbreviations

Acronym / abbreviation	Description
ACQUA	Advanced Communication Quality Analysis
AMR	Adaptive multi-rate
dB	Decibel
dBm	Decibel-milliwatts
DUT	Device under test
GBit	Gigabit
IMS	IP Multimedia Subsystem
IP	Internet Protocol
kHz	Kilohertz
LTE	Long Term Evolution
NR	New Radio
NSA	Non-Standalone
RF	Radio frequency
RTP	Real-time protocol
SA	Standalone
SIM	Subscriber identity module
VolP	Voice over Internet Protocol
VoLTE	Voice over LTE
VoNR	Voice over New Radio

1.4 Applied Interfaces at *lab*CORE and Anritsu MT8000A

1.4.1 *lab*CORE Interfaces Front Panel



Ethernet interface (RJ45) for measuring IP-based communication

1.4.2 Anritsu MT8000A Interfaces for 5G



- Ethernet socket for connecting control computer
- SFP/SFP+ socket for connecting 10 GBit Ethernet switch
- Type N RF antenna connector for connecting an external antenna

1.4.3 Anritsu MT8000A Interfaces for 4G



- Ethernet socket for connecting control computer
- SFP/SFP+ socket for connecting 10 GBit Ethernet switch
- Type N RF antenna connector for connecting an external antenna

1.5 Equipment List

1.5.1 HEAD acoustics Equipment

Required

- IabCORE (Code 7700), Modular multi-channel hardware platform
 - coreBUS (Code 7710), I/O bus mainboard
 - coreOUT-Amp2 (Code 7720), Power amplifier board
 - coreIN-Mic4 (Code 7730), Microphone input board
 - coreIP (Code 7770), VoIP software extension with at least one of the following voice codecs
 - coreIP-AMR (Code 7772), AMR extension
 - coreIP-EVS (Code 7773), EVS extension
- ACQUA (Code 6810), Advanced Communication Quality Analysis software
- HMS II.3 (Code 1703), HEAD measurement system with ear simulator and artificial mouth

Optional

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

1.5.2 Anritsu Equipment

Required

- MT8000A, Anritsu MT8000A Radio Communication Test Station
- MT8000A-001, Control Module
- MT8000A-011, Baseband Module
- MT8000A-012, Data Test Module
- MT8000A-020, RF Base Module
- MT8000A-021, 0.4GHz-6GHz RF Sub Module
- MT8000A-031, 0.4 GHz-6GHz Multi RF Module
- MT8000A-032, 0.4 GHz-6 GHz Multi RF Extension
- MT8000A-033, 0.4 GHz-7.125 GHz Enhanced RF Module
- MX800078A, LTE/NR Platform Software for SmartStudio
- MX800079A, NR Platform Software for SmartStudio
- MX800070A, SmartStudio NR(SSNR)
- MX800070A-002, 5G SA option
- MX800070A-004, 5G Core option
- MX800070A-011, NR TDD option
- MX800070A-012, NR FDD option
- MX800070A-013, SDAP option
- MX800070A-SS110, SmartStudio NR Support Service

Optional

- MX800070A-080, IMS Server option For the following testing applications:
 - Emulates network fault at VoNR connection from UE
 - Simulates VoNR calls from MT8000A/SSNR to UE
 - · Supports supplementary service functions, such as caller ID and call forwarding
 - Authenticates call connections using Early Media sequence
 - GBA certification

1.5.3 Third Party Equipment

- 10 Gigabit Ethernet Switch with SFP+ port
- 3 x Ethernet cable
- 2 x Optical cable MM LC/PC to LC/PC, 3 meters
- 2 x 10 Gigabit Ethernet SR 850nm SFP+ module
- RF cable
- RF antenna
- Computer for ACQUA software
- Computer for SmartStudio NR software
- DUT
- Test SIM card

1.6 Configuration Example



1.7 Cabling

1.7.1 Antenna 5G Connections



Attach the main antenna to the appropriate Type N connectors.

1.7.2 Antenna 4G Connections



Attach the main antenna to one of the appropriate Type N connector.

1.7.3 IabCORE to Anritsu MT8000A



- Connect one Ethernet cable to the Ethernet socket at the front panel of *lab*CORE and to one random RJ45 socket of the Ethernet switch.
- Connect the optical cables to SFP/SFP+ socket of Anritsu MT8000A and to SFP(+) sockets of the Ethernet switch.
- Connect the Control computer via Ethernet to the socket Control of Anritsu MT8000A.
- Connect the Control computer via Ethernet to one random RJ45 socket of the Ethernet switch.

1.8 Installation of Control Computer for Anritsu MT8000A

- For installation of the control computer refer to chapter 2.3 of MX800070A SmartStudio NR Operation Manual.
- Define the network adapter via the control computer according to chapter 2.1.3.1 of MX800070A SmartStudio NR Operation Manual.

1.9 Anritsu MT8000A Delays

The forwarding delays of Anritsu MT8000A are determined and provided by Anritsu Corporation.

Network type	Uplink	Downlink
NR (5G)	2.8 ms	1.8 ms
LTE (4G)	2.0 ms	2.9 ms

Anritsu Corporation accounts for the accuracy of these values.

2 Anritsu MT8000A Configuration

2.1 5G NR Connection Establishment

2.1.1 Preparations

- Interconnect the hardware according to chapter 1.6 and chapter 1.7
- Boot up Anritsu MT8000A.
- Boot up control computer for Anritsu MT8000A.
- Start Anritsu Application Launcher on the control computer.
- Boot up computer and start ACQUA.
- Boot up labCORE.
- Insert test SIM card into DUT, boot up DUT and set it to airplane/offline mode.

2.1.2 5G NR Connection Procedure

Start **SmartStudio NR** v5.11.0.0 from Application Launcher on the Anritsu control computer.



Simulation Parameter Setup

- Select stoopen Simulation Parameter Setup.
- If available, load existing Simulation Parameter Setup (such as SA_NR_LTE_IMS.wnssp3) by selecting Load.
- 3. Select Simulation.
- 4. Set Simulation Model to NR Cell \rightarrow 1 and LTE Cell \rightarrow 0.



- 5. Select PDN Parameter.
- 6. Double-click on the desired packet data network (PDN).

Status Change	No.	Check DNN/APN	IP Type	UE Address	Default /Primary	Dedicated1/Secondary1	Dedicated2/Secondary2	Dedicated3/Secondary3	Dedicated4/Secondary4	Dedicated5/Secondary5	Dedicated
Trigger Message Log Monitor	M 1										
PDN Parameter Services	2		IPv4	192.168.2.103	QCI: 9	GCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	GCI: Depend on UE	GCI: Depe
CONC 200	⊠ 3		IPv4v6	192.168.1.21 2001:0:0:3:1	QCI: 9	QCI: Depend on UE	QCI: Depend on UE	GCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depe
	₽ 4		IPv4v6	192.168.1.31 2001.0.0.4:1	QCI: 9	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depe
	₽ 5		IPv4v6	192.168.1.41 2001.0.0.5:1	QCI: 9	QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depe
	₽ 6		IPv4v6	192.168.1.51 2001.0.0.6:1	QCI: 9	QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depe
	2 7		IPv4v6	192.168.1.61 2001.0.0.7:1	QCI:9	QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depe
	₽ 8		IPv4v6	192.168.1.71 2001.0.0.8:1	QCI: 9	OCI: Depend on UE	GCI: Depend on UE	, GCI: Depend on UE	QCI: Depend on UE	GCI: Depend on UE	GCI: Dep
DN Pa	rame	eter Set	up - [[No.1]							
Check	DN	N/APN	in	IS					~		
				~							

- 7. Enter the desired name for the APN network.
- 8. Select the desired Internet Protocol for the APN network.
- 9. Select the User Equipment tab.
- 10. Enter the IP address of the DUT according to the selected Internet Protocol.

User Equip	ment	Bearer	PDN-Gateway	Network	IP Data Tr	affic
- UE Add	ress					
IPv4:	192.1	68.2.102	2			
IPv6	2001	0.0.1.1				1
	2001.]
UE Add IPv4: IPv6:	ress 192.1 2001:	68.2.102 0:0:1::1	2]

- 11. Select the Network tab.
- 12. Select IMS Services.
- 13. Select **OK** to confirm.

IMS Services	Use the following /	Address		
VNID: 1 V	DNS Address		Primary P-CSCF	Address
	IPv4(Primary):	192.168.1.2	IPv4:	192.168.1.2
	IPv4(Secondary):	192.168.1.3	IPv6:	2001:0:0:1::2
	IPv6:	2001:0:0:1::2	Secondary P	-CSCF Address
			IPv4:	192.168.1.3
			IPv6:	2001:0:0:1::3
			Tertiary P-CS	CF Address
			IPv4:	192.168.1.4
			IPv6:	2001:0:0:1::4

- 14. Select UIM/SIM.
- 15. Add or select the UIM/SIM.
- 16. Enter the appropriate UIM/SIM settings.

or

Confirm if the UIM/SIM settings apply to the SIM card of the DUT.

- 17. If desired, save the simulation parameter setup by selecting **Save**.
- 18. Confirm **simulation parameter setup** by selecting **OK**.

Denator Marchan San Comp San Com	Detademony San Charge Mar Cay Mar Cay	Detailer UM 201 Starting Starting Market Starting Starting Starting <td< th=""><th>How Mark Mark</th><th>ulation Parameter Setup</th><th></th><th></th><th>- D ></th></td<>	How Mark Mark	ulation Parameter Setup			- D >
RNAD (01246/07194/02/05 ATTN (6276/0746/000712675-6276/0748) RC (0156/0746/060800-012675-6276/0712) CK (0156/0746/060800-012675-6276/02100)	RAND 0012460709405009 AUTH INCODE 000000000000000000000000000000000000	RAND (0)234671344CC6973124674670467 AITT (ECCF4400000013574574670470400) IK (0)3455746474040000135745746704301002 OK (20)354567674400000407664391201001	AND (17)248473944C09703473444 ANT (674C0F4480894470267873109122) IX (674C0F4480894470267873109122) OX 32675C07F469898467026787321001	Julicion Parameter Setup Smuldion Common Setuto Drages Tragger Message Log Monter PRIN Parameter L- Services UBM/SIM	100/250 Lef M X Delete P 20134 - P 2014 - P 2014 - P 20144 - P 20144	UM 2M have PODMa.	
OK [20175C07E94688866470C457423101	OK [20154C07E04688684470C68700101]	OK 120154C017E040018864070C617420101	CK DETSECTEMENTALEFOLETIOLETIOLETIOLETIOLETIOLETIOLETIOLETI			NHD: V1236570346CDEF012248570440DEF AUDN: S4C076-886800001207654C0762898 K: 6794CDF648980000120754C07620100122	

- 19. Select the **UIM/SIM** tab at the lefthand side of the main screen.
- 20. Select the applied **UIM/SIM** from the drop-down list.
- 21. Confirm the choice by selecting **Apply**.

	UIM/SIN	<u>/*</u>	-= X	
	🗨 Appl	y 🕼 Restore		
M/SIM* 🕍 Simulation	P0035E IMSI: 3G Secu	3x ~ C 001010123456789		MNC: 01F
🔁 Status Change	Creation of the second	UIM/SIM Mode OP/TOP OPc/TOPc 00112233445566778899AABBCCDDEEFF 000000000000000000000000000000000		

S<u>y</u>stem

- *

<u>H</u>elp

🜃 Anritsu - SmartStudio NR - Ver.02.00.11.00

Save...

<u>File View Setup Si</u>mulation <u>T</u>est Log

Load...

Cell Parameter Setup

1. Select **i** to open Cell Parameter Setup.

evoilable, load eviating Cell

- 2. If available, load existing Cell Parameter Setup by selecting Load.
- 3. Select NR 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. Unfold NR in Cell parameter.
- 7. Set the operating band (**NR Band**) according to the DUT.
- If desired, save the cell parameter setup by selecting Save.
- 9. Confirm Cell Parameter Setup by selecting OK.

Cell List:	Cell Parameter: NR - Default Cell A		
🬃 🚧 🗆 🖈 🖡	0 0 🧤 💩		
NR Presult Cell A Default Cell B Default Cell B Default Cell E Default Cell E Default Cell E Default Cell F Default Cell A Default Cell A Default Cell A Default Cell C Default Cell C	Common Cell Name Power Sharing TRv. Ref Point DL Ref Power UE Rv Power UL Pathloss UL Ref Power UL Pathloss UL Ref Power UL Pathloss MCC Cell Identity ErPLIM Uat ErPLIM Uat RS EPRE Uplink Target Power Density AMF Region ID AMF Set ID AMF Set ID AMF Pointer TAC RANAC Duplex Mode NR Band	Default Cell A None BTS -18.0 -18.0 5.0 5.0 0.0 5.0 0.0 0.0 5.0 0.0 -30.2 254 1 1 1 1 7DD n77	

IPsec and Authentication Settings

1. Select 🗻 to open IMS Services.



- 2. Go to Property.
- 3. Select and highlight IPsec Settings.
- 4. Select ____ to edit IPsec Settings.

			_		
					• ×
DNS	DNS2	MWI	NTP		^
92.168.2.230	192.168.2.230				
.1.1.2	192.168.2.230		-		~
					>
					φ×
		Information	r in the second s		
Target Service (CSC) Monitoring UA Virbal UA User List Min Suthentication User Name Registered List Min Expires 0 0 Public 1 Cor	User info	v Expire Date	Advance Server's Server's Server's Send Error 400 Bad Reques P-CSCF R P-CSCF R Make Make Vi End	ed Mode Behavior mal Response t estoration s Behavio e Call deo Call Cal	×
	NS 22 168 2 230 001 0.0 11:2 1.12 Monitoring UA Mirtual UA ■ MiS Authentication User List Min-Expires 0 ↓ Public I Public I	NS DNS2 122 168 2 230 192 168 2 230 101 0 11 2 2001 0 0 11 2 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 230 11 2 192 168 2 30 12 2 168 2 30 190 16 3 4 1 - 0 12 2 168 2 30 190 16 3 4 1 - 0 12 2 168 2 30 190 16 3 4 1 - 0 12 2 168 2 30 190 16 3 4 1 - 0 12 2 168 2 3 1 - 0 190 16 3 4 1 - 0 12 2 168 2 3 1 - 0 190 16 3 4 1 - 0 12 2 168 2 3 1 - 0 190 16 3 4 1 - 0 12 2 168 2 3 1 - 0 190 16 3 4 1 - 0 12 2 168 2 3 1 - 0 190 16 3 4 1 - 0 12 2 168 2 - 0 190 16 3 4 1 - 0 13 2 1 - 0 190 16 3 4 1 - 0 14 2 1 - 0 190 16 3 4 1 - 0 15 2 1 - 0 190 16 3 4 1 - 0 </th <th>NNS DNS2 MWI 22 668 2 230 192 168 2 230 010.0.11.2 010.0.11.2 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 12 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</th> <th>NIS DNS2 MWI NTP 22:66:2:230 192:168:2:300 201:0:0:1:2 201:0:0:1:2 - 11:2 192:168:2:30 Montoring UA Virtual UA Ser Info Montoring UA Virtual UA VI VII VII VII VII VII VII VII VII VII</th> <th>NS DNS2 MWI NTP 22.568.2.230 200100.11.2 200100.11.2 102.568.2.230 . Target Service CSCF Info Information Montoring UA Virtual UA User Info User List Muthentication Replatered List Mm-Expires O Core Restance Replatered List Public identity Expire Date Mate Video Cat End Cat</th>	NNS DNS2 MWI 22 668 2 230 192 168 2 230 010.0.11.2 010.0.11.2 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 11 2 192 168 2 230 - - 12 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NIS DNS2 MWI NTP 22:66:2:230 192:168:2:300 201:0:0:1:2 201:0:0:1:2 - 11:2 192:168:2:30 Montoring UA Virtual UA Ser Info Montoring UA Virtual UA VI VII VII VII VII VII VII VII VII VII	NS DNS2 MWI NTP 22.568.2.230 200100.11.2 200100.11.2 102.568.2.230 . Target Service CSCF Info Information Montoring UA Virtual UA User Info User List Muthentication Replatered List Mm-Expires O Core Restance Replatered List Public identity Expire Date Mate Video Cat End Cat

5. Enable **IPsecActive** and edit the settings according to the DUT.

or

Disable the **IPsecActive** to deactivate **IPsec**.

- 6. Select **OK** to confirm **IPsec Settings**.
- Set IMS authentication to either True or False according to the DUT.

IPsec Settings	\times
✓ IPsecActive	
Active algorithm	
hmac-md5-96	
M hmac-sha-1-96	
	₩
Active encrypt-algorithm	
des-ede3-cbc	
✓ aes-cbc	T
	-
ОК	Cancel



Simulation Start and DUT Registration

 Select b to start the simulation. 	Image: Second State Image: Second State Elle Yiew Setup Simulation Test Log System Help Simulation Test Image: Simulation Test Image: Simulation Test	• • • • • • • • • • • • • • • • • • •
	UE Status 4 Power Off Detach Registration Idle	X Common C CS PS NR1 NR1: Default Cel A MCC: 001 MNC: 01F DL Power: -100 dBm UL Power: -5.0 dBm WX Service: IN
	Communication Handover UNVSIM UE Release NW Release	UE IN Network

2. Set the DUT to online and confirm that UE status switches to **Communication**.



- 3. Select 🧻 to open IMS Services.
- 4. Go to Information.
- 5. Select the User Info tab.
- 6. Go to Registered List.
- 7. Confirm that the DUT is registered at the IMS server.

2.2 4G LTE Connection Establishment

2.2.1 Preparations

- Interconnect the hardware according to chapter 1.6 and chapter 1.7
- Boot up Anritsu MT8000A.
- Boot up control computer for Anritsu MT8000A.
- Start Anritsu Application Launcher on the control computer.
- Boot up computer and start ACQUA.
- Boot up labCORE.
- Insert test SIM card into DUT, boot up DUT and set it to airplane/offline mode.

2.2.2 4G LTE Connection Procedure

Start **SmartStudio NR** v5.11.0.0 from Application Launcher on the Anritsu control computer.



Simulation Parameter Setup

 Select stoopen Simulation Parameter Setup.

9. If available, load existing

selecting Load. 10. Select Simulation.

and LTE Cell \rightarrow 1.

Simulation Parameter Setup (such as

SA_NR_LTE_IMS.wnssp3) by

11. Set Simulation Model to NR Cell \rightarrow 1

🜃 Anritsu - SmartStudio NR - Ver.02.00.11.00 File Simulation Test Log System View Setup <u>H</u>elp 🗄 💷 🐩 🎦 🕨 🔳 🗄 🧛 🔍 🧠 Measurement * * Save... Load. Simulation Parameter Setup Simulation Common Status Change MT8000A Machine Config: MT8000A #1 MT8000A #2 Trigger Message Log Monitor RF Connecto RF Connec Default Gateway
 PDN Parameter Slot #1: RF Sub Module Slot #1: Services Slot #2: RF Sub Module Slot #2: RF Sub Module RF Sub Mod Main/Aux: Main Main/Aux: Simulation Mode NR LTE Ă۱. RAT NR 1 🛊 1 🛊 Cell

12. Select PDN Parameter.

13. Double-click on the desired packet data network (PDN).

No. Desc. DRU/W1 IP ger Life Attemp Debt // Parry Debt // Parry <thdebt parry<="" th=""> <t< th=""><th></th><th>000 €</th><th>Pot of coby Ellina</th><th>Re 🏨 Doiete 📷</th><th>Boou New • II. 🔶</th><th></th><th></th><th></th><th></th><th></th><th></th></t<></thdebt>		000 €	Pot of coby Ellina	Re 🏨 Doiete 📷	Boou New • II. 🔶						
Departed in IS Departe	ange	No.	Check DNN/APN	IP Type	UE Address	Default /Primary	Dedicated1/Secondary1	Dedicated2/Secondary2	Dedicated3/Secondary3	Dedicated4/Secondary4	Dedicated5/Secondary5
Mining Image: Section 1 Pick 1018182303 Col 9 Col Dependent IE	Log Monitor	2 1	itte	IPv4	192.168.2.102	oci: 9	QCI: Depend on UE	- QCI: Depend on UE	GCI: Depend on UE	- QCI: Depend on UE	QCI: Depend on UE
Image: Strate 1, Strate 1	meter ics	2	•	IPv4	192.168.2.103	QCI: 9	QCI: Depend on UE	GCI: Depend on UE	GCI: Depend on UE	QCI: Depend on UE	GCI: Depend on UE
B • PA46 302188.17 00.19 00.19eerd m LE		⊠ 3		IPv4v6	192.168.1.21 2001.0:0:3:1	QCI: 9	GCI: Depend on UE	QCI: Depend on UE			
Image: Signal		☑ 4		IPv4v6	192.168.1.31 2001.0.0:4:1	QCI: 9	QCI: Depend on UE				
Ø PM46 2016581 00.3 00.0pered m LE 00.0pered m LE<		₽ 5		IPv4v6	192.168.1.41 2001.0.05:1	QCI: 9	, QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE
Image: Provide state in the state in th		6		IPv4v6	192.168.1.51 2001.0.0.6:1	QCI: 9	, QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE
Parameter Setup - [No.1]		2 7		IPv4v6	192.168.1.61 2001.0.0:7:1	QCI: 9	, QCI: Depend on UE	, QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	QCI: Depend on UE
Parameter Setup - [No.1]		₽ 8		IPv4v6	192.168.1.71 2001.0.08:1	QCI: 9	QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE	QCI: Depend on UE	, QCI: Depend on UE
	Pa	ram	eter Set	up -	[No.1]						
	-				0.10	c			10.4		

16. Select the User Equipment tab.

15. Select the desired Internet Protocol for the APN network.

14. Enter the desired name for the

APN network.

17. Enter the IP address of the DUT according to the selection Internet Protocol.

User Equipment Bearer PDN-Gateway Network IP Data Traffic

UE Addi	ess
IPv4:	192.168.2.102
IPv6:	2001:0:0:1::1

- 18. Select the Network tab.
- 19. Select IMS Services.
- 20. Select OK to confirm.



- 21. Select UIM/SIM.
- 22. Add or select the UIM/SIM.
- 23. Enter the appropriate UIM/SIM settings.

or

Confirm if the UIM/SIM settings apply to the SIM card of the DUT.

- 24. If desired, save the Simulation Parameter Setup by selecting Save.
- 25. Confirm Simulation Parameter Setup with by selecting OK.

Endorm Safa Orag PTR Fanadar DMSSM UMSSM UMS	LMLS1MI.mer PEDDate High: 0010012044T18 SL: 0010010000000000000000000000000000000	

- 26. Select the **UIM/SIM** tab at the lefthand side of the main screen.
- 27. Select the applied **UIM/SIM** from the drop-down list.
- 28. Confirm the choice by selecting **Apply**.

	UIM/SIN	И*	-= X	
	🗨 Appl	y 🕼 Restore		
M/SIM* 🕍 Simulation	P0035F IMSI: 3G Sect	Bx 001010123456789 unty: TS34.108		MNC: 01F
🔁 Status Change	CPC: COPC: COPC: TOPC: RAND: AUTN: IK: CK:	UIM/SIM Mode OP/TOP OP/TOPc 00112233445566778899AABBCCDDEEFF 000000000000000000000000000000000000		

S<u>y</u>stem

- *

<u>H</u>elp

🜃 Anritsu - SmartStudio NR - Ver.02.00.11.00

Save...

<u>File View Setup Simulation Test Log</u>

🗄 💷 🐩 🚹 | 🕨 🔳 🗄 🧛 | 🧠 🥋 Measurement

Load...

Cell Parameter Setup

1. Select **i** 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. Unfold LTE in Cell parameter.
- 7. Set the operating band (LTE Band) according to the DUT.
- 8. If desired, save the cell parameter setup by selecting **Save**.
- 9. Confirm Cell Parameter Setup by selecting OK.

List:	Cell Parameter: LTE - Default Cell A		
	0 0 2 1/4 &		
- NR			-
Default Cell A	Comments of the second s		
Default Cell B	Common	D-(h-C-II-A	
Default Cell C	Cell Name	Derault Cell A	
Default Cell D	Power Shanng	None	
Default Cell E	TRx Ref Point	BIS	
Default Cell F	DL Ref Power	-30.0	
Default Cell G	UE Rx Power	-30.0	
Default Cell H	DL Pathloss	0.0	
LTE	UL Ref Power	5.0	
Default Cell A	UE Tx Power	5.0	
Default Cell B	UL Pathloss	0.0	
Default Cell C	MCC	001	
Default Cell D	MNC	01F	
Default Cell E	Cell Identity	0	
	IMS Emergency Support	supported	
	E-PLMN List		
	Emergency Number List		
	Cell Barred	Not Barred	
	 Access Class Barred 	Not Barred	
	Access Class Barred	Not Barred	
	LTE Access Class Barred		
	⊿ LTE		
	RS EPRE	-55.0	
	Uplink Target Power Density	-19.8	
	MME Group ID	32769	
	MME Code	0	

IPsec and Authentication Settings

1. Select 🗻 to open IMS Services.



- 2. Go to Property.
- 3. Select and highlight **IPsec Settings**.
- 4. Select in to edit IPsec Settings.

U	IMS Services								_	\square \times
E	ile <u>V</u> iew	Virtual Network	ool <u>H</u> elp							
	- 🕑 🗏 👮	Ping								
	Virtual Netwo	ork List								• ×
1	👘 🙀 Add	😒 Delete 🛛 🖓 🗸								
	VNID C	SCF	D	NS		DNS2	MWI		NTP	^
	1 19	2.168.2.230	19	2.168	.2.230	192.168.2.230				
	2 1.1	1.1.2	1.	1.1.2	1-140	192.168.2.230	-		-	~
<										>
Virt	ual Network In	formation								ų×
		Property					Information			
~	CSCF			^	Target Service	CSCF ~				
	Enabled	True			Manifester 11	A Metallia Licoriofo				
	Host Name	test.3gpp.con	n		Monitoring 0/	A VIItual OA Oser IIIo				
	IP version	IPV4 & IPV0	0 (0000) (0000)		-User List-				Advanced	Mode
	IP Addresses	(IFV4, 192.106.2.25 (IPv6, 2001;0:0:11)	2 (none) (none)		IMS Auth	entication 📙 🕒 🔒 🗡				
	Port	5060	z,(none),(none)	_	User Name	e			Norma	al
	Monitoring UA	sip:user@tes	t.3app.com						Ignore Registration	quest
	SMSC Auto Fo	orward False								
	IMS Authentic	ation True							Send Error R	esponse
>	User List	[Count = 2]						4	00 Bad Request	
Ι.	Response Co	ompar False			Registered	List			P-CSCF Res	toration
	IPsec Setting	s Active	[Min-Expires	0 🗘 🗼 rejected	-	- F	Wirtual IIA's	Rehavior
	Extension	True				Public Identity	Expire Date		a muunorto	Dentarioi
	Virtual UA Ena	abled True				Public identity	Expire Date			Call
	Virtual UA	SID:01234561	/89@test.3gpp.c	or					Make Vide	o Call
	max-Expires	100000		~					End Cr	all
IPs Set	ec Settings is up IPsec pa	rameter.								

5. Enable **IPsecActive** and edit the settings according to the DUT.

or

Disable the **IPsecActive** to deactivate **IPsec**.

- 6. Select **OK** to confirm **IPsec Settings**.
- Set IMS authentication to either True or False according to the DUT.

IPsec Settings	\times
IPsec Active	
Active algorithm	
hmac-md5-96	
M nmac-sna-1-96	
	₽
Active encrypt-algorithm	
des-ede3-cbc	
✓ aes-cbc	
	₽
ОК	Cancel



Simulation Start and DUT Registration 1. Select **b** to start the simulation. 🜃 Anritsu - SmartStudio NR - Ver.05.11.00.00 <u>File View Setup Simulation Test Log System H</u>elp 📧 🐩 🚹 | 🕨 🔳 🤄 🧠 🔍 Measurement • 🔍 🔍 İ 😵 🌆 🛛 🛃 🔢 🖄 📖 📩 🎪 ***** * 🐠 Test Case UE Status 🗜 🗙 Common 🔘 CS 🔘 PS NR1 LTE1 Default Gateway Power Off NR1: Default Cell A DL Power: -10.0 dBm UL Power: -5.0 dBm NR Detach Registration 244. A Service: IN Simulation Т Idle 1 Status Change Origination Termination Communication . Handover NR . UIM/SIM **6**1 н J UE Release NW Release UE п **6**1 Common 🔘 CS 🔘 PS Common C CS C PS

2. Set NR cell to OUT of service by selecting 🩀.



- 3. Set the DUT to online and confirm that UE status switches to Communication.
- 🐻 Anritsu SmartStudio NR Ver.05.11.00.00 <u>File View Setup Simulation Test Log System H</u>elp - 👧 😡 🛯 🔐 🔛 🔡 🕄 💷 🦄 🆓 🖢 🖃 🗒 🚍 📧 🐩 🚺 | 🕨 🔳 🤅 🧠 | 🧐 🧠 Measurement . . 🚺 Test Case UE Status Common . CS . PS [TAI] MCC: 001 MNC:01F TAC:1 [LAI] MCC: 001 MNC: 01F LAC: 0 NB1 LTE1 Default Power Off LTE1: Default Cell A UL Power: -30.0 dBm UL Power: 5.0 dBm UE Cat: Transmis <u>ا</u> /1 ion Mode DL UL Detach Registration 1945 1 UE Cat (DL/UL): 16 Rate: 17.664M Service: 13 12.576M IN Simulation 11 _ Idle 28 23 MCS: NRB: 25 25) 🚧 Status Origination Termination Change IMS I Packet 2 Connection Communication _ Handover 0 1. **UIM/SIM** 1 UE Release NW Release UE I.

- 4. Select 🗻 to open IMS Services.
- 5. Go to Information.
- 6. Select **User Info** the tab.
- 7. Go to Registered List.
- 8. Confirm that the DUT is registered at the IMS server.

 IMS Services 					- 🗆 ×
<u>File View</u> Vi	rtual <u>N</u> etwork <u>T</u> ool	Help			
🗈 🕟 🖲 🐲 P	ing				
Virtual Network	k List				-
, 😤 💣 🔀 Add 🖻	Delete V.				
VNID CS	OF	DNS	DNS2	MWI	NTP
🤐 , 192.	168.2.230	192.168.2.230	192.168.2.230		
* 1 2001	1:0:0:11::2	2001:0:0:11::2	2001:0:0:11::2		
2 1.1.1	.2	1.1.1.2	192.168.2.230		
<	1-0-0-440	0004-0-0440	2004-0-0-142		>
/irtual Network Info	rmation				a
	Property			Information	
IP Addresses (I	Pv6: 2001:0:0:11::2,(n	one) (none) 🔿 Target Ser	vice CSCE V		
Port	5060				
Monitoring UA	sip:user@test.3g	pp.com Monitorin	g UA Virtual UA User Info		
SMSC Auto Fon	warc False	- User Li	st		Advanced Mode
IMS Authenticat	ion False	A INS/	withentication		- Server's Behavior
> User List	[Count = 2]				
Response Con	npar False	UserN	ame		Normal
IPsec Settings	Active	001010	123456789@ims.mnc001.mcc001.3gppr	ietwork.org	Ignore Request
Extension	True	001010	123456789@test.3gpp.com		Send Error Response
Virtual UA Enab	led True				100 Ded Desuret
Virtual UA	sip:0123456789	@test.3gpp.cor			400 Bad Request
Max-Expires	1000000	Registe	red List		P-CSCF Restoration
Communication	1500	Min-Exp	res 1500 👻 🗼 rejected 🔹		Virtual UA's Behavior
Originating ID	True		Public Identity Exp	ire Date	Make Call
Terminating ID	True		(1) nin:001010122456790@ 090	2 2021 00:16:55	make can
Precondition	True		 Sip.001010123456789(gj 08.0 	3.202103.10.30	Make Video Call
Treconduction	1100	*			End Call
Psec Settings					
sets up in sec para	meter.				
Service Log 🔫	Virtual Network Inform	nation			

3 ACQUA Configuration

3.1 General Settings

- 1. Start Hardware Configuration.
- 2. Drag and drop the blocks from the left-hand selection area into the right-hand configuration area. Interconnect the blocks according to the applied connections. Alternatively, use the **Hardware Configuration Wizard**.



3.2 *lab*CORE Settings

- 1. Open VolP Settings.
- 2. Go to the Network Settings tab.
- 3. Select the desired Internet Protocol.
- 4. Determine the IP address of *lab*CORE.

					1
etwork Setting	s SIP Settings	RTP Se	ttings	Call Radio Tester Wizard Diagnosti	cs
IPv4 Configur	ation			IPv6 Configuration	
● On ○ 0	Dff			◯ On	
<u>I</u> P	192 . 168 .	2.	101	IP	
Subnet <u>M</u> ask	255 . 255 .	ο.	0	Prefi <u>x</u>	
<u>G</u> ateway	192 . 168 .	2.	1	<u>G</u> ateway 0 . 0 . 0 . 0	manual
D <u>N</u> S 0.0.0.0 Apply	MAC address: 00:	lf:7b:68:0)1:8b		
D <u>N</u> S 0.0.0.0	MAC address: 00:	1f:7b:68:0	01:8b		
D <u>N</u> S 0.0.00	MAC address: 00:	1f:7b:68:0	01:8b		
D <u>N</u> S 0.0.0 Apply	MAC address: 00:	1f:7b:68:0	01:8b		
D <u>N</u> S 0.0.00	MAC address: 00:	1f:7b:68:(01:8b		
D <u>N</u> S 0.0.0.0	MAC address: 00:	1f:7b:68:(01:8b		

- 5. Select the SIP Settings tab.
- 6. Enter **Port** and **Server address** according to IMS Services from SmartStudio NR.

UoIP Settings	×
🝸 🔄 🖬 🔍 Net	work Impairments
Network Settings SIP Settings Call	Radio Tester Wizard Diagnostics
General Settings	SIP Registration
Port 50000 UDP ~	Server Address 192.168.2.230:5060
<u>C</u> ontact 🍂 sip:2345@192.168.2.230:7060	User ID 2345
Firewa <u>l</u> l Policy None ~	Password 🔽 show
Fire <u>w</u> all Address	Identity 🌽 sip:2345@test.3gpp.com
Apply	Contact Parameter
	Outbound Proxy
	Status 🔘 Unregistered
	Register Unregister
Status: Audio System 🥝 🛛 Reset 🛛 VolP System 🥝	Reset SIP Registration O SIP Call O <u>R</u> TP Stream O
VoIP Settings	×
🍸 🔄 🖬 🔍 Net	work Impairments
Network Settings SIP Settings Call	Radio Tester Wizard Diagnostics
General Settings	SIP Registration
Port 50000 UDP ~	Server Address 192.168.2.230:5060
<u>C</u> ontact 🌽 sip:2345@192.168.2.230:7060	User ID 2345
Firewa <u>l</u> l Policy None ~	Password Show
Fire <u>w</u> all Address	Identity 🌮 sip:2345@test.3gpp.com
Apply	Contact Parameter
Арру	Outbound Proxy

- 7. Select **Register** to register *lab*CORE at the IMS server of Anritsu MT8000A.
- 8. ACQUA indicates the successful registration via the green virtual LED and a text hint on screen.

VoIP Settings	×
🍸 🔄 🖬 🔍 Netw	ork Impairments
Network Settings SIP Settings Call	Radio Tester Wizard Diagnostics
General Settings	SIP Registration
Port 50000 UDP ~	Server Address 192.168.2.230:5060
<u>C</u> ontact 🍂 sip:2345@192.168.2.230:7060	<u>U</u> ser ID 2345
Firewa <u>l</u> l Policy None ~	Password Show
Firewall Address	Identity 🌮 sip:2345@test.3gpp.com
Apply	Contact Parameter
	Outbound Proxy
	Status 🥝 Registered
	Register Unregister
Status: Audio System 🤗 Reset VolP System 🤗 🛛	Reset SIP Registration 🥥 SIP Call 🖉 RTP Stream 🖉

Application Note

9. Select the RTP Settings tab. La VolP Settings × 10. Set the appropriate voice codec. 7 💌 🔲 🔚 🔌 Network Impairments... SIP Settings RTP Settings Call Network Settings Radio Tester Wizard Diagnostics General Settings Codec Configuration Remote Port 7078 AMR-WB, 16 kHz, PT = 96, mono < 7078 Local Port Payload Type 96 \sim Media encryption None \sim Packet Length 20 ms 100 g ms Initial jitter buffer length Parameter Apply Encoder EMTP octet-align=1 Edit... Default ⊗ Advanced Encoding delay (RCV): 98,5 ms Decoding delay (SND): 122,5 ms Status: Audio System 🥝 Reset VoIP System 🥝 Reset SIP Registration 🥝 SIP Call 🔘 <u>R</u>TP Stream 🔘

3.3 Call Establishment

Anritsu MT8000A Control Computer

1. Open IMS Services 🗻.

- 🗄 😣 🌆 💀 🏧 🏢 🗄 🎆 | 进 | 🚈 | 🚸 🚸 🗄 🛃 - 🗄 🍑 |

- 2. Go to Information.
- 3. Select the **User Info** tab.
- 4. Go to Registered List.
- Confirm that both clients (*lab*CORE and DUT) are registered at the IMS server.

IMS Services								- 🗆	
<u>F</u> ile ⊻iew Virtua	l <u>N</u> etwork <u>T</u> ool <u>H</u> elp								
🗎 🕟 🖲 🐲 Ping									
Virtual Network Lis	st								• >
😤 者 🕦 Add 🗐 D	elete 🛛 🛛 🕶								
VNID CSCF		DNS		DNS2		MWI		NTP	
192.168	.2.230	192.168	2.230	192.168.2.230					
2001:0:0	:11::2	2001:0:0	:11::2	2001:0:0:11::2					
2 1.1.1.2		1.1.1.2		192.168.2.230				-	
<				0004-0-044-0					>
/irtual Network Informa	ition								4 :
	Property				Infor	mation			
IP Addresses (IPv6	2001:0:0:11::2,(none),(no	ne) 🔺	Target Service	CSCE V					
Port	5060		ranger e ennee						
Monitoring UA	sip:user@test.3gpp.com		Monitoring UA	Virtual UA User Info					
SMSC Auto Forward	False		User List					Advanced Mode	le
IMS Authentication	False		& IMS Auther	ntication 🛛 🔉 👌 🔍 🗙				Server's Behav	lior
> User List	[Count = 2]							Cerver's Denav	101
Response Compa	False		User Name				_	Normai	
IPsec Settings	Active		0010101234	56789@ims.mnc001.mcc00	1.3gppnetwork.org		•	Ignore Request	.t
Extension	True		0010101234	56789@test.3gpp.com				Send Error Respon	inse
Virtual UA Enabled	True						400	Red Dequest	
Virtual UA	sip:0123456789@test.3g	pp.cor	Desistant					Dau Request	
Max-Expires	100000		Registered L	IST				P-CSCF Restorati	ion
Communication Eq	Folge		Min-Expires	1500 👻 🗼 rejected	•			Virtual UA's Beha	avior
Originating ID	True			Public Identity	Expire Date			Make Call	
Terminating ID	True		1	sin:2345@test 3ann.com	01 03 2021 11	35:24			
Precondition	True		T T	sin:001010123456789@	08 03 2021 09	16:55		Make Video Cal	
			<u> </u>					End Call	
Psec Settings	07								
pers up in sec parallier	C1.								

ACQUA Computer

- 1. Select the Call tab.
- 2. Enable Automatic in section Jitter Buffer Reset.
- 3. Enter the **SIP URI** (SIP address) of the DUT in the textbox **Target**.
- 4. Select Call.

or

Call *lab*CORE from the DUT. Dial *lab*CORE identity (e.g., 2345) and execute call.

Х

5. The status switches from Released to Streams running. The virtual LED switches from gray to green. The virtual LED SIP Call illuminates green.

VoIP Settings			
-	🝷 🕕 📕 🔌 Network Impair	ments	
work Settings	SIP Settings RTP Settings Call Radio	Tester Wizard Diagnostics	
SIP Call		Jitter Buffer Reset	
Target	sip:001010123456789@192.168.2.230:50000 🗸	Automatic	
<u>Autocomplete</u>	sip:001010123456789@192.168.2.230:50000	Manual Reset	\square
Status 🛛 🥝 S	treams running		
	Call lefininate		
	Send DTMF		
RTP Stream			
Remote	~		
chankura (1) [
status 🕘 U	Start Stop		
	Start Stob		
Codec Parameter	Adjustment		
Selected Codec: AN	MR-WB, 16 kHz, PT = 96, mono		
	✓ Send Parameter		

Anritsu MT8000A Control Computer

- 1. Open IMS Services.
- 2. Go to Information.
- 3. Select the Monitoring UA tab.
- 4. Select *lab*CORE/DUT from the drop-down list and select apply.
- 5. Confirm if the applied device has the status **Connected**.

