

Agilent PXT Wireless Communications Test Set (E6621A)



Agilent N6070A Series Signaling Conformance Test User's Guide



Agilent Technologies

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Where to Find the Latest Information

Documentation is updated periodically. For the latest information about this product, including operating and application information and product and accessory information, see the following URL:

<http://www.agilent.com/find/pxt>

Is your product software up-to-date?

Periodically, Agilent releases software updates to integrate new test cases, incorporate product enhancements and fix known defects. To search for software updates for your Agilent N6070A Signaling Conformance Test system, go to the Technical Support website at <http://www.agilent.com/find/pctdownloads>.

NOTE	You are directed to the above website, because it contains information specific to conformance testing. In general, all PXT software products are available for download from www.agilent.com/find/softwaremanager .
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IMPORTANT	An active N6050AS software and technical support contract (STSC) is required to access the software manager website (displayed above), together with the login credentials registered by you or your company for activation. See the section on licensing in the <i>Agilent PXT Wireless Communications Test Set Getting Started Guide</i> for instructions to activate your STSC.
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1 Introduction

Welcome to the **Agilent N6070A Series Signaling Conformance Test User's Guide** for the Agilent E6621A PXT Wireless Communications Test Set (PXT). The purpose of this guide is to provide you with an introduction to the components of the Agilent N6070A Series Signaling Conformance Test system, and show you how to install and configure it.

It defines the requirements of your computer(s). It shows you a step-by-step procedure for the installation of the required applications and how to inter-connect the computer(s) and PXT.

2 About the Signaling Conformance Test system

This section provides background to the Agilent implementation of a Signaling Conformance Test system. It shows you a block diagram of a Test System and how that is implemented with the Agilent N6431A TTCN-3 Environment, the N6072A LTE Signaling Conformance Test software, and the Agilent E6621A PXT Wireless Communications Test Set. The system components are detailed in the table below:

Component	Description	Notes
E6621A	Wireless Communications Test Set (PXT)	<p>With options:</p> <ul style="list-style-type: none"> E6621A-2D2 2x2 downlink MIMO (required) E6621A-BB1 Enhanced Baseband Processing (optional) <p>And features:</p> <ul style="list-style-type: none"> N6050A-7FP LTE FDD Base Station Emulation N6050AS-1SY Software and Technical <p>Support Contract (Refer to the <i>E6621A PXT Wireless Communication Test Set Getting Started Guide</i> for more information)</p>
N6072A	LTE Signaling Conformance Test software	<p>Includes these components:</p> <ul style="list-style-type: none"> TTCN-3 source code Pre-compiled TTCN-3 modules TTCN-3 Test Adapter N6072A System Configuration Manager USB Key Utilities <p>Required options:</p> <ul style="list-style-type: none"> N6072AS-1SY Software and Technical Support Contract N6072A-1TP LTE Signaling Conformance Batch A test cases
N6431A	TTCN-3 Environment	For the appropriate version required for a specific version of Agilent N6072A LTE Signaling Conformance Test software, refer to the software compatibility matrix downloadable from www.agilent.com/find/pctdownloads .
N6061A	LTE Protocol Logging and Analysis software (Optional)	Refer to the <i>Agilent N6061A LTE Protocol Logging and Analysis User's Guide</i> for more information.

Block Diagram Implementation

The Signaling Conformance Test system block diagram shown below is based closely on TTCN-3 (Testing and Test Control Notation version 3) industry standards.

The N6431A TTCN-3 Environment provides a graphical user interface and software framework for other components of the system. The tool enables TTCN-3 test cases to be loaded, edited or created, compiled and executed. It includes logging functions and the ability to automate sequences of tests with Campaigns, Meta-campaigns and a Command Line Interface (CLI). The N6431A is based on Testing Technologies IST GmbH's TWorkbench product.

The Agilent N6070A series Signaling Conformance Test system provides the standard TTCN-3 compiled test cases, an adaptor that connects the standardized TTCN-3 Runtime Interface (TRI) to the unique implementations of PDCP, RLC, MAC and PHY contained within the PXT and a message codec to encode and decode protocol messages.

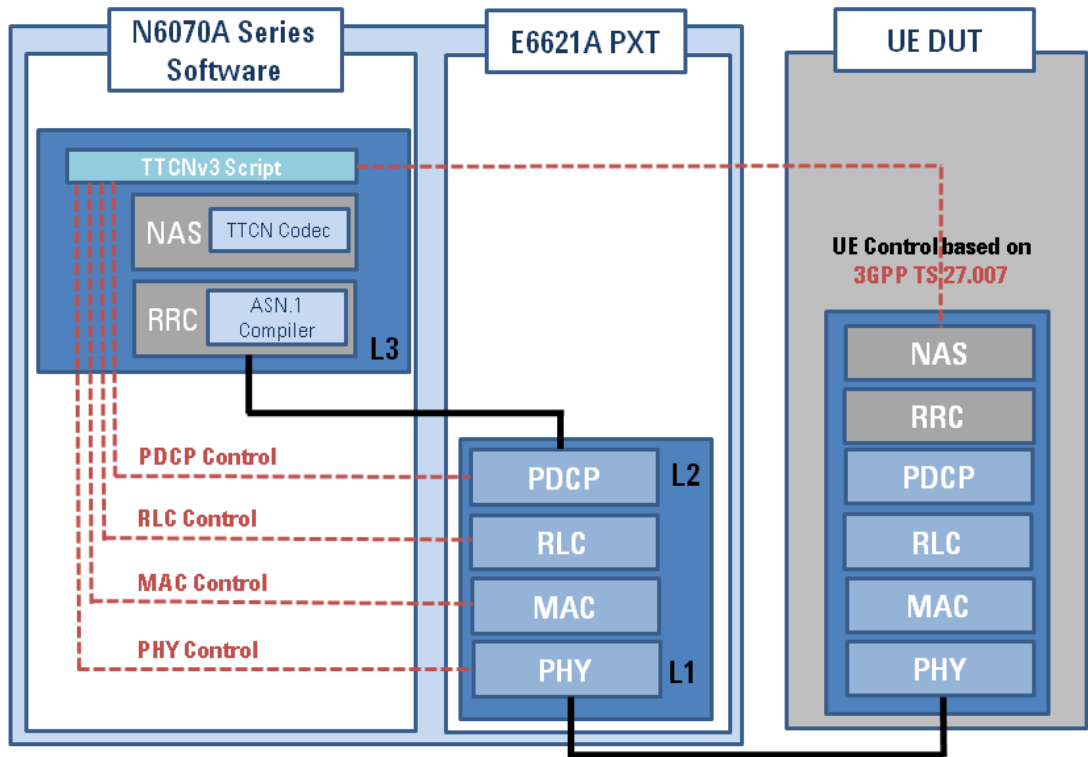


Figure 2-1: Agilent N6070A Series Signaling Conformance Test system

Agilent N6070A Series Signaling Conformance Test User's Guide

The figure below shows an example of the TTCN-3 environment.

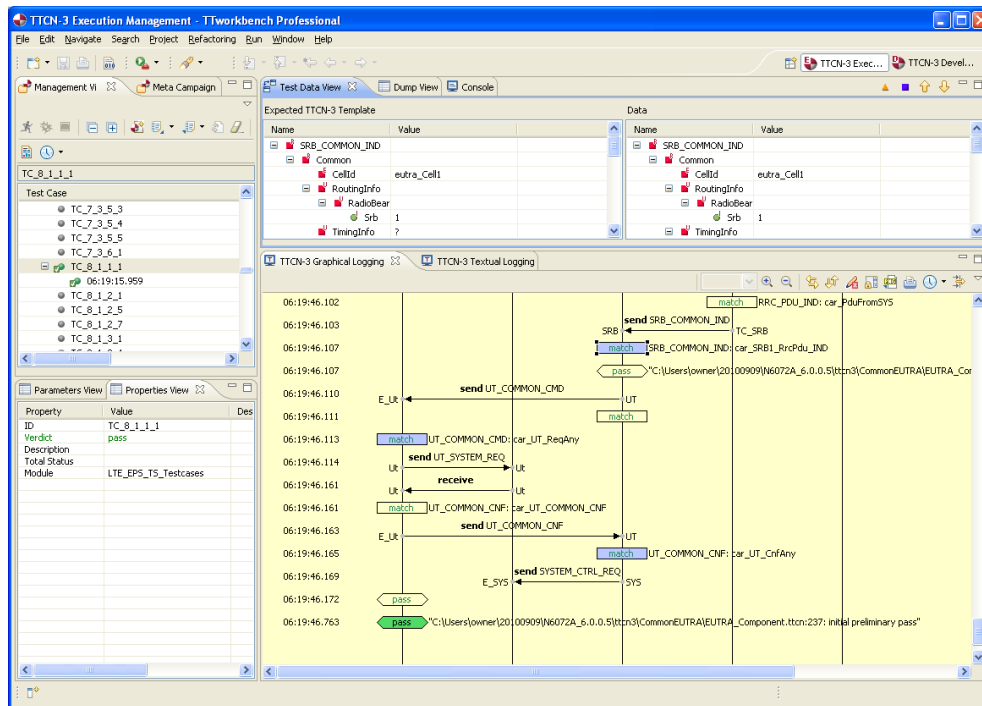


Figure 2-2: TTCN-3 Environment

The PXT exchanges messages with the N6072A TTCN-3 test adapter (TA) using a proprietary protocol carried over a private Ethernet connection. The PXT contains an implementation of the 3GPP LTE protocol PDCP (Protocol Data Convergence Protocol), RLC (Radio Link Control), MAC (Media Access Control) layer and PHY (Physical) layer that includes an RF interface that can be used to connect to the equipment under test. When operated as a stand-alone test set, the PXT MAC layer operates autonomously to emulate an LTE base station. When operated in TTCN-3 mode, and connected to the N6072A LTE Signaling Conformance Test Software, the PXT's upper MAC is disabled and replaced by the functionality of the TTCN-3 script being executed within the N6070A Series Signaling Conformance Test system. In this mode, the N6070A emulates a Base Station.

The N6061A Protocol Logging and Analysis software can be connected to the PXT to capture MAC and PHY message exchange. The software can operate with the PXT in either a stand-alone configuration, or in configurations where the PXT is used with the N6070A series Signaling Conformance Test system. The figure below shows an example N6061A log.

No	Time	RFN	TTI	DIR	Protocol	RNTI	Layer	Channels	Length	PDU Message	Note
1584	2010/07/07 06:41:05.795	74	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1585	2010/07/07 06:41:05.817	76	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1586	2010/07/07 06:41:05.817	76	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1587	2010/07/07 06:41:05.837	78	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1588	2010/07/07 06:41:05.837	78	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1589	2010/07/07 06:41:05.837	64	3	-	TTCN	-	NAS	SRB=2	-	aTTACH_COMPLETE	timReceive_c
1590	2010/07/07 06:41:05.846	-	-	-	TTCN	-	-	-	-	SYSTEM_CTRL_REQ	timSend_m
1591	2010/07/07 06:41:05.859	80	1	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1592	2010/07/07 06:41:05.859	80	1	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1593	2010/07/07 06:41:05.859	80	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1594	2010/07/07 06:41:05.859	80	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1595	2010/07/07 06:41:05.864	-	-	-	TTCN	-	RRC	SRB=1	-	rrcConnectionRelease	timReceive_c
1596	2010/07/07 06:41:05.876	82	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1597	2010/07/07 06:41:05.876	82	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1598	2010/07/07 06:41:05.895	-	-	-	TTCN	-	RRC	SRB=1	-	rrcConnectionRelease	timSend_m
1599	2010/07/07 06:41:05.895	84	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1600	2010/07/07 06:41:05.895	84	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1601	2010/07/07 06:41:05.902	-	-	-	TTCN	-	-	-	-	Timer Start	timStart
1602	2010/07/07 06:41:05.916	-	-	-	TTCN	-	-	-	-	SYSTEM_CTRL_REQ	timSend_m
1603	2010/07/07 06:41:05.917	86	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1604	2010/07/07 06:41:05.917	86	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1605	2010/07/07 06:41:05.922	-	-	-	TTCN	-	-	-	-	SYSTEM_CTRL_REQ	timSend_m
1606	2010/07/07 06:41:05.928	-	-	-	TTCN	-	-	-	-	SYSTEM_CTRL_REQ	timSend_m
1607	2010/07/07 06:41:05.936	88	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1608	2010/07/07 06:41:05.936	88	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1609	2010/07/07 06:41:05.964	90	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1610	2010/07/07 06:41:05.964	90	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1611	2010/07/07 06:41:05.975	92	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1612	2010/07/07 06:41:05.975	92	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1613	2010/07/07 06:41:05.997	94	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1614	2010/07/07 06:41:05.997	94	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1615	2010/07/07 06:41:06.012	96	1	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1616	2010/07/07 06:41:06.012	96	1	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	
1617	2010/07/07 06:41:06.012	96	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1618	2010/07/07 06:41:06.012	96	5	DL	LTE	0xFFFF	PHY	PDCCH	3	PHY_DATA	

Figure 2-3: N6061A Example Log

When used in conjunction with the Agilent N6072A LTE Signaling Conformance Test software, the N6061A can augment the built-in logging functions of the TTCN-3 Environment and provide greater insight for troubleshooting and analysis.

3 Installation

Several software products and components are required to complete the Agilent N6070A Series Signaling Conformance Test system. This chapter provides a step-by-step guide to their installation and configuration.

The following topics are contained in this chapter:

- Please Check on page [6](#)
- Minimum Computer Requirements – for N6070A Series Signaling Conformance Test on page [6](#)
- Step 1 – Redeem Licenses for Software and Technical Support Contracts on page [7](#)
- Step 2 – Redeem Licenses on page [9](#)
- Step 3 – Determine the Required Software Versions on page [10](#)
- Step 4 Install the N6431A TTCN-3 Environment software on page [11](#)
- Step 5 – Install the Agilent N6072A LTE Signaling Conformance Test Software on page [12](#)
- Step 6 – Install E6621A PXT Software on page [13](#)
- Step 7 – Connecting the System on page [13](#)
- Step 8 – Start and configure the TTworkbench Application on page [15](#)

Please Check

Before proceeding, please confirm you have the following:

- Agilent E6621A PXT Wireless Communications Test Set
- A computer meeting the requirements specified in the “Minimum Computer Requirements – for N6070A Series” section on page [6](#)
- Ethernet hub or switch and LAN cables
- N6431A-2FP Entitlement certificate
- N6072AS-1SY Software and Technical Support Contract Entitlement certificate
- N6072A-1TP LTE Signaling Conformance Batch A test cases Entitlement certificate
- N6072A Signaling Conformance Test Application USB license key

(Refer to the *Configuration* section of the PXT specifications at www.agilent.com/find/pxt for more details of the software products and licenses.)

Minimum Computer Requirements – for N6070A Series

Processing large amounts of time critical data is an inherent requirement of the signaling conformance test system. A high performance desk-top style computer is recommended. The N6070A Series installation computer should meet the requirements specified below for successful operation of the software.

Minimum System Requirements	
Operating System	Computer running Windows XP (32 bit) or Windows 7 (32 or 64 bit)
Communication with Test Set(s)	Ethernet
RAM (Memory)	4 GB RAM (Minimum)
Processor	>2.5 GHz Intel Pentium® Quad core or equivalent
Disc Space	≥ 200 Mb for N6431A TTCN-3 Environment ≥ 190 Mb for Java Environment ≥ 120 Mb for N6072A Signaling Conformance Test software

NOTES:

1. Consideration for storage space should also be given for subsequent downloaded releases, updates, development and validated scripts, and all supporting documentation.
2. A clean installation of Windows is required to ensure freedom from Ad-ware, Spy-ware, updaters and other processor resource consuming applications. For expected performance, antivirus software should not be running.

Optional: Additional Network Interface Cards (NIC) or adaptors if connection to public or corporate network is required.

Step 1 – Redeem Licenses for Software and Technical Support Contracts

Your entitlement to PXT and PC application software updates requires a current Software and Technical Support Contract for each product. The contracts provide time-perishable licenses which are installed on the PXT or on a USB key for the Agilent N6072A LTE Signaling Conformance Test software.

To use the Agilent N6072A LTE Signaling Conformance Test software, you must have the following Software and Technical Support Contracts

- N6072AS LTE Signaling Conformance Test
- N6050AS LTE Mobile Test Software

Software and Technical Support Contracts (STSC) License Redemption

To redeem (or subsequently renew) these contracts, follow the instructions on your Software and Technical Support Contract Entitlement Certificates.

Once you have redeemed these contracts, you will have access to download the Agilent N6072A LTE Signaling Conformance Test software, the PXT software and additional software applications such as the N6061A LTE Protocol Logging and Analysis software.

You must also install licenses on your PXT and N6072A USB License Key to enable the N6072A and PXT to operate and run the latest firmware and software.

To install the licenses on your PXT and N6072A USB License Key, follow the instructions in the email that contains the license file.

Verifying Correct Installation of the STSC License on the E6621A PXT

Press the **INFO** button on the E6621A PXT. The information about the installed Software and Technical Support Contract is displayed in the bottom left corner of the screen. Verify the expiration date matches the date your E6621A STSC contract expires.

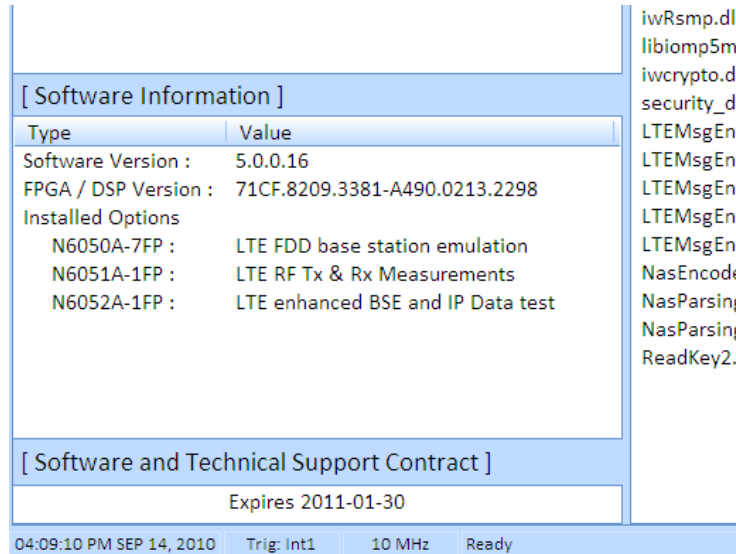


Figure 3-1: INFO Display Screen

Verifying Correct Installation of the STSC License on the N6072A USB License Key

You can check the current entitlement status of the USB license key using the installed utilities found in the **Start** menu. If the utilities are not already installed, they can be downloaded from this location:

http://wireless.agilent.com/rfcomms/downloads/software/USB_Utils/setup_PXT_USB_Key_Utilities.zip.

Click **Start, Agilent PXT, N6070A Series Utilities, USB License Key Utilities, ReadLicense**, then click the "Read Key" button on the Read License utility to view the USB license key contents. A window similar to that shown below provides the information about the USB license key and licenses. The serial number is also printed on the key.

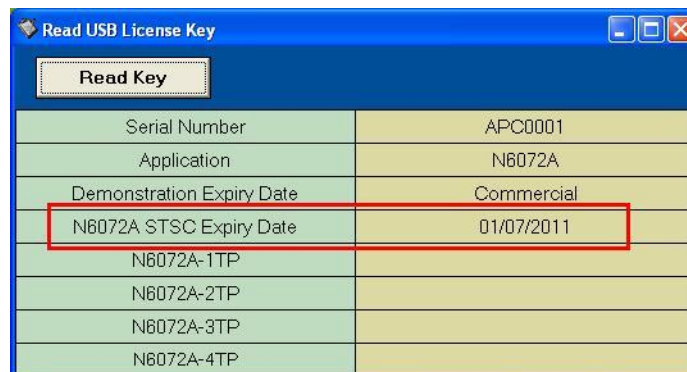


Figure 3-2: USB license Key STSC Details

Step 2 – Redeem Licenses for N6431A TTCN-3 Environment and N6072A LTE Signaling Conformance Test Software

N6431A TTCN-3 Environment License Redemption

The N6431A TTCN-3 Environment software (TWorkbench) is provided through collaboration with Testing Technologies IST GmbH. Agilent provides one option for TWorkbench products.

To redeem your N6431A-2FP License, you will need the following:

- Entitlement Certificate for your N6431A-2FP, which contains
- Agilent Order Number
- Agilent Certificate Number
- Installation computer hostname and LAN adaptor physical address

To determine the computer hostname and LAN adaptor physical address of your PC, start a command window and enter “ipconfig /all” to list information about your network adaptors. In the example shown in Figure x, the hostname is “2CE02021VZ” and the physical address is 00-16-B6-70-D9-1D (to be entered as “0016B670D91D” when redeeming your license).

```
Windows IP Configuration

Host Name . . . . . : 2CE02021VZ
Primary Dns Suffix . . . . . : britain.agilent.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : britain.agilent.com
                                britain.agilent.com
                                agilent.com

Ethernet adapter Private LAN:

Connection-specific DNS Suffix . . : 
Description . . . . . : Gigabit Ethernet Adapter
Physical Address. . . . . : 00-16-B6-70-D9-1D
Dhcp Enabled. . . . . : No
IP Address. . . . . : 192.168.1.100
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
```

Figure 3-3: Example Hostname and MAC Address

Follow the steps detailed on the License Entitlement Certificate to redeem the N6431A-2FP license.

NOTE	When prompted for the “Server name or IP Address and Host ID”, enter the computer hostname and its physical address separated with a space as shown below.
-------------	--

Enter Server name or IP Address, and Host ID *

Enter Agilent instrument serial number

(* indicates a required field.)

BackNext

Figure 3-4: Entering IP Address and Host ID

N6072A LTE Signaling Conformance Test Cases License Redemption

Follow the steps detailed on the License Entitlement Certificate to redeem and install the N6072A-1TP License to your N6072A USB License Key.

You can check the current entitlement status of your USB license key using the **Start, Agilent PXT, N6070A Series Utilities, USB License Key Utilities, ReadLicense** utility.

Read Key	
Serial Number	APC0001
Application	N6072A
Demonstration Expiry Date	Commercial
N6072A STSC Expiry Date	01/07/2011
N6072A-1TP	Supported
N6072A-2TP	
N6072A-3TP	
N6072A-4TP	

Figure 3-5: USB License Key Entitlement Details

Step 3 – Determine the Required Software Versions

Software, and software updates for the N6431A and N6072A LTE Signaling Conformance Test applications are released frequently to align with new script releases and validation processes. For successful operation it is important to ensure that compatibility between the applications and the PXT software is maintained. The N6072A Version Compatibility Matrix is available from the Agilent Signaling/Protocol Conformance Test web pages at www.agilent.com/find/pctdownloads and lists the correct version of each software component that should be used. Software downloads and release information are available to registered users at www.agilent.com/find/softwaremanager.

An example N6072A Software Compatibility Matrix is shown below, indicating the compatible versions of each component.

NOTE	This is an example only and does not reflect any actual release.
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N6072A Software Compatibility Matrix

Release Date	N6072A	TTCN	N6431A	N6061A	E6621A	8960	N6072A Logging Plugin	Release Status
2010-10-14	6.0.0.5	2009-12 10wk26	1.1.10.2.2	6.0.0.2	6.0.0.16	N/A	6.0.0.1	TBC

Step 4 – Install the N6431A TTCN-3 Environment software

The N6431A TTCN-3 Environment software installation is available for download from the www.agilent.com/find/softwaremanager website. Registered users with a current Software and Technical Support Contract can download software from this website.

NOTE	The Agilent N6072A LTE Signaling Conformance Test software uses a customized version of the TWorkbench Environment. Even if you already have TWorkbench installed, installation of the correct version of N6431A is required. Follow the instructions to install the correct version.
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Install Procedure

1. Using the N6072A Software Compatibility Matrix downloaded in step 3 (above), determine the version of N6431A required to be used with the latest qualified or tested beta version of the Agilent N6072A LTE Signaling Conformance Test software.
2. Login to www.agilent.com/find/softwaremanager.
3. Navigate to find the latest qualified or tested beta version of the Agilent N6072A LTE Signaling Conformance Test software that matches the version of N6072A you want to use.
4. Download the required version of N6431A software.
5. When the download is complete, run the downloaded setup file.
6. Follow the displayed instructions.

NOTE	The TWorkbench and Agilent N6072A LTE Signaling Conformance Test software require the installation of a specific version of JDK (Java™ SE Development kit). Installing the N6431A may add another version of JDK to your Add/Remove Programs if you already have a different version installed. Remove all other versions of JDK and JRE before installing the N6431A.
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Un-install Procedure

If you need to uninstall the Agilent N6431A TTCN-3 environment, use **Add or Remove Programs** accessed from the Windows **Control Panel**.

Step 5 – Install the Agilent N6072A LTE Signaling Conformance Test Software

The Agilent N6072A Signaling Conformance Test software requires that the N6431A TTCN-3 Environment is installed. If you have not already done so, refer to step 4, above. The N6072A installation loads the following items on your computer:

- USB License Key driver
- USB License Key utilities (available from the **Start** menu)
- N6072A LTE Signaling Conformance Test software, adapters, and test cases
- N6072A System Configuration Manager

Install Procedure

1. Using the N6072A Software Compatibility Matrix downloaded in "[Step 3 - Determine the Required Software Versions](#)" determine the latest qualified or tested beta version of the N6072A LTE Signaling Conformance Test software.
2. Login to www.agilent.com/find/softwaremanager.
3. Navigate to find the latest qualified or tested beta version of the Agilent N6072A LTE Signaling Conformance Test software.
4. Download the desired version of Agilent N6072A LTE Signaling Conformance Test software.

NOTE	The N6072A installation program also installs the drivers for your USB License Key.
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5. When the download is complete, run the downloaded setup file.
6. Follow the displayed instructions.

NOTE	If the USB license key driver software installation requires you to reboot your PC, choose to reboot manually, later, and perform the reboot after the remainder of the N6072A installation process is complete.
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7. After the N6072A installation has completed, reboot the PC if required.
8. After the installation and any reboots have completed, verify the USB license key installation is correct by plugging in the USB license key. A green light is displayed on the license key when the installation is successful.

NOTE	If a window showing "Welcome to the Found New Hardware Wizard" appears when you plug in the N6072A USB License Key, the installation has not been successful. Remove the license key, un-install and then re-install the Agilent N6072A LTE Signaling Conformance Test software. Take care to ensure that the "Device Driver" component is selected during installation.
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Un-install Procedure

If you need to uninstall the Agilent N6072A LTE Signaling Conformance Test software, use **Add or Remove Programs** accessed from the Windows **Control Panel**.

Step 6 – Install E6621A PXT Software

The PXT must have the correct software version installed to meet the requirements of specific N6072A LTE Signaling Conformance Test software releases.

1. Using the N6072A Software Compatibility Matrix downloaded in "[Step 3 - Determine the Required Software Versions](#)", determine the version of PXT software required to be used with the latest qualified or tested beta version of the Agilent N6072A LTE Signaling Conformance Test software.
2. Login to www.agilent.com/find/softwaremanager.
3. Navigate to find the latest qualified or tested beta version of the Agilent N6072A LTE Signaling Conformance Test software.
4. Download the desired version of PXT software.
5. Install the software in your PXT as described in the *E6621A PXT Wireless Communication Test Set User's Guide*.

Step 7 – Connecting the System

For operation with the Agilent N6072A LTE Signaling Conformance Test software, the PXT and application host computers must be connected via a private Ethernet hub or switch. The instruments and computers operate using fixed IP addresses.

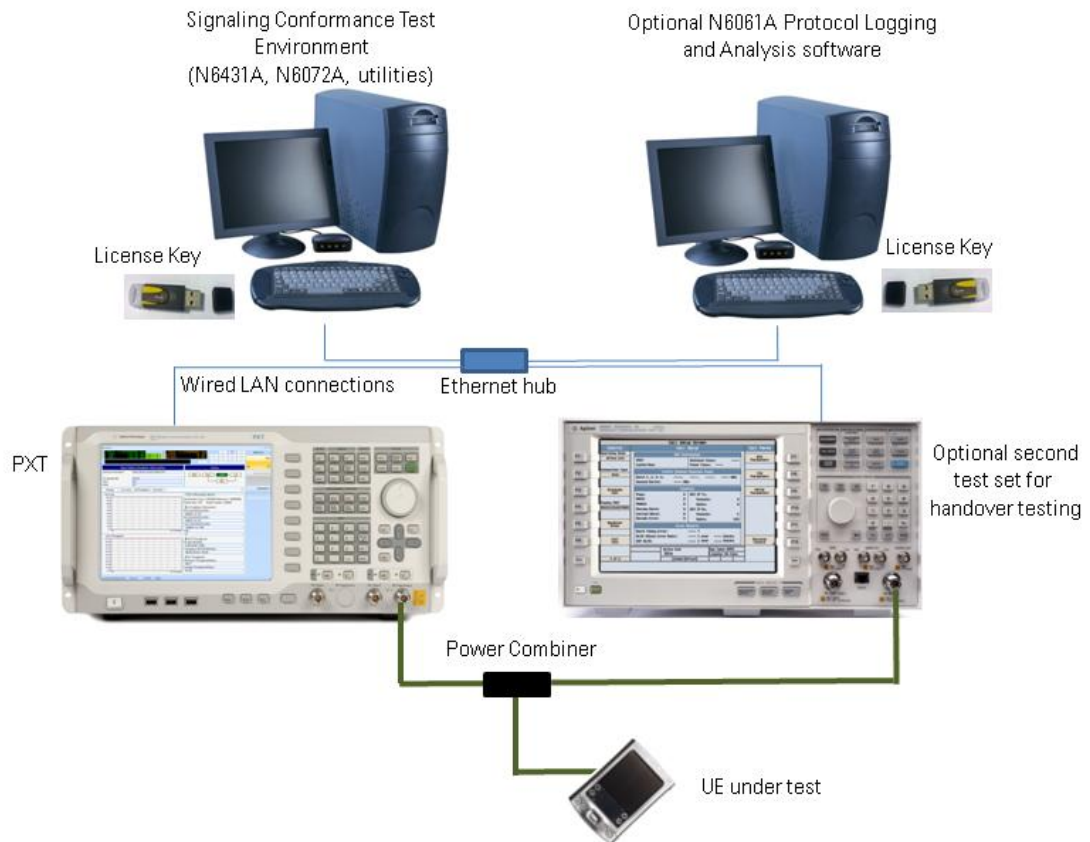


Figure 3-6: Example Setup

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Before connecting the setup, configure the PXT and computer IP addresses as shown in the table of default IP addresses below. You may choose alternative IP addresses if you wish.

Item	Agilent N6072A LTE Signaling Conformance Test PC	Agilent E6621A PXT	Agilent N6061A Protocol Logging and Analysis PC
IP address	192.168.1.100	192.168.1.60	192.168.1.135
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0
Gateway	not required	not required	not required

NOTES:

1. If the UE requires a client PC, it will normally be connected via USB. See the UE documentation for connection details and operating information. The client PC should be set to receive its IP address automatically, and should not be connected to the same LAN as the other equipment.
2. The N6061A Protocol Logging and Analysis software should be run on a separate PC to ensure real-time logging is not compromised by other applications.
3. Connecting the equipment to an in-house network is not recommended.

Setting the Computer IP Addresses

If the IP settings are not defined as shown, change them by clicking **Start, Control Panel, Network Connections**. Click your local area connection and select **Properties**. Highlight **Internet Protocol** and select **Properties**. Enter the IP address information in the table and click **OK**.

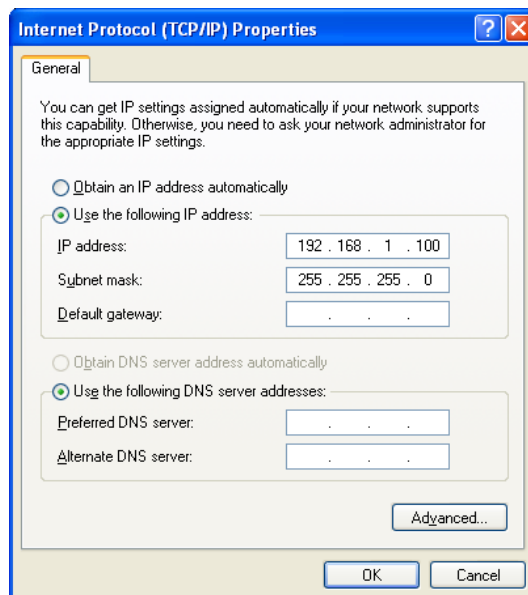


Figure 3-7: IP Address Entry - Signaling Conformance Test Computer

Setting the E6621A PXT IP Address

To set the IP address of the PXT, refer to the *E6621A PXT Wireless Communication Test Set Users Guide*.

Check the Connection

On each computer, open a command prompt and ping the IP address of the PXT. Confirm that the lines displayed start with "**Reply from . . .**" as shown in the example below. The computer and PXT are configured correctly and can transfer packets successfully if you see the "**Reply from . . .**" message. If the LAN configuration is incorrect, the ping command results in a timeout.

```
C:\>ping 192.168.1.60

Pinging 192.168.1.60 with 32 bytes of data:

Reply from 192.168.1.60: bytes=32 time=12ms TTL=128
Reply from 192.168.1.60: bytes=32 time<1ms TTL=128
Reply from 192.168.1.60: bytes=32 time<1ms TTL=128
Reply from 192.168.1.60: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.60:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms

C:\>
```

Figure 3-8: Successful Ping Response

Step 8 – Start and configure the TTworkbench Application

Use the following procedure to start and configure your TTworkbench application.

1. Insert your N6072A USB License Key in your computer.
2. Start TTworkbench by double-clicking on the TTworkbench Professional <TTworkbench version> icon on your desktop:



Alternatively, TTworkbench can be started by clicking **Start, Programs, Testing Technologies, TTworkbenchProfessional <TTworkbench version>, TTworkbench Professional**

3. Create a TTworkbench workspace.
When prompted with the pop-up shown below, type a folder name to establish a new workspace. It is recommended that a different workspace is used for each different version of Agilent N6072A LTE Signaling Conformance Test software. Agilent recommends using a workspace as follows:

```
C:\Documents and Settings\\workspaces-<TTworkbench version>\N6072A\  
<N6072A version>. (Windows XP)  
C:\users\\workspaces-<TTworkbench version>\N6072A\  
<N6072A version>. (Windows 7)
```

See the example below:

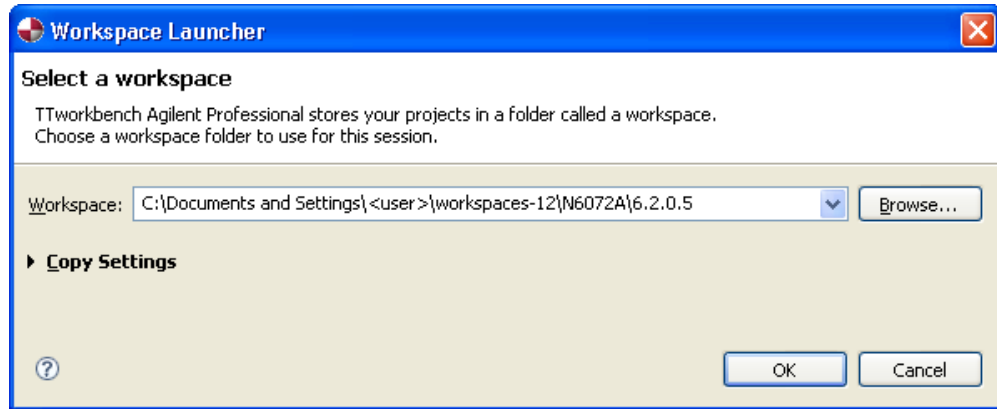


Figure 3-9: Creating a TTworkbench Workspace

4. Select, "Go to the workbench".
If you have created a new workspace, the TTworkbench welcome screen is shown. This is not shown when subsequently starting TTworkbench in an existing workspace. On the welcome screen, select the curved arrow symbol on the right-hand slide "Go to the workbench".

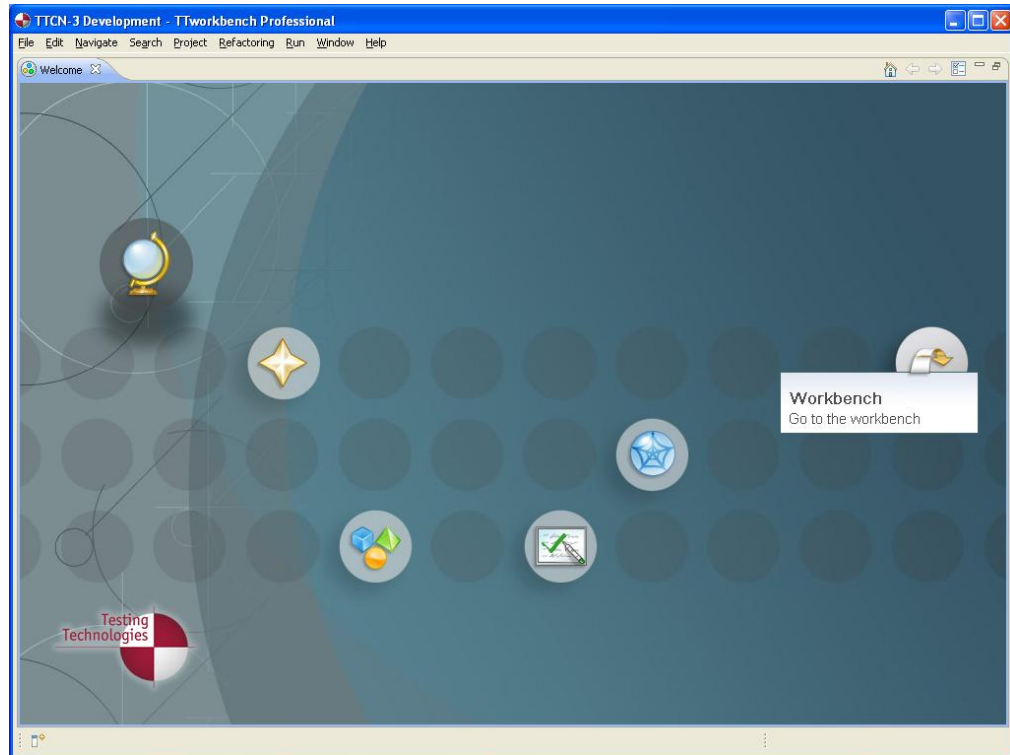
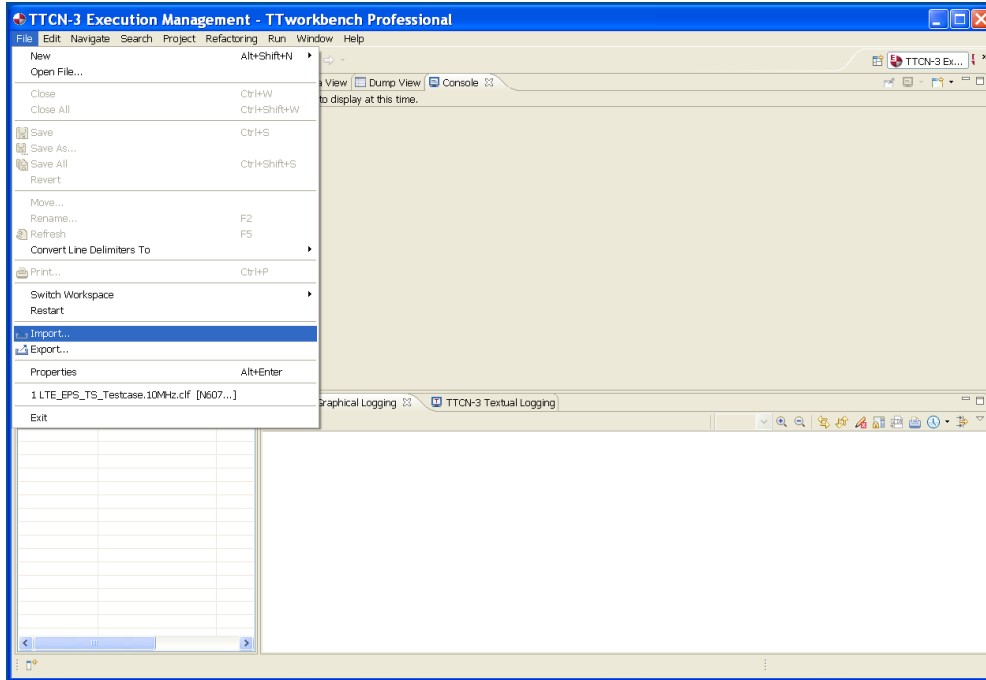


Figure 3-10: TTworkbench Welcome Screen

TTworkbench will start in the TTCN-3 Development perspective where TTCN-3 files and projects are managed.



5. Import an existing project.
From the TTworkbench menu bar, select **File**, then **Import ...**
Select **Existing Projects into Workspace** from the **General** group, and select **Next**.

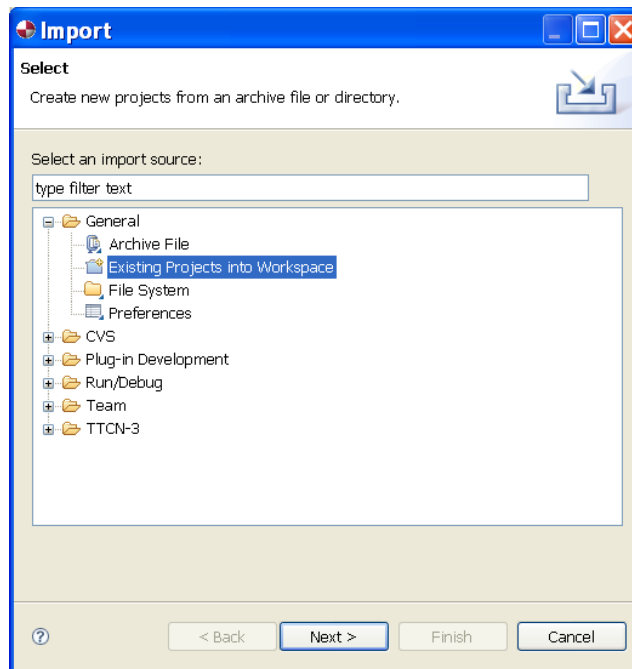


Figure 3-11: Importing an Existing Project

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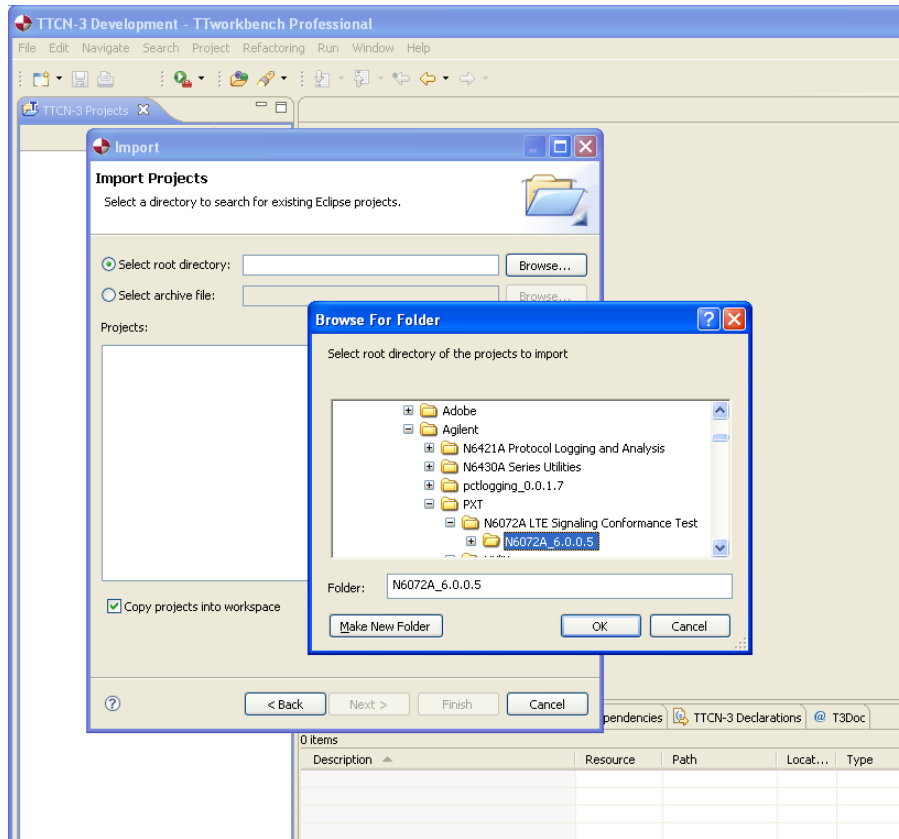


Figure 3-12: Selecting Desired Version of N6072A Software

6. Select the desired version of the N6072A software.
Select **Next**. Ensure “Select root directory” is selected, then open the **Browse...** window. Browse to the desired version of N6072A. Select **OK**

NOTE	The operating system on your pc determines the location of the software: For Windows XP or Windows 7 (32 bit): C:\Program Files\Agilent\PXT\N6072A LTE Signaling Conformance\N6072A_<version> For Windows 7 (64 bit): C:\Program Files (x86)\Agilent\PXT\N6072A LTE Signaling Conformance\N6072A_<version>
-------------	--

Confirm the path has been selected in the **Import Projects** window, and select the “Copy projects into workspace” checkbox, then select **Finish**.

IMPORTANT	Ensure the “Copy projects into workspace” box is selected.
------------------	--

7. Verify that the correct version of N6072A is displayed in the Projects list.
The project import will take a few seconds. When complete, confirm that the correct version of N6072A is displayed in the Projects list.

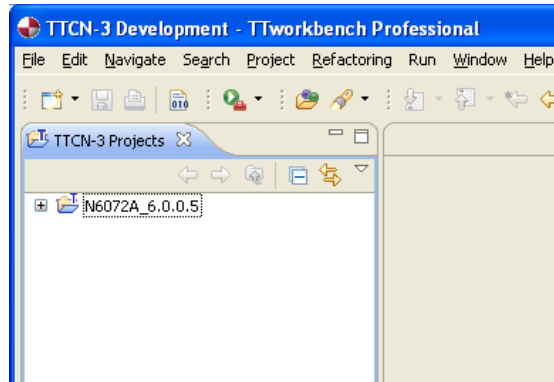


Figure 3-13: Verifying Correct Version of N6072A is Displayed

4 Running Your First Test Case

Prior to running a test case, you should connect your device under test to the PXT and ensure you complete the following:

1. Insert the Agilent USIM delivered with your PXT (part number E5515-10008) in your UE.
2. Establish an RF connection between your UE and the PXT.
3. Within TWorkbench's TTCN-3 Projects area, expand the N6072A_<version> release directory, then expand the ttcn3 directory.
4. Double-click the LTE_EPS_TS_Testcases_Band13_10MHz.clf.

NOTE	The default CLF file is configured for Band 13, 10MHz operation. To change to a different band or bandwidth, wait for the test campaign to load and then set the <i>px_ePrimaryFrequencyBand</i> or <i>px_ePrimaryBandChannelBandwidth</i> parameters. Refer to Modifying TWorkbench Run-time Parameters for further information on changing common parameters.
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The TWorkbench application now changes to the Execution Perspective and starts loading the test campaign. This may take a few minutes. During this process, warnings are displayed if you have failed to correctly connect with the PXT or if you have licensing issues. Follow the instructions in the messages to resolve the issue.

When the test campaign is fully loaded, it is listed in Management View pane of the Execution Perspective. Each release contains all of the LTE Signaling Conformance Test Cases released by ETSI that have been integrated into the N6072A LTE Signaling Conformance Test software.

5. You can now run a test case. Scroll down the list of test cases to find test case TC_8.1.1.1. Select this test case, and then run it either by double-clicking on the test case name, or click on the "running man" icon at the top left corner of the Management View.

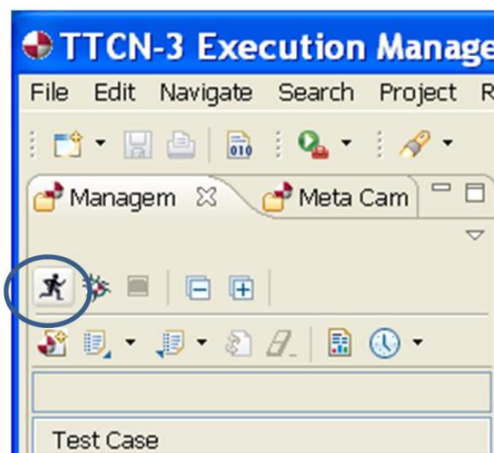


Figure 4-1: Select "running man" Icon to Run Test Case

During the execution of the test case, follow any on-screen prompts requiring manual intervention with the UE. While the test case is executing, you can monitor progress on the graphical or textual log window.

After the test case completes, the TTworkbench screen shows the results, with a log of the message exchange.

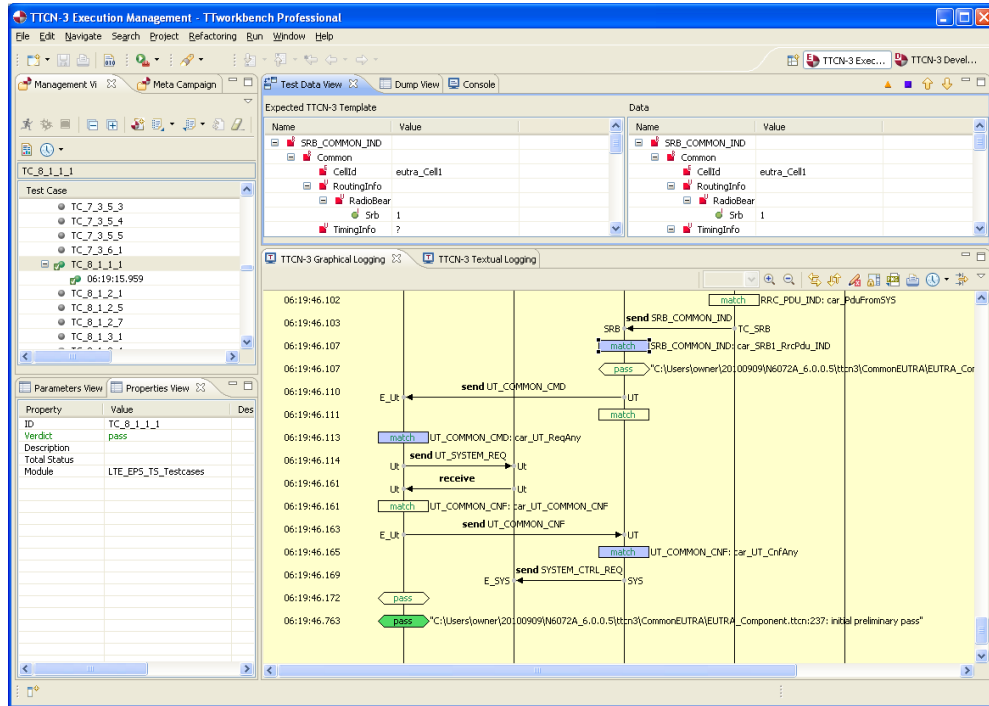


Figure 4-2: Test Case Results with Message Exchange Log

Troubleshooting Test Case 8.1.1.1

If you have trouble executing test case 8.1.1.1, the following table provides some debugging help for common problems during the execution of this test case.

Symptom	Cause	Resolution
No RA Preamble seen on E6621A screen	E6621A Downlink signal level is too low	Reduce any external attenuation between E6621A and UE Increase the RF Output Power offset on the E6621A
	E6621A Downlink signal level is too high	Add external attenuation between E6621A and UE Decrease the RF Output Power offset on the E6621A
	E6621A Input Signal level is too high	Increase the Input Attenuation on the E6621A Add external attenuation between E6621A and UE
	E6621A Input Signal level is too low	Decrease the Input Attenuation on the E6621A Reduce any external attenuation between E6621A and UE
	UE does not support the selected band or bandwidth	Alter the <i>px_primaryFrequencyBand</i> and/or <i>px_primaryBandChannelBandwidth</i> in TTworkbench
E6621A screen shows RA Preamble and RA Responses only	E6621A does not receive Msg3 (RRC Connection Request) from the UE	Check the UE's transmit timing. PCT uses a fixed Timing Advance of "0"; if the UE has a significant timing difference between UL and DL, the E6621A will not be able to decode Msg3. Observe the Timing Advance in the RA Response in BSE mode to check the value detected by the E6621A.
	UE does not receive the RA Response from the E6621A	Adjust the RF Output Power Offset and/or Input Attenuation on the E6621A
Test case proceeds but stops with an "Authentication Failure" message	Mismatch in Authentication settings	Ensure the UE supports Dummy authentication Ensure the Authentication K value used by the UE matches that defined in <i>px_AuthK</i> in TTworkbench
Test case proceeds, but stops with an "Unexpected RRC PDU" message	UE is configured to support IPv6 and is performing a Router Solicitation	Configure the UE to support only IPv4 Ensure <i>pc_IPv4</i> is <i>true</i> and <i>pc_IPv6</i> is <i>false</i> in TTworkbench
	UE is trying to send IP packet from some software component on the UE computer	Enable a firewall on the UE computer and block all traffic
Test case proceeds, but UE does not respond to the second page	The UE was not listening on the paging channel that the N6072A paged the UE on	Ensure that the IMSI value used by the UE matches that defined in <i>px_IMSI_def</i> in TTworkbench

5 Integrating the N6061A Protocol Logging and Analysis Application (optional)

The N6061A Protocol Logging and Analysis Application can be integrated with the N6070A Series Signaling Conformance Test software. This combination enables the N6061A to show the TTCN information in the same log as the over-the-air messaging between the E6621A and the UE.

Configure the N6072A System Configuration Manager

1. Open the N6072A System Configuration Manager by clicking Start, Programs, Agilent PXT, Utilities, N6072A System Configuration Manager, N6072A System Configuration Manager.
2. In the N6072A System Configuration Manager's main window, ensure the "N6061A Logging" box is checked and the correct N6061A IP Address is configured for the BS Emulator.

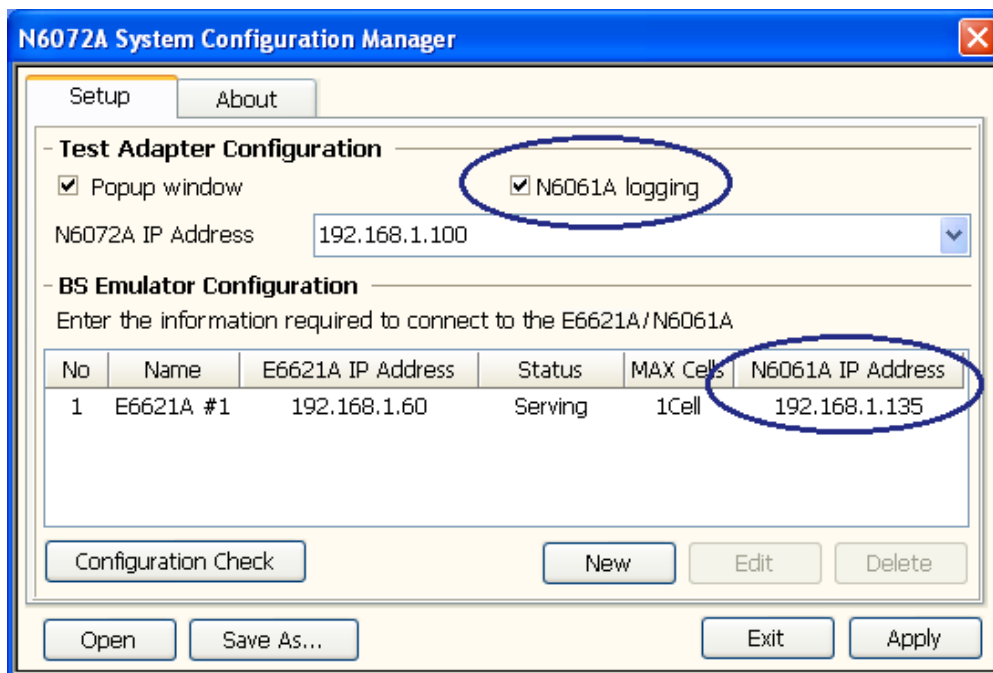


Figure 5-1: N6072A System Configuration Manager Configured for TTCN Logging

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3. To change the IP address of the N6061A, select the BS Emulator row from the list, and click "Edit" to open the "Edit BS Emulator Information" window. You can then update the IP address for the N6061A. Close the "Edit BS Emulator Information" window and click "Apply" in the N6072A System Configuration Manager's main window.

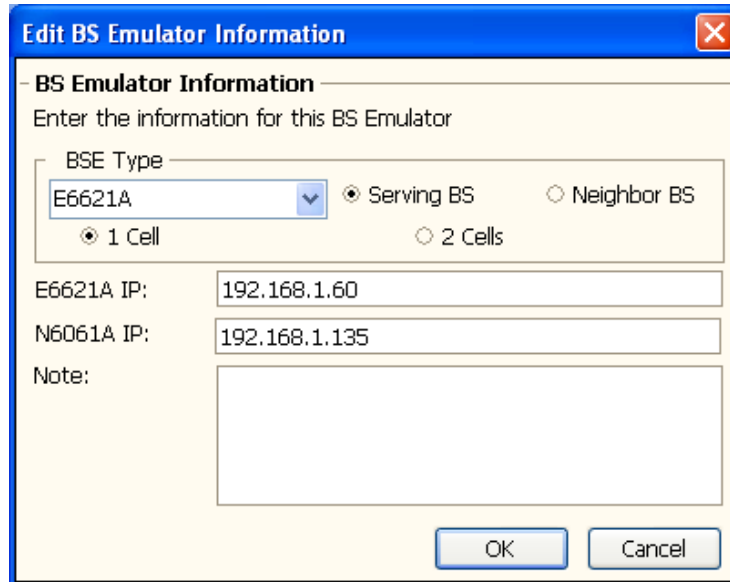


Figure 5-2: Editing the BS Emulator Information

4. Use the "Configuration Check" button on the N6072A System Configuration Manager's main window to verify the system is configured correctly.

Configure the N6061A Protocol Logging and Analysis Application

1. Start the N6061A Protocol Logging and Analysis Application on the PC with the IP address configured in step 3 of the section above, entitled, "Configure the N6072A System Configuration Manager".
2. In the N6061A Protocol Logging and Analysis Application, click the "PCT" button to open the PCT view. This view will show logging information from the N6070A Series Signaling Conformance Test software. You may wish to open other views in the N6061A to view other protocol layers.
3. Refer to the **Agilent N6061A Protocol Logging and Analysis Users Guide** for more information on using the N6061A.

Running a Test Case with N6061A Logging Enabled

1. The N6072A System Configuration Manager's settings are only applied to the Test Adapter when the CLF loads. Reload any CLFs that you have opened to update the system with the new N6072A System Configuration Manager's settings.
2. Run a test case by selecting the test case and click the "running man" icon
3. Check that the PCT view of the N6061A Protocol Logging and Analysis software shows logging from TTworkbench during the execution of the test case.

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No	Time	RFN	TTI	DIR	Protocol	RNTI	Layer	Channels	Length	PDU Message	Note
1584	2010/07/07 06:41:05.795	74	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1585	2010/07/07 06:41:05.817	76	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1586	2010/07/07 06:41:05.817	76	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1587	2010/07/07 06:41:05.837	78	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1588	2010/07/07 06:41:05.837	78	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1589	2010/07/07 06:41:05.837	64	3		TTCN		NAS	SRB=2		aTTACH_COMPLETE	timReceive_c
1590	2010/07/07 06:41:05.846	-	-		TTCN					SYSTEM_CTRL_REQ	timSend_m
1591	2010/07/07 06:41:05.859	80	1	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1592	2010/07/07 06:41:05.859	80	1	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1593	2010/07/07 06:41:05.859	80	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1594	2010/07/07 06:41:05.859	80	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1595	2010/07/07 06:41:05.864	-	-		TTCN		RRC	SRB=1		rrcConnectionRelease	timReceive_c
1596	2010/07/07 06:41:05.876	82	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1597	2010/07/07 06:41:05.876	82	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1598	2010/07/07 06:41:05.895	-	-		TTCN		RRC	SRB=1		rrcConnectionRelease	timSend_m
1599	2010/07/07 06:41:05.895	84	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1600	2010/07/07 06:41:05.895	84	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1601	2010/07/07 06:41:05.902	-	-		TTCN					Timer Start	timStart
1602	2010/07/07 06:41:05.916	-	-		TTCN					SYSTEM_CTRL_REQ	timSend_m
1603	2010/07/07 06:41:05.917	86	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1604	2010/07/07 06:41:05.917	86	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1605	2010/07/07 06:41:05.922	-	-		TTCN					SYSTEM_CTRL_REQ	timSend_m
1606	2010/07/07 06:41:05.928	-	-		TTCN					SYSTEM_CTRL_REQ	timSend_m
1607	2010/07/07 06:41:05.936	88	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1608	2010/07/07 06:41:05.936	88	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1609	2010/07/07 06:41:05.964	90	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1610	2010/07/07 06:41:05.964	90	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1611	2010/07/07 06:41:05.975	92	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1612	2010/07/07 06:41:05.975	92	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1613	2010/07/07 06:41:05.997	94	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1614	2010/07/07 06:41:05.997	94	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1615	2010/07/07 06:41:06.012	96	1	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1616	2010/07/07 06:41:06.012	96	1	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	
1617	2010/07/07 06:41:06.012	96	5	DL	LTE	0xFFFF	MAC	DCI	3	DCI Format 1c	
1618	2010/07/07 06:41:06.012	96	5	DL	LTE	0xFFFF	PHY	PDCCCH	3	PHY_DATA	

Figure 5-3: N6061A Example Display Including TTCN Logging

6 Modifying TTworkbench Run-time Parameters

The CLF file included with each release of N6072A is configured for a Band 7 UE at 5MHz, using the Agilent E5515-10008 USIM.

In order to support testing UEs using different Bands, Bandwidths or USIMs, it is necessary to reconfigure the run-time parameters in the TT workbench environment.

From the TT workbench Execution Perspective, select the Parameters View and scroll through the list of parameters that can be altered.

Commonly Modified Parameters	
px_AuthK:	The authentication "K" Value for the USIM inserted into the UE. This is a 128 bit binary value.
px_IMEI_def:	The IMEI of the UE under test. This value is specific to each UE and must therefore be set differently for each UE tested. This is a 15 digit hexadecimal value. Note: The last digit of the IMEI is the Luhn check digit (refer to 3GPP 23.003, section 6.2.1). The IMEI value transmitted by the UE sets this check digit to zero, so px_IMEI_def should accordingly have its last digit set to zero.
px_IMSI_def:	The IMSI value for the USIM inserted into the UE. This is a 15 digit BCD value.
px_primaryBandChannelBandwidth:	This is an enumeration defining the N_{RB} value to be used. Refer to 3GPP 36.101 table 5.6-1 for the mapping between channel bandwidth (MHz) and N_{RB} .
px_primaryFrequencyBand:	This is an integer value defining the LTE frequency band to be used (refer to 3GPP 36.101). Note: The N6072A will choose the middle EARFCN for the selected band when configuring the E6621A.
pc_eBand<m>_Supp:	Set these parameters to true for the bands that the UE supports.
pc_featrGrp_<n>:	Set these parameters to true for the Feature Groups that the UE supports.

After altering parameters, you may save this as a new test campaign using the "Export Test Campaign" feature in the Execution Perspective. In the future, you will be able to select your modified test campaign from the Development Perspective.

7 Software Updates

If you have a valid Software and Technical Support contract for both the PXT and the N6072A LTE Signaling Conformance Test Application, software updates, including new test cases, are available at www.agilent.com/find/pctdownloads.

Each release of Agilent N6072A LTE Signaling Conformance Test software is provided as an .exe file which can be installed as detailed above. All associated software components for this same release are available on the Agilent Software Manager website.

Release notes, supported configurations matrix and validation status information is also available from this website.

8 Service and Support

Calling Agilent Technologies

Agilent Technologies has offices around the world to provide you with complete support for your products. For help, to obtain servicing information or to order replacement parts, contact the nearest Agilent Technologies office listed below. In any correspondence or telephone conversations, you will need the product number, full serial number, software revision and Software and Technical Support Contract (STSC) details.

Press the **INFO** front panel key to view the product number (E6621A), serial number, and software revision information and STSC expiration date.

Service and Support

Americas

Brazil
(11) 4197 3600

Canada
(877) 894 4414

Mexico
01800 5064 800

United States
(800) 829 4444

Asia Pacific

Australia
1 800 629 485

India
1 800 112 929

Malaysia
1 800 888 848

China
800 810 0189

Japan
0120 (421) 345

Singapore
1 800 375 8100

Hong Kong
800 938 693

Korea
080 769 0800

Taiwan
0800 047 866

Other Asian Countries:

www.agilent.com/find/contactus

Europe & Middle East

Belgium
32 (0) 2 404 93 40

Ireland
1890 924 204

Spain
34 (91) 631 3300

Denmark
45 45 80 12 15

Israel
972-3-9288-504/544

Sweden
0200-88 22 55

Finland
358 (0) 10 855 2100

Italy
39 02 92 60 8484

Switzerland
0800 80 53 53

France
0825 010 700*
*0.125 €/minute

Netherlands
31 (0) 20 547 2111

United Kingdom
44 (0) 118 927 6201

Germany
49 (0) 7031 464 6333

Other Unlisted Countries:

www.agilent.com/find/contactus

Software and Technical Support Contracts

Software and Technical Support Contracts (STSC) entitle you to software updates and feature enhancements, as well as direct access to a technical expert for technical support for a fixed period, usually one year.

The STSC gives you direct access to technical product experts to increase your productivity and minimize the software difficulties you encounter. These technical support engineers are experts on the N6070A series Signaling Conformance Test solution, the E6621A PXT test set, and its complementary software products. They have instant access to instruments and software to enable them to resolve your issues as quickly as possible. Agilent will investigate all software defects and operational problems reported through the technical support channel. Upon completion of the investigation, we will advise you on possible solutions and functional alternatives. Where possible, Agilent will provide software releases to address problems caused by defects in the firmware or software.

STSCs for the Agilent E6621A PXT and N6072A Signaling Conformance Test Software

The N6050AS STSC covers the N6050A, N6051A and N6052A software applications running on the E6621A PXT wireless communications test set, plus the associated N6061A and N6062A PC software applications. The N6072AS STSC covers the N6072A LTE Signaling Conformance Test software running within the 6431A TTCN-3 Environment.

If you have a Software and Technical Support Contract, there are three methods of accessing your technical support:

- Web-based support: My Support Center
- E-mail support
- Phone support

For fastest response times, we recommend using the web-based or email access methods as these provide the most direct route to your technical support expert. All support cases may be viewed and tracked through the online support center (My Support Center), regardless of how you initially contacted technical support.

Web-based support

You can directly enter and manage your support requests online via www.agilent.com/find/mysupportcenter.

The first time you use My Support Center you will be asked to create a profile and provide proof of entitlement. Once your profile is created, you can use the online support center to enter your support request.

Each support request will be given a unique case number which you can use to track the progress of your support case. A technical expert will contact you via phone or email (whichever you have stated as your preferred option) to resolve your issue.

English, Japanese, Korean, and Mandarin local language support is available.

E-mail support

You can also contact our technical support at the following e-mail addresses:

- wireless_test_support_americas@agilent.com
- wireless_test_support_japan@agilent.com
- wireless_test_support_europe@agilent.com
- wireless_test_support_asia@agilent.com
- wireless_test_support_korea@agilent.com

Your support request will be routed to a technical expert who will contact you via e-mail or phone (whichever you have stated as your preferred option) to help resolve your issue.

English, Japanese, Korean, and Mandarin local language support is available.

Phone support

If you prefer to speak to someone directly, you can call the Agilent customer contact centers at the telephone numbers provided in the section entitled, "Service and Support" on page [29](#).

The customer contact center will route your request to a technical support expert, who will contact you about your support request via phone or email. Local language support is available in many countries.

