Willtek

User's Guide

7311 Lector Basic
7312 Lector Enhanced
7315 Scriptor

Software Version 6.10

boosting wireless efficiency

Notice

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Ordering information

This guide is issued as part of Lector and Scriptor. The ordering number for a published guide is M 294 309. The ordering number for the product is M 897 310 for 7312 Lector Enhanced and M 897 311 for 7315 Scriptor. These two products consist of the software (which can be downloaded from Willtek's website) and a USB dongle. 7311 Lector Basic cannot be ordered but only downloaded from Willtek's website; in addition it is being delivered with test instruments such as Willtek's 3100 Mobile Fault Finder.

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About This Guide

Purpose and scope

The purpose of this guide is to help you successfully use the Lector and Scriptor features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the Lector and Scriptor. Additionally, this guide provides a description of Willtek's warranty, services, and repair information, including terms and conditions of the licensing agreement.

Assumptions

This guide is intended for novice users who want to use the Lector and Scriptor effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience.

Related information

Use this guide in conjunction with the following information:

Table 1 Additional manuals

Manual	Ordering number
7310 Lector and Scriptor getting started manual	M 294 310
2201 ProLock user's guide	M 290 003
2303 Stabilock user's guide	M 290 002
3100 Mobile Fault Finder getting started manual	M 295 111
3100 Mobile Fault Finder user's guide	M 290 111
4100 Mobile Phone Tester Series user guide	M 290 012
4200 Mobile Service Tester Series user guide	M 290 013
4300 Mobile Service Tester Series user's guide	M 290 043
4400 Mobile Phone Tester getting started manual	M 295 011
4400 Mobile Phone Tester Series user's guides	(various)
Bluetooth Connectivity Test Products user's guide	M 292 018
7201 Update Utility user's guide	M 294 001

Technical assistance

If you need assistance or have questions related to the use of this product, call one of Willtek's technical assistance centers. You can also contact Willtek by e-mail at customer.support@willtek.com.

Table 2 Technical assistance centers

Region	Phone number	Fax number
Europe, Middle East, Asia, Africa	+49 (0)89 99641 311	+49 (0)89 99641 440
Americas	+1 973 386 9696	+1 973 386 9191
China	+86 21 5836 6669	+86 21 5835 5238

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 3 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch.
Code and output messages appear in this `typeface`.	`All results okay`
Text you must type exactly as shown appears in this **`typeface`**.	Type: **`a:\set.exe`** in the dialog box.
Variables appear in this <typeface>.	Type the new <hostname>.
Book references appear in this typeface.	Refer to Newton's Telecom Dictionary
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Square brackets [ ] indicate an optional argument.	`login [platform name]`
Slanted brackets < > group required arguments.	<`password`>

Table 4 Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive keystrokes.	Press **Alt+f,s**
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Overview

1

This chapter provides a general description of the Lector and Scriptor. Topics discussed in this chapter include the following:

About Lector and Scriptor

Willtek's Lector and Scriptor software is an economical solution for service centres and repair shops testing returned mobile phones. Running on a PC, the software provides an easy-to-use interface to the 4100 Series Mobile Phone Testers (requires Lector Enhanced or Scriptor), the 4200 and 4300 Series Mobile Service Testers (both require Lector Enhanced or Scriptor), the 3100 Mobile Fault Finder and the 4400 Series Mobile Phone Testers.

Willtek's family of test automation programs provides a scalable test solution for different applications around wireless device testing. It fits the needs of test operators and administrators in large service centres as well as in small repair shops. The members of this family are:

- 7311 Lector Basic – Carry out automated measurements with simple pass/fail indication and more detailed test reports! (free of charge)
- 7312 Lector Enhanced – Analyze test reports in more detail!
- 7315 Scriptor – Edit and define test scripts and limits, and add new mobile phone models with coupling factors!
- 7360 Coupling Factor Update License – Update your database of coupling factors for new mobile phone models over the Internet; the 1-year license is available for use with 7312 Lector Enhanced and 7315 Scriptor
- 7361 Bluetooth Connectivity Test License – Additionally check if the Bluetooth module of the phone is performing! This option adds Bluetooth Go/NoGo tests for instruments which do not support it inherently, like the 4100 and 4200 series instruments. With the 7361 Bluetooth Connectivity Test License, the 4941 Bluetooth Hardware can be connected directly to the PC.

Using one of these instruments and Lector on a PC, service and repair centres easily can check the performance of returned mobile phones. The system automatically recognises the phone type, and it can test single, dual, triple and quad band models. All major RF parameters are measured against specifications, and audio tests check microphone and speaker functionality. Results can be stored in a database for analysis or printed for reports.

The operator doesn't have to learn the complexities of WCDMA or CDMA2000 testing: The Pass/Fail indication is good enough to filter bad from good phones. The accompanying detailed results can be printed or stored, and forwarded to the repair technician for fault diagnosis.

Using Scriptor, the test scripts running in Lector can easily be adapted and extended to individual needs. Support for GSM, GPRS, EDGE, WCDMA/UMTS, HSDPA, CDMA2000, 1xEV-DO mobile phones and TETRA radios is already built in.

Lector Basic is a standard accessory to the 3100 Mobile Fault Finder and can also be used as a free tool for the other mobile phone testers – just download the software from the Internet!

Features and capabilities

- Supported instruments:
  - 2201 ProLock
  - 3100 Mobile Fault Finder
  - 3110 Mobile Service Tester
  - 4100 Mobile Fault Finder
  - 4200 Mobile Service Tester
  - 4300 Mobile Service Tester
  - 4400 Mobile Phone Tester
  - 2303 Stabilock TETRA Mobile Station Tester
- Supported technologies:
  - GSM, GPRS, EDGE, WCDMA, HSDPA and Bluetooth
  - CDMA2000, EVDO, AMPS
  - TETRA
- Free version available to run the tests: 7311 Lector Basic
- Coupling factor calculation
- Automatic calculation for GSM, WCDMA, CDMA2000 and TETRA
  - Self explaining wizard
  - Algorithm for defining the optimum position on the shuttle for GSM and WCDMA, with both the standard and the XY shuttle
  - Coupling factor editor
- Coupling factor (CPL) database for popular phones included
- 7360 Coupling Factor Update License for one year included
  - Monthly update for the latest phones from various vendors
  - Online update via Internet
- Multiple installations on one PC for multiprocessing
- Synchronization
- Codes indicating reason for failure
- Different start conditions of test scripts possible
  - Test dependent
  - Mobile phone dependent (using serial no. indicated in signaling protocol)
  - TAC dependent (using serial no. read by barcode reader)
- Test result summary available
  - Can be stored automatically
  - Stores also failure reason codes
- Easy-to-use script editor, mobile list editor, limits editor and X2T editor (Scriptor)
- One installation for all types of products (available functionality depends on USB dongle)

Delivery

For 7312 Lector Enhanced and 7315 Scriptor, the software comes on a CD, together with a USB dongle. After software installation, the dongle must be plugged into a free USB port. See Chapter 2 ''Installation'' for more details.

For all three products, you can also download the latest Lector and Scriptor software from Willtek's webserver at www.willtek.com. Without an appropriate dongle, you can only take advantage of the 7311 Lector Basic features.

Installation

2

This chapter describes how to install Lector and Scriptor. The topics discussed in this chapter are as follows:

Scope of delivery

Lector and Scriptor come on a CD with an installation program. The installation includes the driver software necessary to control a 2201 ProLock, a 3100 Mobile Fault Finder or a 4400 Series Mobile Phone Tester via USB.

Software requirements

Lector and Scriptor can be installed and run on every PC with Microsoft Windows NT, Windows 2000, Windows XP or Windows Vista. You will need to log in with administrator rights to install the software.

Table 1 shows which instruments are supported and by which member of the Lector and Scriptor family of test automation products.

Table 1 Supported instruments vs. Lector-Scriptor versions

	7311 Lector Basic	7312 Lector Enhanced	7315 Scriptor
2201 ProLock	✓	✓	✓
2303 Stabilock[a]	✓	✓	✓
3100	✓	✓	✓
3110	✓	✓	✓
4100 Series	–	✓	✓
4200 Series	–	✓	✓
4300 Series	–	✓	✓
4400 Series	✓	✓	✓

a. Remote control by Lector or Scriptor quires the 2331 Autotest Option to be installed

To control a 4400 Series Mobile Phone Tester, the instrument will need firmware version 6.20 or higher. In order to take advantage of all the latest features, the latest firmware is required.

To control a 3100 Mobile Fault Finder, the instrument will need firmware version 15.00 or higher. In order to take advantage of all the latest features, the latest firmware is required.

To make use of the Bluetooth and the Intersystem Handover capabilities, software version 15.00 or higher of the 4400 or 3100 is required.

Hardware requirements

Before installing Lector and Scriptor on a PC, make sure that the PC has

- at least 60 Mb of free hard disk space
- a CD drive
- a free RS-232 or USB port (for initial setup of the 3100 Mobile Fault Finder)
- a free USB port for the USB dongle if you want to install 7312 Lector Enhanced and 7315 Scriptor
- a screen size of at least 1024 x 768 pixels

In addition, the PC needs an interface to the instrument to be controlled. Ensure that both the PC and the instrument can be connected using one of the following interfaces supported by Lector and Scriptor:

- TCP/IP
- GPIB (National Instruments interface)
- USB
- RS-232

Installing the software

Installing from the Lector and Scriptor CD

In these directions we assume that you are installing the software from the Lector and Scriptor installation CD delivered by Willtek.

1 Insert the CD into the CD drive of the PC.

2 If the installation does not start automatically, use Microsoft Explorer to start the AUTORUN.EXE program from the CD.

3 Click on ''Install Lector or Scriptor''
The Lector and Scriptor Setup Assistant appears.

4 Follow the instructions on the screen. In particular:
   - Select a language for the setup assistant
   - Read and accept the license agreement
   - Select a folder to install the program files of Lector and Scriptor (e.g. ''C:\Program files\Willtek\731X Lector-Scriptor'')
   - Choose a program group name that will appear under **Start > Programs** (e.g. Willtek)
   - Select if you want to have a Lector and Scriptor icon on the Windows desktop
   - Start the installation process

   The Lector and Scriptor program will be installed.

5 After completion of the Lector and Scriptor installation, the setup program asks if you wish to install various drivers. If you want to run 7312 Lector Enhanced or 7315 Scriptor, enable HASP HL USB dongle driver installation. If you are likely to use the USB connection to the 3100,3110 or 4400, have the setup program install the CP210X USB to serial driver. For remote control of the ProLock via USB, select the Gadget Serial driver.
If selected, the HASP device driver is started.

6 Confirm the Welcome menu and the license agreement.
The HASP device driver is installed. Depending on the dongle installed, you may now be able to use the 7311 Lector or 7315 Scriptor features.

7 For 3100, 3110 and 4400: If selected, the Wizard for CP210X USB to UART Bridge Controller Driver appears. Follow the instructions on the screen.
The USB driver will be installed, typically in C:\SiLabs. After completion, you will be able to control the instrument via USB.

8 For 2201 ProLock: If selected the Gadget Serial installation wizard appears. Follow the instructions on the screen.
The USB driver will be installed. After completion, you will be able to control the ProLock via USB.

Installing from other media

These instructions are applicable to an installation from either the Manual CD that is delivered with Willtek products, or from a downloaded file:

1 Call up the setup program for Lector and Scriptor.

2 Follow the instructions on the screen. In particular:
- Select a language for the setup assistant.
- Read and accept the license agreement.
- Select a folder to install the program files of Lector and Scriptor (e.g. "C:\Program files\Willtek\731X Lector-Scriptor").
- Choose a program group name that will appear under **Start > Programs** (e.g. Willtek).
- Select if you want to have a Lector and Scriptor icon on the Windows desktop.
- Start the installation process.

The Lector and Scriptor program will be installed.

3 After completion of the Lector and Scriptor installation, the setup program asks if you wish to install the USB drivers. If you want to run 7312 Lector Enhanced or 7315 Scriptor, enable HASP HL USB dongle driver installation. If you are likely to use the USB connection to the 3100 or 4400, have the setup program install the USB to serial driver.
If selected, the HASP device driver is started.

4 Confirm the Welcome menu and the license agreement.
The HASP device driver is installed. Depending on the dongle installed, you may now be able to use the 7311 Lector or 7315 Scriptor features.

5 The Wizard for CP210X USB to UART Bridge Controller Driver appears. Follow the instructions on the screen.
The USB driver will be installed, typically in C:\SiLabs. After completion, you will be able to control the instrument via USB.

Setting up the hardware

Before starting a test, the PC should be connected to the instrument and the USB dongle should be installed (Lector Enhanced and Scriptor only). The table below summarizes the remote control interfaces supported.

Table 2 Interfaces supported by the instrument types

	RS-232/USB	TCP/IP	GPIB
2201 ProLock	✓	✓	–
2303 Stabilock[a]	–	✓	–
3100	✓	✓	✓[b]
3110	✓	✓	–
4100 series	✓	–	–
4200 series	✓	–	–
4300 series	✓	–	✓
4400 series	✓	✓[c]	✓

a. Remote control by Lector or Scriptor quires the 2331 Autotest Option to be installed
b. Optional (3180 GPIB - IEEE 488.2 Option required)
c. Instruments with a serial number below 0911001 require the 4478 TCP/IP Option

Please note the following particularities.

2201 ProLock

The ProLock can be controlled by 7311 Lector Basic, 7312 Lector Enhanced or 7315 Scriptor. The interfaces available for remote control are LAN (TCP/IP), USB and RS-232.

If you want to control the instrument via USB, you should select to install the Gadget Serial driver with the software.

2303 Stabilock

The Stabilock can be controlled by 7311 Lector Basic, 7312 Lector Enhanced or 7315 Scriptor. The interface available for remote control is LAN (TCP/IP); see ''TCP/IP'' on page 10. The 2331 Autotest Option must be installed in the Stabilock.

3100 Mobile Fault Finder

The 3100 Mobile Fault Finder supports remote control via TCP/IP, GPIB, USB and RS-232.

If the 3100 shall be controlled via TCP/IP, a connection via USB or RS-232 must be established at first-time use because the 3100 must be programmed with a valid IP address. You can find out the IP address by connecting the 3100 over the USB first; the **Connection > Check Connection** menu will show you the IP address.

If the 3100 shall be controlled via GPIB, a connection via USB or RS-232 must be established at first-time use because the 3100 must be programmed with a valid GPIB address. See the manual for the 7201 Update Utility for more information.

3110 Mobile Service Tester

The 3110 Mobile Service Tester supports remote control via TCP/IP, USB and RS-232.

Series 4100 Mobile Phone Testers

The Series 4100 testers can be controlled by 7312 Lector Enhanced or 7315 Scriptor via a serial interface (RS-232).

Series 4200 Mobile Service Testers

The Series 4200 testers can be controlled by 7312 Lector Enhanced or 7315 Scriptor via a serial interface (RS-232).

Series 4300 Mobile Service Testers

The CDMA and AMPS versions of the Series 4300 testers can be controlled by 7312 Lector Enhanced or 7315 Scriptor via GPIB or a serial interface (RS-232).

4400 Mobile Phone Tester Series

Instruments from the 4400 Mobile Phone Tester Series support remote control via GPIB and, depending on the status of the instrument and the installed options, via TCP/IP and USB.

TCP/IP

The LAN connector of your instrument can be connected with the PC in two different ways:

- Existing TCP/IP network with router or hub: Use a CAT5 or CAT6 LAN cable to connect the instrument to the LAN. Similarly, also connect the PC to the LAN.
- Point-to-point connection: Use a crossed-line LAN cable to directly connect the instrument to the PC.

Lector Enhanced and Scriptor

To make use of the advanced features of 7312 Lector Enhanced and 7315 Scriptor, the USB dongle provided as part of the product must be installed.

After installing, but before running the software, slide the USB dongle into a free USB port of the PC.
After starting the Lector and Scriptor software, the title bar of the Lector or Scriptor menu should indicate the name of the product you have purchased, i.e. either ''7312 Lector Enhanced'' or ''Willtek 7315 Scriptor''.

Working with a network license

Lector Enhanced is also available with a network license with the following advantages:

- Central management of the software license for 7312 Lector Enhanced and 7360 Coupling Factor Update License for multiple users
- Purchasing several a network license for several computers can be cheaper than individual licenses for each computer
- Individual dongles may get lost, whereas a dongle on a server in a separate IT room is usually safe

Procedure

1 Install the Lector software (version 4.00 or higher) and the HASP dongle driver on all the PCs in the network that will either run Lector or serve as the network license host.

2 Connect the network dongle to a free USB port on that PC.
The network license(s) should now be available to all other PCs on the network running Lector version 4.00 or higher.

3 Take the following steps if you want to ensure that the dongle is properly installed and accessible to other computers on the network:

   a On the PC with the network dongle (the network license host), open a web browser and call up http://localhost:1947.
   If the dongle is properly connected, the HASP License Manager will appear in the web browser. Click on **HASP Keys** to see on which PC the dongle is installed; the PC name is shown in the Location column.

   b On a different PC on the same LAN, call up http://localhost:1947.
   If the PC is connected to the network license host over the LAN (or a VPN tunnel see below), the HASP License Manager will appear in the web browser.
   If the HASP License Manager does not load, check the LAN connection to the network license host using one of the command line programs PING and TRACERT, with the name of the network license host PC name as a command line argument.

4 Run Lector on as many computers as copies are available on the network dongle!

Particularities

Only one computer (the network license host) on the local area network requires a dongle, the other computers automatically obtain their license information over the network. The network dongle is available for a maximum number of users; each PC requesting a network license decreases the number of licenses left for other computers. If a user exits the Lector software then the license becomes available for another user. If a computer running Lector is switched off without properly closing Lector, the license will time out after a few minutes.

Individual users can be blocked or admitted, and the usage and availability of licenses can be checked over the network using the HASP License Manager. The software can be called up with a web browser using the following address:
http://localhost:1947
The HASP License Manager software includes a Help button with detailed information about how to use the software.

Network license host requirements

The computer holding the network dongle must be switched on and connected to the LAN in order for the network license to be available to other computers on the same LAN.

If a PC requiring a license is not connected to the LAN with the network license host, you can connect them over a Virtual Private Network (VPN).

Configuring the software

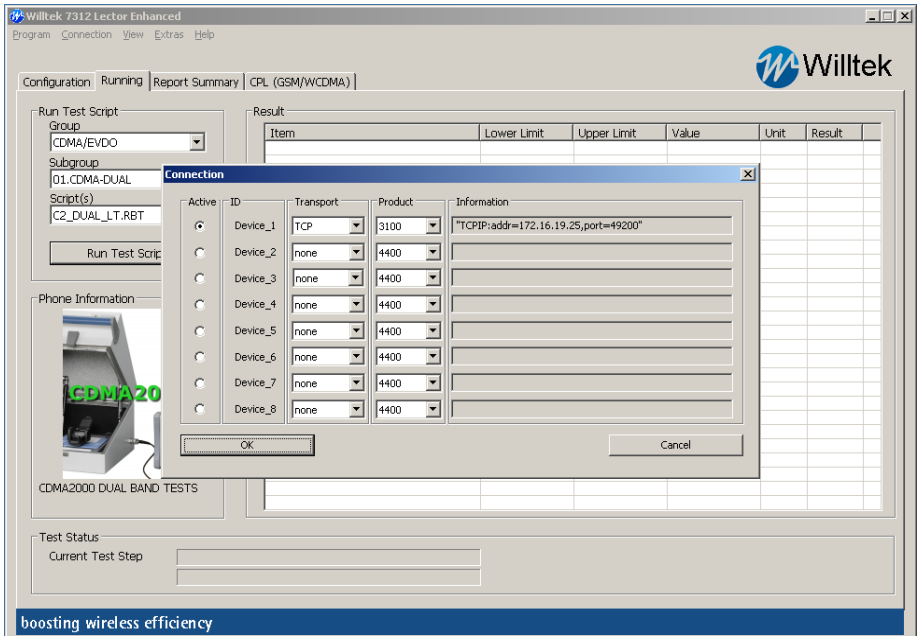
Lector and Scriptor can be set up to communicate with several different instruments over different connections. Only one instrument, however, can be used at any time while Lector is running.

The connections need to be defined and the active instrument must be selected as follows:

1 In Lector and Scriptor, select **Connection > Define Interface**.
The Connection box appears.

2 In the first column, select the instrument (device) to be used with Lector and Scriptor for the next test. If no device has been defined as yet, select the first one and fill out the device information according to the table below.

3 Confirm your changes by selecting **OK**.
The PC will try to set up a connection with the tester and inform you if the attempt was successful.



Each device can be defined as follows by selecting the appropriate entries:

Table 3 Transport input fields in the Connection menu

Transport type	Parameters	Remarks
USB/ RS-232	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/Xoff, RTS, None)	For RS-232 connections, use the physical COM port number. The physical USB port is rerouted to a logical RS-232 port number. Once a 3100 or 4400 is connected to the PC via USB, the port number is automatically assigned and can be looked up in the Windows environment at **Start > Control Panel > System > Hardware > Device Manager > Ports**. It should then be copied to the COM port input field. Default values: COM1, 115200 bit/s, None.
TCP/IP	IP Address Port	The IP address must be selected in line with the local area network policies. This must be the same address as selected on the 3100 or 4400. Each address must exist only once within the network. See "Finding the TCP/IP address" on page 14. The port number indicates the logical port for the software. Default port is 49200.

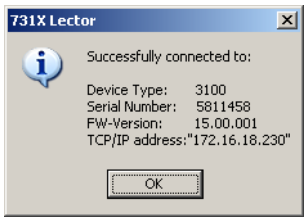
Table 3 Transport input fields in the Connection menu

Transport type	Parameters	Remarks
GPIB	GPIB Address (range 1 – 31)	This should be identical with the GPIB address of the instrument. Default: 4.

Testing the connection setup

When you are not sure if a connection to a tester is still operational, you can check the connection (including the setup parameters) by selecting **Connection > Check Connection**.

The PC will try to establish a connection to the instrument marked as Active in the **Connection > Define Interface** menu. If successful, a box pops up showing the instrument type found, together with its serial number, firmware version number and address (see below).



Finding the TCP/IP address

If you want to use the LAN (TCP/IP) connection to control the instrument, you need to find out the IP address first. If the network uses DHCP (Dynamic Host Configuration Protocol), the address is dynamically assigned by an address server and may change after the instrument is rebooted.

The current IP address can be found out in several ways:

- With Lector and Scriptor, set up an RS-232 or USB connection. Check the connection as described in "Testing the connection setup" on page 14. If the connection is established, the pop-up box confirming the connection will also show the current IP address along with the instrument type, serial number and software version number.
- In the 4400, you will find the IP address in the **TOOLS** > **Config** > **I/O** menu.
- You can also use the 7201 Update Utility to check the IP address. See separate manual for the utility.
- In the 2201 ProLock, you will find the IP address in the start menu and in the **Config** menu.

Updating or upgrading software licenses

The Lector and Scriptor family of wireless automation programs includes the 7312 Lector Enhanced, 7315 Scriptor and the 7360 Coupling Factor Update License. These are dongle-protected. If you are updating the Coupling Factor Update License or upgrading to 7315 Scriptor and already have a dongle, this can easily be done without shipping a new dongle or even returning the old dongle. You will simply be asked to send your current license code in a file, and receive a new one.

Creating a license data file

When you are asked to send the license data file, proceed as follows:

1 Connect the Willtek dongle to the PC.

2 Start Lector or Scriptor.

3 Klick on **Extras > License > Export**.
The C2V Export menu pops up.

4 Select a path (folder) where the file should be stored locally.

5 Click **Export**.
A new file with file name extension C2V is created in that folder.

6 Send an e-mail to the address that you received and attach the C2V file.
You will receive a new license data file from Willtek.

Updating the dongle with the new license

When you receive an e-mail with the new license file, you can update the Willtek dongle as follows.

1 Store the license file from the e-mail in a folder on the local hard disk.
The file should have the file name extension C2V.

2 Connect the Willtek dongle to the PC.

3 Start Lector or Scriptor.

4 Klick on **Extras > License > Import**.
The V2C Import menu pops up.

5 Select the path (folder) where the received V2C file is stored locally.

6 Click **Import**.
The file is read and the information in the dongle is overwritten with the new license information. When finished you can close Lector or Scriptor, open it again and use the license.

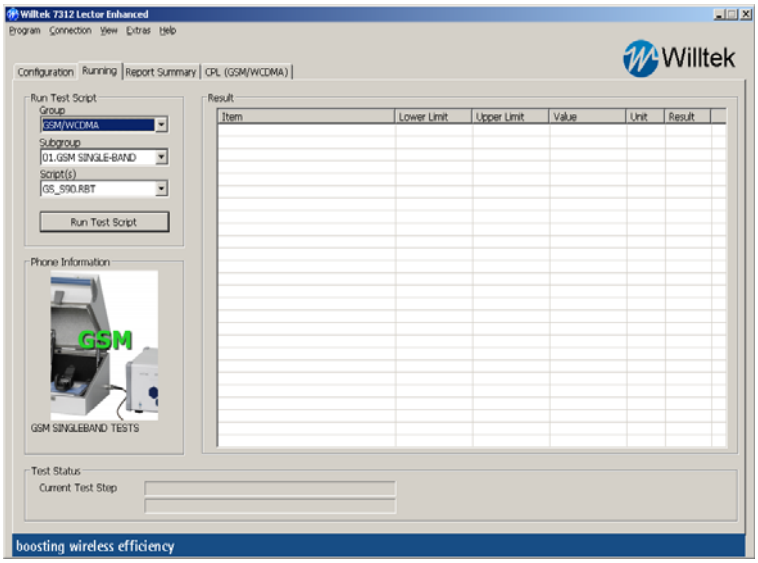
Running a Test

3

This chapter describes how to run a predefined test. These topics are covered in the following chapters:

Starting Lector

Lector can be started by selecting 731X Lector-Scriptor from the **Start > Programs > Willtek > 731X Lector-Scriptor** menu. Alternatively, double-click the **731X Lector-Scriptor** icon on the Windows desktop if installed. As a result, the Lector program window appears.



Getting started

This section describes the basic user interface elements that can be found in all three versions of the Lector and Scriptor family of automation software.

The main elements of the Lector and Scriptor program window include

- the horizontal menu bar at the top to open pull-down menus
- a number of tabs (four in Lector Basic, more in the other program versions) for different menus

Menu bar

The menu bar at the top of the program window allows you to stop a running test, to lock the configuration against changes, to set up the printer and to configure and test the connection to an instrument.

To select one of these menu entries

- either klick on the respective entry in the menu, then klick on the appropriate entry in the pull-down menu that opened upon the first klick,
- or key in **Alt**, then the underscored letter for the menu to select, then use the cursor keys to move the highlight bar in the pull-down menu to the desired entry, and press **RETURN**.

Tabs

There are least four horizontally aligned tabs (Configuration, Running, Report Summary, Calculate CPL) in the program window. A click on one of the tabs changes the display and buttons in the area below (input/output section). See the next sections for details on how to use the different tabs.

Selecting a test

There is a large variety of different types of phones for different cellular standards (such as GSM, WCDMA, CDMA etc) and for different frequency bands on the market. Before measurements can be started, a test must be selected.

To ease the selection, the tests are grouped into different categories. Each Group can have one or more Subgroups, which in turn consist of individual Test Scripts.

While the number of tests can easily be extended with Scriptor, there are already several default groups and test scripts available with Lector and Scriptor (if the respective mode is enabled under **Program > Phones Config > Activate...**). These tests are (subject to change and amendment):

Table 4 Default test scripts delivered with Lector and Scriptor

Group	Subgroup	Test Script
CDMA/EVDO	01.CDMA-Dual	C2_DUAL_ST.RBT
		C2_DUAL_LT.RBT
	02.CDMA-US800	C2_US800_ST.RBT
		C2_US800_LT.RBT
	03.CDMA-USPCS	C2_USPCS_ST.RBT
		C2_USPCS_LT.RBT
	04.CDMA-KOREAN	C2_KPCS_ST.RBT
		C2_KPCS_LT.RBT
	05.CDMA-NMT450	C2_450_ST.RBT
		C2_450_LT.RBT
	06.EVDO+CDMA	EVC2_US800_ST.RBT
		EVC2_US800_LT.RBT
		EVC2_USPCS_ST.RBT
		EVC2_USPCS_LT.RBT
		EVC2_DUAL_ST.RBT
		EVC2_DUAL_LT.RBT
		EVC2_KPCS_ST.RBT

Table 4 Default test scripts delivered with Lector and Scriptor (Continued)

Group	Subgroup	Test Script
		EVC2_KPCS_LT.RBT
		EVC2_450_ST.RBT
		EVC2_450_LT.RBT
	07.EVDO-ONLY	EV_US800_ST.RBT
		EV_US800_LT.RBT
		EV_USPCS_ST.RBT
		EV_USPCS_LT.RBT
		EV_KPCS_ST.RBT
		EV_KPCS_LT.RBT
		EV_450_ST.RBT
		EV_450_LT.RBT
		EV_DUAL_ST.RBT
		EV_DUAL_LT.RBT
	08.MEID2TEST	MEID2TEST.X2T
GSM/WCDMA	01.GSM SINGLE-BAND	GS_S90.RBT
		GS_S18.RBT
		GS_S19.RBT
		GS_S85.RBT
	02.GSM DUAL-BAND	GS_D9018.RBT
		GS_D8519.RBT
	03.GSM TRI-BAND	GS_T901819.RBT
		GS_T851918.RBT
	04.GSM QUAD-BAND	GS_Q.RBT
	05.WCDMA	WC_ST.RBT
		WC_LT.RBT
		WC2_ST.RBT
		WC2_LT.RBT
		WC5_ST.RBT
		WC5_LT.RBT
		WC25_ST.RBT
		WC25_LT.RBT
		WC125_ST.RBT
		WC125_LT.RBT
	06.WCDMA;HSDPA	WH_ST.RBT
	07.WCDMA;GSM	WG_D9018_ST.RBT

Table 4 Default test scripts delivered with Lector and Scriptor (Continued)

Group	Subgroup	Test Script
		WG_D9018_LT.RBT
		WG_T901819_ST.RBT
		WG_T901819_ST.RBT
		W25G_D8519_ST.RBT
		W25G_D8519_LT.RBT
		W125G_Q_ST.RBT
		W125G_Q_LT.RBT
	08.WCDMA;GSM;EDGE	WGE_D9018_ST.RBT
		WGE_D9018_LT.RBT
		W25GE_D8519_ST.RBT
		W25GE_D8519_LT.RBT
		W125GE_Q_ST.RBT
		W125GE_Q_LT.RBT
	09.WCDMA;GSM;HSDPA	WGH_D9018_ST.RBT
	10.GSM;EDGE	GE_D9018.RBT
		GE_D8519.RBT
		GE_T901819.RBT
	11.GPRS	GP_S90.RBT
		GP_S18.RBT
		GP_S85.RBT
		GP_S19.RBT
		GP_D9018.RBT
		GP_D8519.RBT
	12.TAC2TEST	TAC2TEST.X2T
TETRA	EXAMPLE	TETRA_TTM_BER.RBT
		TETRA_TMO_4.RBT

Abbreviations used:

- C2: CDMA2000 standard
- EV: 1xEV-DO standard
- GS: GSM standard
- GP: GSM standard including GPRS
- GE: GSM standard including EGPRS
- H: HSDPA extension of WCDMA standard
- WC: WCDMA standard (UMTS FDD)
- WG: WCDMA standard and GSM standard

- WGE: WCDMA standard and GSM standard including EGPRS
- TTM: TETRA Test Mode
- TMO: Trunked Mode Operation
- US800: US-800 frequency band used in North America
- USPCS: US-PCS frequency band used in North America
- DUAL: dual-band (US-800 and US-PCS)
- 450: NMT-450 frequency band
- KPCS: Korean PCS frequency band
- S: single frequency band
- D: dual frequency band
- T: triple frequency band
- Q: quadruple frequency band
- 18: 1800 MHz frequency band
- 19: 1900 MHz frequency band (North America)
- 85: 850 MHz frequency band (North America)
- 90: 900 MHz frequency band
- ST: Short test (one channel per band)
- LT: Long test (three channels per band, additional tests)

Note

TAC2TEST is a special case where the type of test is determined by the TAC (Type Approval Code) that is part of the mobile phone's serial number. Please refer to Chapter 9 "X2TEST Editor".

Willtek may offer updates and additional test scripts and configuration files available on its website www.willtek.com in the Lector and Scriptor Downloads section.

Carrying out a test

Starting and stopping a test

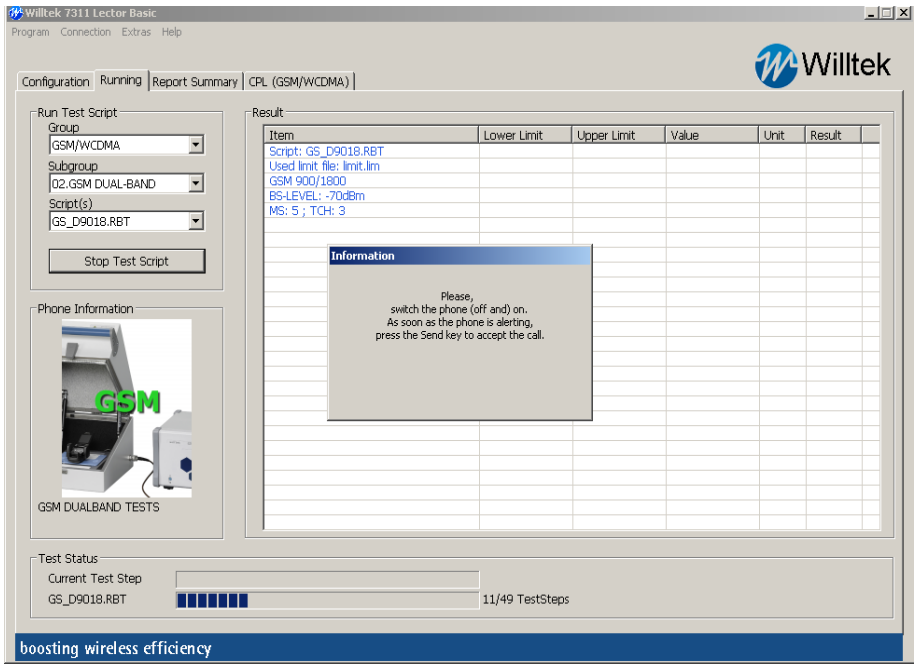
To run a test, proceed as follows:

1 Select a test script in the Running input/output section, as described in "Selecting a test" on page 19.

2 In the Running input/output section, move the mouse pointer over the Run Test Script button.
The connection type currently selected is displayed. Check the details and, if necessary, change them under **Connection > Change Interface**.

3 Click on **Run Test Script**.
The test will start, the instrument will set up a connection with the mobile phone and take various measurements. Lector and Scriptor will

keep you informed about the progress (see example below). During the test, you may be asked to switch on the phone or to speak into the microphone and check the audio receiver.



4 To stop a test, click on the **Stop Test Script** button on the Running tab.

At the end of the test, the software will show an overview of the results, together with a Pass or Fail statement. Depending on the selections made in the General configuration group in the Configuration tab menu (see sections "Save Test Result" on page 37 and "Print Test Result" on page 37), the results can be printed and/or stored on a media device.

Messages and queries during the test

During the test you may be asked to switch on the phone, answer a call and many other things. The following subsections highlight a few messages and queries that are not so obvious.

Assign TAC to an existing mobile phone

This message appears as part of a dialog box when the type of mobile phone under test cannot be found. This may happen either with a phone that is not included in the database of mobile phones at all, or with a phone that has multiple TACs (Type Approval Code, part of the serial number (IMEI) in GSM and WCDMA phones) but not all of them are in the database yet.

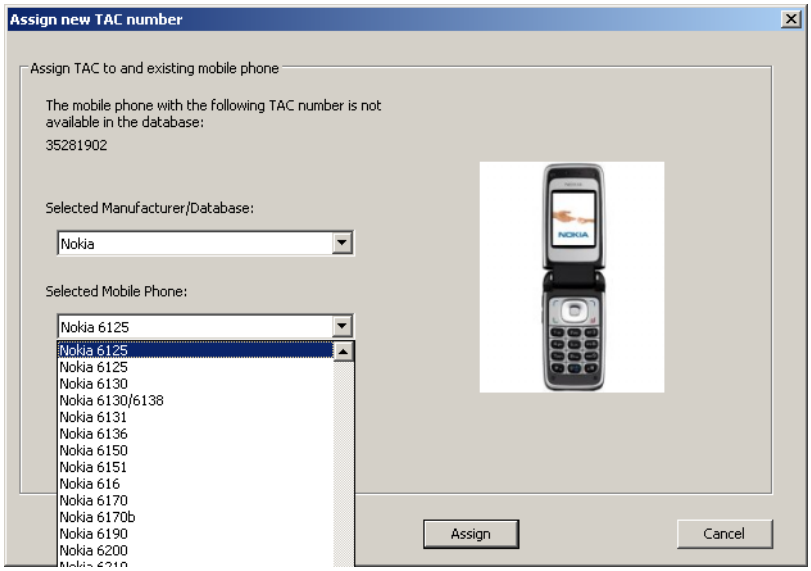
If the phone model is not yet stored in the database, click on **Cancel**.
An error message will be stored in the results log file because there are no coupling factors available for proper measurements.

If the phone model is stored in the database:

1 Select the manufacturer or database from the Selected Manufacturer/ Database selection field.

2 Select the mobile phone model from the Select Mobile Phone selection field. As you scroll through the list of phones, the respective phone will be displayed in the dialog box, making it easier to choose the right one.

3 Click on **Assign**.
A warning will be stored in the results log file because the assignment of the mobile phone may potentially be wrong.
The TAC and the associated mobile phone model name will be stored in file USERTAC.DAT, and can be deleted from that file again if necessary.



IMEI Comparison Failed

This message appears as part of a dialog box when the IMEI reported by the phone and the one entered by the user do not match (particularly in TAC2TEST).

Click on **Stop Test** if you are unsure why the IMEI is not correct or if you suppose that the IMEI has been entered incorrectly.
The test will be stopped.

Click on **Continue Test** if you want to proceed with testing anyway.
The test will be continued, but the test will be considered as failed.

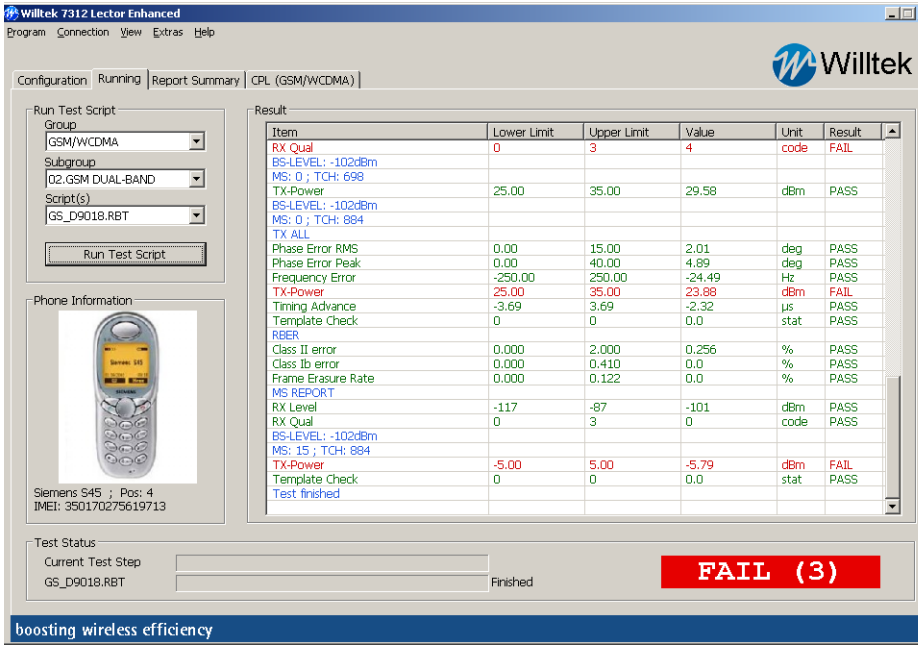
Click on **Swap Phone** if you changed the IMEI on purpose.
The test will be continued, and the results log will indicate that the IMEI has been changed, i.e. a SWAP will be stored instead of PASS or FAIL.

Note

The IMEI comparison (and consequent error messages) can be switched off in the Configuration tab, see section "IMEI Comparison" on page 36.

Reading and interpreting test results

Once a test has been started, the Result output section of the Running tab provides information about the progress, see picture below.



In the tabular results output, text in blue color indicates instrument parameters which are being set up by the software.
Text in green or red color shows test parameters, their limits and the actual test result. The test result translates into a test verdict which is indicated at the right-hand side. A passed test is shown in green while a failed test test is indicated in red.

The progress is also shown in the Test Status area of the Running tab. A large PASS or FAIL shows all the tests in the Test Script have been passed or not.

Viewing the test report summary

The software can also display a summary of all the tests performed since Lector or Scriptor has been started. (Note that this results summary may be lost when you close Lector or Scriptor, unless you store the table in a file.)

Click on the **Report Summary** tab to see a list of previously tested mobile phones with test script name, serial number of the phone and verdict.

You can view the summary sorted by e.g. date, serial number or test script: Just click on the respective header in the table and the result summaries will be sorted alphanumerically.

Double-click on a line to open the detailed test report. This requires that the test report was stored previously. A test report can be stored by setting parameter Save to "Always" in the **Configuration > General** menu.

You can add a comment that is displayed at the right-hand side of the line by double-clicking into this field. This comment field can be useful to explain aborted or failed tests.

In addition to a simple Pass or Fail verdict, the report summary also displays a failure code indicating the part of the test which failed. The failure code is composed of two parts as detailed in "Display of Failure Codes" on page 38.

The summary can be printed or saved to a file using the appropriate buttons on the Report Summary tab. The report summary can be saved on disk in either pure text format or in CSV format (comma-separated values). The latter can easily be imported into a spreadsheet (e.g. Microsoft Excel) for further processing.

If Lector or Scriptor is closed and restarted on the same day, the previous results of tests from the same day will appear in the summary if the Report Summary Storage parameter on the Configuration tab is set to Date(DD.MM.YYYY).csv. See "Report Summary Storage" on page 33 for more information.

Troubleshooting

If you experience problems with Lector, please refer to one of the Technical Assistance Centers (TAC) (see page xi).

If you call the TAC, please keep the following information at hand:

- Problem description
- Log file log.txt from the program installation folder, including the type and serial number of instrument and the version number of Lector or Scriptor. Lector logs the SCPI commands executed during the last application run into file log.txt. The log file can be loaded to a file viewer from within Lector or Scriptor by clicking **Help > Troubleshooting > Show Logfile**.
- Installed options on the tester
- Script file
- Result file

Alternatively, if you request help from customer support by e-mail, you can generate a ZIP file with useful information that can be sent along with the problem description by clicking **Help > Troubleshooting > Collect Data**.

Configuring The Test Environment

4

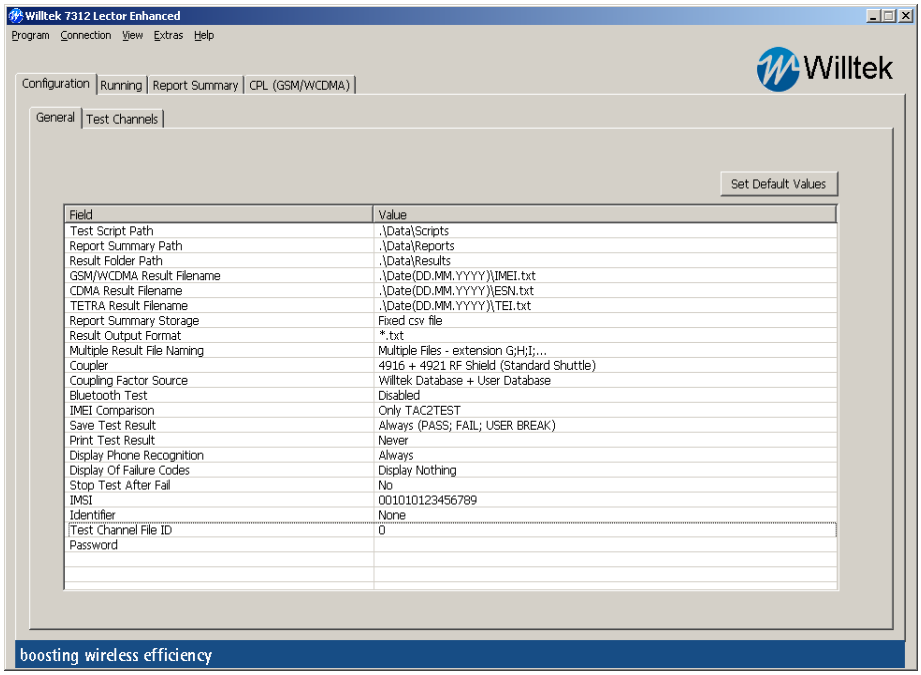
This chapter describes how Lector and Scriptor can be configured to optimally fit the test needs. Topics discussed in this chapter are as follows:

Introduction

This chapter explains how Lector and Scriptor can be set up from the Configuration tab. The various parameters are grouped into general parameters and into parameters for the different frequency bands for GSM, WCDMA and CDMA including 1xEV-DO.

General settings

This section explains the parameters that can be set up in the General configuration group of the Configuration tab.



Field	Value
Test Script Path	.\Data\Scripts
Report Summary Path	.\Data\Reports
Result Folder Path	.\Data\Results
GSM/WCDMA Result Filename	.\Date(DD.MM.YYYY)\IMEI.txt
CDMA Result Filename	.\Date(DD.MM.YYYY)\ESN.txt
TETRA Result Filename	.\Date(DD.MM.YYYY)\TEI.txt
Report Summary Storage	Fixed csv file
Result Output Format	*.txt
Multiple Result File Naming	Multiple Files - extension G;H;I;...
Coupler	4916 + 4921 RF Shield (Standard Shuttle)
Coupling Factor Source	Willtek Database + User Database
Bluetooth Test	Disabled
IMEI Comparison	Only TAC2TEST
Save Test Result	Always (PASS; FAIL; USER BREAK)
Print Test Result	Never
Display Phone Recognition	Always
Display Of Failure Codes	Display Nothing
Stop Test After Fail	No
IMSI	001010123456789
Identifier	None
Test Channel File ID	0
Password	

Note on folders

Some of the parameters are folder names. In the default configuration, all folders are located in the installation directory (e.g. C:\Program files\Willtek\731X Lector-Scriptor\ or one of its subdirectories.

Note on protected parameters

If the parameters are greyed out and cannot be changed, they are password-protected. See section Password below to learn how to make password-protected parameters accessible again.

Test Script Path

This parameter determines the folder where Lector and Scriptor will be looking for test scripts. New tests should be stored in this folder.

Double-click on the Test Script Path line to change the folder name.
A new window pops up, and you can browse through the drives and folders to select another folder. Click on **OK** to accept the change, or **Cancel** to retain the old setting.

Note on folders

Instead of using the drive and folder defined in the respective parameter (such as Test Script Path), you can also store files in different locations. Lector and Scriptor remember directories below the one set in the folder parameter relative to that, while other directories are stored with their absolute location (drive and folder).

Report Summary Path

This parameter determines the folder where Lector and Scriptor will save test report summaries. These are stored on user's request on the Report Summary tab or even automatically. The file format of the report summary can be defined with the "Report Summary Storage" parameter.

Double-click on the Test Report Path line to change the folder name.
A new window pops up, and you can browse through the drives and folders to select another folder. Click on **OK** to accept the change, or **Cancel** to retain the old setting.

Result Folder Path

This parameter determines the folder where Lector and Scriptor will save detailed test results as they appear in the Running tab. The results may either be saved for each test, or under certain conditions, or never; see the Save parameter below.

Double-click on the Result Folder Path line to change the folder name.
A new window pops up, and you can browse through the drives and folders to select another folder. Click on **OK** to accept the change, or **Cancel** to retain the old setting.

GSM/WCDMA Result Filename

At the end of each test, the results may be stored in a file. This may lead to dozens of new files being stored on your harddisk every day. To keep some order in the result files, Lector and Scriptor save them in different subdirectories according to a selectable method.

The GSM/WCDMA Result Filename parameter determines the method to which the result files are stored; select a method in the scroll box as follows.

.\Date(DD.MM.YYYY)\IMEI.txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate folder for each day, e.g. a test performed on December 25, 2008 will be saved in directory 25.12.2008. The file name is determined by the phone's serial number IMEI (International Mobile Equipment Identity); if the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test.

Example: The results of the first test run are stored in a file named 350170275619713.txt. The results for the second run with the same phone are stored in 350170275619713A.txt.

.\Date(YYYY-MM-DD)\IMEI.txt

This selection has the same effect as in .\Date(DD.MM.YYYY)\IMEI.txt except that the year in the date of the folder name comes first. This sequence is easier to sort by date in the file manager (e.g. Windows Explorer).

.\IMEI.txt

Lector and Scriptor store the results in the folder determined with the Result Folder Path parameter. The file name is determined by the serial number of the mobile phone (the IMEI); if the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test.
Example: The results of the first test run are stored in a file named 350170275619713.txt. The results for the second run with the same phone are stored in 350170275619713A.txt.

.\TAC\SN.txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate folder for each phone model; the model is determined by the first digits of the serial number. The file name consists of the remaining digits of the serial number. If the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test.
Example: The results of the first test run are stored in a file named 350170\275619713.txt. The results for the second run with the same phone are stored in 350170\275619713A.txt.

.\(Manufacturer)\Date(DD.MM.YYYY)\IMEI.txt
.\(Manufacturer)\Date(YYYY-MM-DD)\IMEI.txt
.\(Manufacturer)\IMEI.txt
.\(Manufacturer)\TAC\SN.txt

With these methods, the date, IMEI or TAC folder becomes a subfolder to a folder with the name of the manufacturer or vendor of the respective mobile phone.
Example: Nokia\2009-01-31\350170275619713.txt.

.\(ScannedNumber).txt

At the end of the test, a pop-up box requests the serial number of the phone. The number can be entered manually or with the help of a barcode reader.
The results are written to a file in the results folder. The file name is identical with the scanned number.

CDMA Result Filename

At the end of each test, the results may be stored in a file. This may lead to dozens of new files being stored on your harddisk every day. To keep some order in the result files, Lector and Scriptor save them in different subdirectories according to the selected method.

The CDMA Result Filename parameter determines the method to which the result files are stored; select a method in the scroll box as follows.

.\Date(DD.MM.YYYY)\ESN(hex).txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate folder for each day, e.g. a test performed on December 25, 2008 will be saved in directory 25.12.2008. The file name is determined by the Electronic Serial Number (ESN) of the mobile phone; the ESN is given in hexadecimal value. If the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test.
Example: The results of the first test run are stored in a file named 657DC6DE.txt. The results for the second run with the same phone are stored in 657DC6DEA.txt.

.\Date(DD.MM.YYYY)\ESN.txt

This has the same effect as above, but the file name includes the ESN in decimal rather than hexadecimal format.
Example: The results of the first test run are stored in a file named 1018242910.txt. The results for the second run with the same phone are stored in 1018242910A.txt.

.\Date(YYYY-MM-DD)\ESN(hex).txt

This selection has the same effect as in .\Date(DD.MM.YYYY)\ESN(hex).txt except that the year in the date of the folder name comes first. This sequence is easier to sort by date in the file manager (e.g. Windows Explorer).

.\Date(YYYY-MM-DD)\ESN.txt

This has the same effect as in .\Date(YYYY-MM-DD)\ESN(hex).txt, but the file name includes the ESN in decimal rather than hexadecimal format.

.\ESN(hex).txt

Lector and Scriptor store the results in the folder determined with the Result Folder Path parameter. The file name is determined by the Electroni Serial Number (ESN) of the mobile phone; the ESN is given in hexadecimal value. If the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test.
Example: The results of the first test run are stored in a file named 657DC6DE.txt. The results for the second run with the same phone are stored in 657DC6DEA.txt.

.\ESN.txt

This has the same effect as in .\Date(YYYY-MM-DD)\ESN(hex).txt, but the file name includes the ESN in decimal rather than hexadecimal format. Example: The results of the first test run are stored in a file named 1018242910.txt. The results for the second run with the same phone are stored in 1018242910A.txt.

TETRA Result Filename

At the end of each test, the results may be stored in a file. This may lead to dozens of new files being stored on your harddisk every day. To keep some order in the result files, Lector and Scriptor save them in different subdirectories according to the selected method.

The TETRA Result Filename parameter determines the method to which the result files are stored; select a method in the scroll box as follows.

Note on TEI

Some types of TETRA radios do not support the mandatory protocol for requesting and transmitting the TETRA Equipment Identifier (TEI). Therefore, if the instrument could not determine the TEI but needs it for storing the test results, Lector will prompt for manual entry of the number. The TEI is printed on the back or under the battery of each TETRA radio, and can easily be entered with a barcode scanner.

.\Date(DD.MM.YYYY)\TEI.txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate folder for each day, e.g. a test performed on December 25, 2008 will be saved in directory 25.12.2008. The file name is determined by the serial number, i.e. the TETRA Equipment Identifier(TEI) of the mobile station; the TEI is given as a 15-digit hexadecimal value. If the same TETRA radio is tested multiple times, the serial number in the file name is amended by a new letter for each new test. Example: The results of the first test run are stored in a file named 1BF45C657DC6DE.txt. The results for the second run with the same radio are stored in 1BF45C657DC6DEA.txt.

.\Date(YYYY-MM-DD)\TEI.txt

This selection has the same effect as in .\Date(DD.MM.YYYY)\TEI.txt except that the year in the date of the folder name comes first. This sequence is easier to sort by date in the file manager (e.g. Windows Explorer).

.\Date(YYYY-MM-DD)\Time(HH-MM-SS).txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate folder for each day, e.g. a test performed on December 25, 2008 will be saved in directory 2008-12-25. The file name is determined by the time of day of the test, in the format hh-mm-ss.txt (hours – minutes – seconds).

.\TEI.txt

Lector and Scriptor store the results in the folder determined with the Result Folder Path parameter. The file name is determined by the TETRA Equipment Identifier (TEI) of the mobile station; the ESN is given as a 15-digit hexadecimal value. If the same phone is tested multiple times, the serial number in the file name is amended by a new letter for each new test. Example: The results of the first test run are stored in a file named 1BF45C657DC6DE.txt. The results for the second run with the same phone are stored in 1BF45C657DC6DEA.txt.

.\YYYYMMDD-HHMMSS.txt

In the folder determined with the Result Folder Path parameter, Lector and Scriptor store the results in a separate file for each test. The file name is determined by the day and time of test, in the format YYYYMMDD-HHMMSS.txt, i.e. year – month – day – hour – minute – second.

Report Summary Storage

This field determines the format and the file name in which the results summary is automatically stored. The folder where the results summary is stored, is determined by the "Report Summary Path" parameter (see above).

Date(DD.MM.YYYY).csv

With this selection, the fields of the results summary are separated by commas and stored in a file (CSV format, comma-separated values). This format can easily be imported into a spreadsheet program such as Microsoft Excel, and processed according to individual needs such as sorting by serial number or failure codes.

The file name consists of the current date. If you close Lector and Scriptor and open it again on the same day, the previous results from that day will be shown in the Report Summary section. New results will be appended to the file.

Date(DD.MM.YYYY).txt

The results summary is stored in a file in pure text format, containing the same information as shown on the screen.

Fixed csv file

With this selection, the fields of the results summary are separated by commas and stored in a file (CSV format, comma-separated values). This format can easily be imported into a spreadsheet program such as Microsoft Excel, and processed according to individual needs such as sorting by serial number or failure codes.

Fixed txt file

The results summary is stored in a file in pure text format, containing the same information as shown on the screen.

(Manufacturer) Date(DD.MM.YYYY).csv

With this selection, the fields of the results summary are separated by commas and stored in a file (CSV format, comma-separated values). This format can easily be imported into a spreadsheet program such as Microsoft Excel, and processed according to individual needs such as sorting by serial number or failure codes.
The file name is generated from the current date in the format year-month-date (YYYY-MM-DD). A separate summary file is created for each manufacturer and stored in the respective directory.
Example: Results summaries for Samsung phones tested on January 31, 2009 are stored in the folder Samsung\2009-01-31.csv.

(Manufacturer) Fixed csv file

The results summary is stored as for Fixed csv file, but separately for each manufacturer: For each manufacturer the results summary is stored in a folder named after the manufacturer.

Never

With this selection, the results summary is not automatically stored. You can, however, store it by clicking the **Save as...** button.

Result Output Format

Lector and Scriptor can write the results into a file in different formats: pure text, HTML and XML. The latter is easier to import and interpret by a spreadsheet or database program.

Select ''*.html'' for a file format that is easily viewn in a web browser.
Select ''*.html+*.xml'' for both the web browser-compatible format and the format for postprocessing by a spreadsheet program.
Select ''*.txt'' if you do not need HTML or XML formatting. Only the text file will be written.
Select ''*.txt+*.srw'' if you want to get the results in a format that is suitable for database applications. Please refer to one of Willtek's technical asssistance centers (see page xi) for more information on this format.
Otherwise, select ''*.txt+*.xml''. Both a text file and an XML file will be written into the results folder.

Multiple Result File Naming

This parameter tells Lector and Scriptor how to treat result files when the same phone has been tested before. This is particularly useful when files are not saved in date folders (see ''GSM/WCDMA Result Filename'' on page 29 and ''CDMA Result Filename'' on page 31).

Select ''Multiple files - extension A;B;C;...'' if you want to keep older results while saving new measurement results from the same phone. A letter is added in the file name to distinguish the files.

Select ''Single files only'' if you want Lector or Scriptor to overwrite the results from a previous test of the same phone.

Coupler

A double-click on this parameter opens a scroll box offering different options for the radio frequency (RF) connection being used for the tests.

Cable

Select this option if you connect your mobile phone with the test instrument using an RF cable. This option is useful if you have cables for the different types of phones available. The measurement accuracy is best with this method, and the effects of interference with other signals are rather low. The phone's antenna, however, is not included in the test. This method uses fixed coupling factors for the upper and lower band.

User Connection

Use this option if none of the other options (cable, or 4916, or 4916 with 4921) is applicable. You will need to define the coupling factors for the different types of mobile phones.

4916 Antenna Coupler (Standard Shuttle)

This option is useful because Willtek already delivers the coupling factors for many phone models for testing with the 4916 Antenna Coupler with the blue shuttle. In tests with the antenna coupler, the antenna is included in the test. The power accuracy, however, is comparatively low because the exact coupling depends on the environment. Also, there may be interference from other phones and the real network that affect the measurement, and the power transmitted by the phone during the test may interfere with the real network.

4916 Antenna Coupler (XY Shuttle)

This option is useful because Willtek already delivers the coupling factors for many phone models for testing with the 4916 Antenna Coupler with the green XY shuttle. In tests with the antenna coupler, the antenna is included in the test. The power accuracy, however, is comparatively low because the exact coupling depends on the environment. Also, there may be interference from other phones and the real network that affect the measurement, and the power transmitted by the phone during the test may interfere with the real network.

4916 Antenna Coupler and 4921 RF Shield (Standard Shuttle)

This option is the best compromise because interference is avoided through the 4921 RF Shield, the coupling factor can be determined quite exactly and the antenna of the mobile phone is included in the test. It assumes that the mobile phone is mounted on a 4916 with the blue shuttle inside the 4921 RF Shield.

4916 Antenna Coupler and 4921 RF Shield (XY Shuttle)

This option is the best compromise because interference is avoided through the 4921 RF Shield, the coupling factor can be determined quite exactly and the antenna of the mobile phone is included in the test. It assumes that the mobile phone is mounted on a 4916 with the green XY shuttle inside the 4921 RF Shield.

Coupling Factor Source

There are several ways how to define the coupling factors. Lector and Scriptor keep a database of different phone models with their individual coupling values in different frequency bands. User-defined coupling values are stored separately.

Select one of the following choices from the scroll list:

User Database

With this selection, Lector and Scriptor will look for the phone model and its coupling factors in the user-defined database only.

User Database + Willtek Database

When Lector and Scriptor identify the type of phone, they first look for phone-specific data in the user-defined database and if there are no data available there, they look them up in the Willtek-provided database.

Willtek Database

With this selection, Lector and Scriptor will look for the phone model and its coupling factors only in the database provided by Willtek.

Willtek Database + User Database

When Lector and Scriptor identify the type of phone, they first look for phone-specific data in the Willtek database and if there are no data available there, they look them up in the user database.

Bluetooth Test

Most of the Willtek-provided tests include a test sequence to check the Bluetooth device of the phone. This test requires the Bluetooth Connectivity Test Package to be installed in the instrument or in Lector or Scriptor. More on Bluetooth connectivity tests can be found in Appendix A. Also, the BLUETOOTH or the BLUETOOTH_DIRECT command must be implemented in the respective test script, depending on the instrument. See page 99 for the details.
In order to have the test script actually carry out the Bluetooth test, the Bluetooth Test parameter must be set to ''Enabled''; Lector and Scriptor will prompt a message to enable the Bluetooth feature in the phone before the Bluetooth test starts.
If you want Bluetooth tests to be performed without the message, select ''Enabled (without pop-up messages)''.
The test can easily be disabled again by setting the Bluetooth Test parameter to ''Disabled''.

IMEI Comparison

In GSM and WCDMA tests, Lector and Scriptor can compare the IMEI (serial number) transmitted in the signaling protocol with the IMEI entered manually or with a barcode reader. This feature helps to verify that the serial number programmed into the phone matches the one on the sticker. It is required that the IMEI_RDCMP command is implemented in the respective test script, see page 101.

Select ''Always'' if you want the IMEI comparison to be run as part of all the tests.

Select ''Never'' if you do not want the IMEI comparison to be carried out at all.

Select ''Only TAC2TEST'' if you want the IMEI comparison to be run as part of the TAC2TEST procedure only.

Save Test Result

This parameter determines the conditions under which the test results are stored in a file. Double-click on the present parameter value to open a pop-menu with a scroll list of supported values:
Select ''Always (PASS; FAIL; USER BREAK)'' if you want Lector or Scriptor to always save the test results automatically.
Select ''If Overall result is Fail'' if you want the results from only those tests to be saved that were not passed.
Select ''If Overall result is Pass'' if you want the results from only those tests to be saved that failed.
Select ''If Overall result is Pass or FAIL'' if you want the results from all tests to be saved, except when the test was interrupted by the user.
Select ''Never'' if you do not want any results to be saved.
Select ''On Request'' if you want to determine on a case-by-case basis if results should be stored or not. Lector or Scriptor will prompt after each test run.
See parameters Result Folder Path and FileNameFormat above about the way the results are stored.

Print Test Result

After a test, the detailed results can be printed either always, only if passed or failed, on request or never. Double-click on the Print parameter line to open a scroll box that allows you to change the setting:
Select ''Always (PASS; FAIL; USER BREAK)'' if you want Lector or Scriptor to always print the test results automatically.
Select ''If Overall result is Fail'' if you want the results from only those tests to be printed that were not passed.
Select ''If Overall result is Pass'' if you want the results from only those tests to be printed that failed.
Select ''If Overall result is Pass or FAIL'' if you want the results from all tests to be printed, except when the test was interrupted by the user.
Select ''Never'' if you do not want any results to be printed.
Select ''On Request'' if you want to determine on a case-by-case basis if results should be printed or not. Lector or Scriptor will prompt after each test run.
See parameters Result Folder Path and FileNameFormat above about the way the results are stored.

Display Phone Recognition

Normally, when a test is run and Lector and Scriptor identify a phone model, it is useful to have a message indicating which model has been found and how to set up the antenna coupler. Select ''Always'' if you want associated pop-up boxes to be displayed.

If you testing phones of the same model over and over again, you may want the pop-up boxes to be omitted. Select ''Once'' if you only want the box to be displayed at the first time. Select ''Never'' if you do not want the messages to be displayed at all.

Display of Failure Codes

Lector and Scriptor automatically generate a short failure code when a mobile has failed the test. This failure code is shown in the Report Summary menu and can also be shown and stored with the test results, depending on how this parameter field is set up.

The failure codes can be analyzed to determine a particular trend in the mobile phones, e.g. when there are many phones of the same type that fail the transmitter or receiver tests. Repetitive occurance of the same failure code over all the phones may also indicate a problem with the test setup, e.g. with the cabling.

Display options

You can select from the following options in the list.

Add To Result

With this selection, the Running menu will include the failure codes at the end of the test.

Display Info Box After Test

After completion of the test, a pop-up box will show the failure codes if applicable.

Add to Result And Display Info Box

Both of the above options are enabled with this selection.

Display Nothing

At the end of the test, the failure codes are not displayed automatically. They are, however, included in the report summary. This selection is the default.

Failure codes

The failure codes consists of two parts: The first part determines the type of test step that failed, and the second part details the technology and frequency band. More than one failure code may occur in a test.

The failure codes are composed as follows:

Table 5 Failure codes in the results summary

Type of test step that failed	Technology and band information
0 – Pass 1 – Call dropped 2 – Call not answered 3 – Keyboard error 4 – User break 9 – Other	0 – General error
0 – No answer 7 – Device not ready 9 – Other	1 – Bluetooth
0 – TX failure 1 – RX failure 2 – BER failure 3 – Audio failure 4 – GPRS failure 5 – E-GPRS failure 8 – Handover failure 9 – Other	2 – GSM 850 3 – GSM 900 4 – GSM 1800 5 – GSM 1900
0 – TX failure 1 – RX failure 2 – BER/BLER failure 3 – Audio failure 4 – TX failure in HSDPA mode 5 – RX failure in HSDPA mode 6 – BER/BLER failure in HSDPA mode 8 – Handover failure 9 – Other	6 – WCDMA Band 1 7 – WCDMA Band 2 8 – WCDMA Band 3 9 – WCDMA Band 4 10 – WCDMA Band 5 11 – WCDMA Band 6 12 – WCDMA Band 7 13 – WCDMA Band 8 14 – WCDMA Band 9 15 – WCDMA Band 10
0 – TX failure 1 – RX failure 2 – BER failure 3 – Audio failure 5 – EVDO failure 8 – Handover failure 9 – Other failure	16 – CDMA US800 17 – CDMA US-PCS 18 – CDMA NMT-450 19 – CDMA KPCS 21 – CDMA AWS
0 – TX failure 8 – Handover failure 9 – Other	20 – AMPS

Table 5 Failure codes in the results summary (Continued)

Type of test step that failed	Technology and band information
0 – TX failure	21 – TETRA 300 MHz
1 – RX failure	22 – TETRA 400 MHz
2 – BER or Paging Sensitivity Test failure	23 – TETRA 800 MHz
8 – Handover failure	24 – TETRA 900 MHz
9 – Other failure	

Example: Failure code `1-6` means that Lector or Scriptor found a problem with a receiver test in WCDMA (Band 1), probably with the MS report. (Typical RX failures include problems with RX_LEVEL, RX_QUAL, RSCP.)

Stop Test After Fail

When a measurement result exceeds the test limits, Lector or Scriptor can either continue with the test, e.g. to determine all the problems that occur. Or the test may be halted to save time. The Stop Test After Fail parameter lets you select which way you want the software to proceed after a problem occurred. The selection field lets you choose between No (the test will be continued until the end) or After 1st Fail (the test is halted immediately).

IMSI

This parameter is applicable for GSM, GPRS, EDGE and WCDMA phones.
The International Mobile Subscriber Identity (IMSI) is the individual identity number of the subscriber in the GSM or UMTS network. The mobile reads the IMSI from the SIM card. This parameter is used when calls from the tester are established without prior registration, i.e. when the instrument does not otherwise know the IMSI of the phone under test. The default IMSI is 001-01-0123456789; this is the IMSI on Willtek's test SIM.

Identifier

This parameter is used to help identify individual Lector or Scriptor windows when running multiple instances of Lector or Scriptor. The instances are identified by individual numbers from 1 to 4. See "Running multiple instances of Lector or Scriptor" on page 56 for more information.

Test Channel File ID

This parameter can be used for frequency planning, where several test stations in a service center are centrally managed.
In service centers where Lector configuration files and software updates are automatically distributed from a central server, all test stations use the same configuration files to ensure proper testing under defined conditions. The only wanted deviation may be the set of frequencies used for testing because test stations may interfere with each other. To ensure that each test station uses its own set of channels, enumerated channel files are distributed and each test station is allocated a channel file number. The Test Channel File ID set up in this parameter field must correspond to a channel file with the same number at the end of the file name.
Example: The test script refers to a channel file as follows:

`TEST_CHANNEL, ManufacturerXYZ_Channels.tcf`
The server distributes files such as ManufacturerXYZ_Channels_1.tcf, ManufacturerXYZ_Channels_2.tcf etc. The test station with the Test Channel File ID set to 3 loads the channel list from ManufacturerXYZ_Channels_3.tcf.
If Test Channel File ID is set to 0, the ID will be ignored.
See "Frequency band settings" on page 42 for more information about how to set up test channel files for the various wireless standards and frequency bands.

Password

Administrators can protect the configuration data and coupling data from unauthorized modification by operators. If protected by a password, the configuration or coupling data can be modified only if the password is entered.

Locking the configuration data

To protect the configuration data from modifications, double-click on Password.
Lector and Scriptor prompt for a password. A password of arbitrary length can be set. The password must consist of Latin characters and Arabic numerals only. For a new password you will be prompted to repeat the password.
The configuration data are protected against modification with the next start of Lector or Scriptor, or if you select **Program > Configuration locked**.

Notes

Choose a password that cannot easily be guessed by colleagues.

Note down the password and store it in a place that is not accessible to others because if you forget the password, you will not be able to modify the configuration via Lector anymore.

Unlocking the configuration data

To unlock the test Configuration section, select **Program > Configuration locked**. You will have to enter the password once more.

In order to undo the password protection, leave the Password entry field empty.

Locking the "CPL (GSM/WCDMA)" tab

You can also protect the CPL (GSM/WCDMA) tab to protect the coupling data from modifications. The input/output section will not be accessible anymore if the password protection is enabled (see section"Locking the configuration data" above).

Select **Program > CPL tab locked**.
The input/output section of the CPL (GSM/WCDMA) tab will not appear if you click on that tab.

Unlocking the "CPL (GSM/WCDMA)" tab

To unlock the input/output section of the CPL (GSM/WCDMA) tab, select **Program > CPL tab locked**. If a password is enabled, Lector or Scriptor will prompt for the password.

Frequency band settings

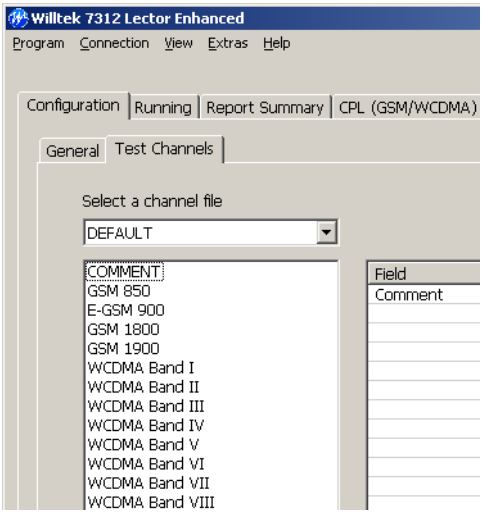
The system and frequency dependent setup menus allow you to configure the frequency channels on which the measurements shall be performed. Tests are typically performed on three channel pairs: at the band edges and in the middle of the band.

Today's phones support more than one frequency band. Lector and Scriptor allow you to define frequencies for testing in each band.

Select **Configuration > Test Channels** to change the system and frequency-dependent parameters.

Note

The GSM frequency bands also apply to GPRS and EDGE (EGPRS) tests.



Test channel configurations

Multiple test channel configurations can be defined, saved and loaded. The default folder for test channel configuration files is Data\Channels in the installation folder of Lector and Scriptor.

In order to load a configuration file, use the selection field "**Select a channel file**".

After making changes to the channel configuration, click on **Save As** to store the configuration changes (only available in 7315 Scriptor). Select a new name to save the channel definition in a separate file, or use the previous name to overwrite the previous settings.

Comment

This parameter field can be used to enter text that is stored with the phone configurations while they are exported (**Program > Phones Config >Export**). You can even fill more than one line in the Value column. The comment appears on screen when the phone configurations are imported.

GSM settings

There are three subtypes for the GSM 900 band. The E-GSM 900 band is the most popular one and is supported by most GSM phones. If a mobile phone does not support the E-GSM frequencies, select a channel numbers from the P-GSM band (see Table 6).

A frequency for the BCCH (Broadcast Control Channel or base channel) must be defined separately for each band because the mobile phone will drop a test call if the BCCH is not present. The BCCH may be located on one of the other test frequencies in the same band.

Table 6 GSM frequency bands

Frequency band	Channel numbers	Uplink frequencies	Downlink frequencies
GSM 850	128—251	824—849 MHz	869—894 MHz
P-GSM 900	1—124	890—915 MHz	935—960 MHz
E-GSM 900	975—1023, 0—124	880—915 MHz	925—960 MHz
R-GSM 900	955—1023, 0—124	876—915 MHz	921—960 MHz
GSM 1800	512—885	1710—1785 MHz	1805—1880 MHz
GSM 1900	512—810	1850—1910 MHz	1930—1990 MHz

WCDMA settings

The WCDMA setup menus allow you to configure the frequency channels on which the measurements shall be performed. Tests are typically performed on three channel pairs: at the band edges and in the middle of the band.

WCDMA uses different channel numbers for the uplink (mobile transmit) and downlink (base station transmit) directions; see Table 7. There are different frequency bands in use with their respective channel numbers.

Table 7 WCDMA frequency bands

Frequency band	Uplink channels	Downlink channels	Region or designation
Band I	9612—9888 (1920—1980 MHz)	10562—10838 (2110—2170 MHz)	Europe, China, Japan, Korea

Table 7 WCDMA frequency bands (Continued)

Frequency band	Uplink channels	Downlink channels	Region or designation
Band II	9262—9538, 12, 37, 62, 87, 112, 137, 162, 187, 212, 237, 262, 287 (1850—1910 MHz)	9662—9938, 412, 437, 462, 487, 512, 537, 562, 587, 612, 637, 662, 687 (1930—1990 MHz)	North America (PCS band)
Band III	937—1288 (1710—1785 MHz)	1162—1513 (1805—1880 MHz)	Europe/Asia (GSM 1800 band)
Band IV	1312—1513, 1662, 1687, 1712, 1737, 1762, 1787, 1812, 1837, 1862 (1710—1775 MHz)	1537—1738, 1887, 1912, 1937, 1962, 1987, 2037, 2062, 2087 (2110—2155 MHz)	North America
Band V	4132—4233, 782, 787, 807, 812, 837, 862 (824—849 MHz)	4357—4458, 1007, 1012, 1032, 1037, 1062, 1087 (869—894 MHz)	North America (US cellular band)
Band VI	4162—4188, 812, 837 (830—840 MHz)	4387—4413, 1037, 1062 (875—885 MHz)	Japan
Band VII	2012—2338, 2362, 2387, 2412, 2437, 2462, 2487, 2512, 2537, 2562, 2587, 2612, 2637, 2662, 2687 (2500—2570 MHz)	2237—2563, 2587, 2612, 2637, 2662, 2687, 2712, 2737, 2762, 2787, 2812, 2837, 2862, 2887, 2912 (2620—2690 MHz)	UMTS 2600 (not supported by 3100 and 4400 series)
Band VIII	2712—2863 (880—915 MHz)	2937—3088 (925—960 MHz)	Europe, Asia (E-GSM band)
Band IX	8762—8912 (1749.9—1784.9 MHz)	9237—9387 (1844.9—1879.9 MHz)	Japan

Table 7 WCDMA frequency bands (Continued)

Frequency band	Uplink channels	Downlink channels	Region or designation
Band X	2887—3163, 3187, 3212, 3237, 3262, 3287, 3312, 3337, 3362, 3387, 3412, 3437, 3462 (1710—1770 MHz)	3112—3388, 3412, 3437, 3462, 3487, 3512, 3537, 3562, 3587, 3612, 3637, 3662, 3687 (2110—2170 MHz)	

CDMA and 1xEV-DO settings

CDMA and 1xEV-DO use the same parameters, which depend on the frequency band. The parameters that can be affected are the channel numbers on which to test, and an additional coupling offset.

Configuring the channels to be used

CDMA and 1xEV-DO use the same channel numbering system. The channel numbers for the different frequency bands can be found in Table 8, while more details regarding the frequency numbering is available in Table 9.

Table 8 CDMA2000 frequency bands

Frequency band	Channel numbers	Uplink frequencies	Downlink frequencies
US-800	1–799, 991–1023	824–849 MHz	869–894 MHz
US-PCS	0–1199	1850–1910 MHz	1930–1990 MHz
Korean PCS	0–599	1750–1780 MHz	1840–1870 MHz
NMT 450	1–300, 539–871, 1039–1473, 1792–2016	411–484 MHz	421–494 MHz
AWS	0–899	1710–1755 MHz	2110–2155 MHz

Table 9 Channel arrangements

Band	Channel number	Center frequency, reverse link (in MHz)	Center frequency, forward link (in MHz)
US-800	1 to 799 991 to 1023	.03·n + 825 .03·(n-1023) + 825	.03·n + 870 .03·(n-1023) + 870
US-PCS	0 to 1199	.05·n + 1850	.05·n + 1930

Table 9 Channel arrangements (Continued)

Band	Channel number	Center frequency, reverse link (in MHz)	Center frequency, forward link (in MHz)
Korean PCS	0 to 599	.05·n + 1750	.05·n + 1840
NMT 450	1 to 300 539 to 871 1039 to 1473 1792 to 2016	.025·(n-1) + 450 .025·(n-512) + 411 .025·(n-1024) + 451 .025·(n-1792) + 479	.025·(n-1) + 460 .025·(n-512) + 421 .025·(n-1024) + 461 .025·(n-1792) + 489
AWS	0 to 899	.05·n + 1710	.05·n + 2110

TETRA settings

There are no general TETRA frequency bands with fixed test channels; models are normally built (optimized) to work on a customer-specific number of channels. Therefore, the test channels are typically entered in the Model Editor for each type of TETRA radio.

Coupling offset

This parameter can be used to adjust minor differences in the cable attenuation between different test systems. This way, the various test systems in a service center can use the same databases containing mobile phone configurations and coupling factors, but the coupling factors are finetuned locally.

By entering a non-zero value, the coupling factor automatically found can be increased by a static factor (for each band). This can be used, for example, to compensate an additional coupling loss caused by very long cables.

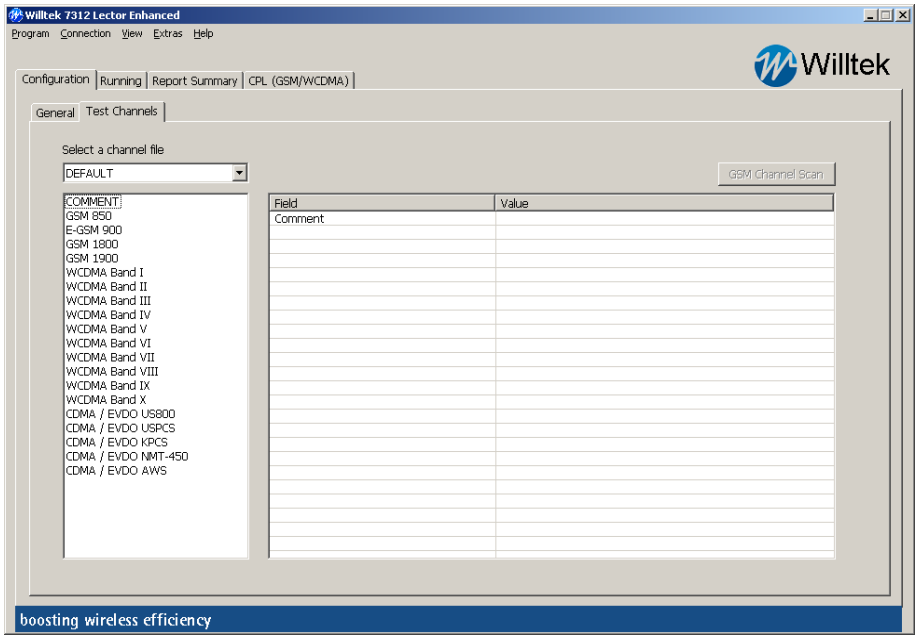
Finding appropriate GSM channels for testing

If you intend to test over the air using an antenna coupler and without appropriate shielding, make sure that the measurements are not affected by a neighboring test station or the signals from a real network!

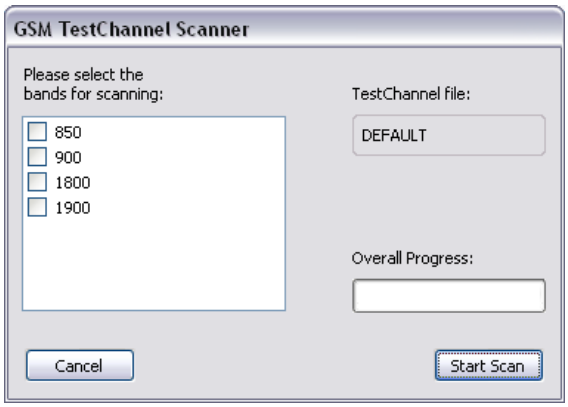
Lector and Scriptor can find occupied GSM channels for you, at least for nearby base stations transmitting permanently, if you are using a 4100 or 4200 series instrument:

1 Connect the 4100 or 4200 to the PC running Lector or Scriptor, and configure the interface (see Chapter 2 "Installation").

2 Click on the **Configuration** tab and select the **Test Channels** submenu. The Test Channels menu appears.



3 Click on **GSM Channel Scan**.
A pop-up menu appears, offering the GSM bands supported.



4 Select the GSM frequency bands that you want to include in the testing, and click on **Start Scan**.
Lector tests the currently selected low, mid and high channels for the selected bands for the presence of a base station signal on these channels. For this purpose, it uses the 4100 and 4200 with the attached antenna coupler. If a base station signal is found, the test is repeated on a higher or lower channel until a free channel is found. Lector replaces the previous entries for the low, mid and high channel by the respective free channel.

Note

Do not forget to save the new test channel settings in a channel file, they will be lost once you exit Lector or Scriptor!

Obtaining software and configuration updates

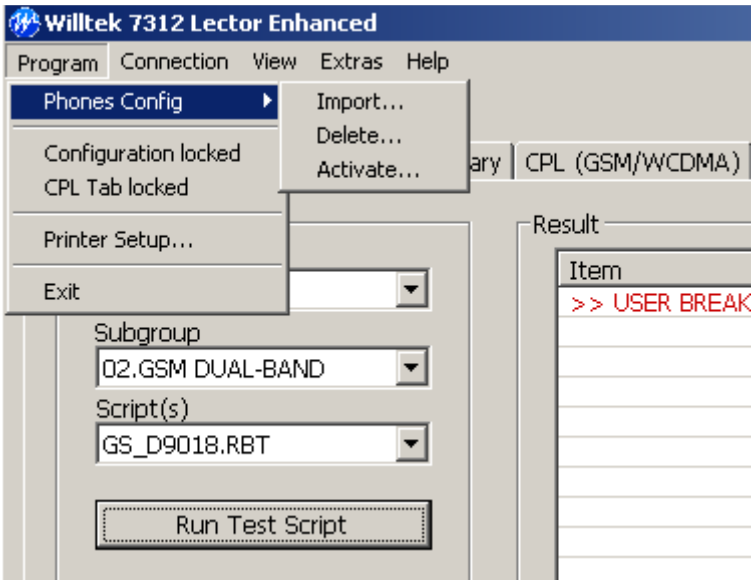
Overview

Lector and Scriptor provide several options to update the software and the configuration, and to distribute additional configuration information.

- If you want to frequently check for Lector or Scriptor software updates and coupling factor updates (from the 7360 Coupling Factor Update License), please refer to "Updating the Lector and Scriptor software and the coupling factors" on page 53.
- If you want to share configuration information and test scripts amongst a number of test stations connected by a local area network (LAN), please refer to "Updating the configuration from a network drive" on page 51.
  Note: This option is only available for 7312 Lector Enhanced and 7315 Scriptor.
- If you want to add test scripts that have been provided by a service center administrator or a mobile phone vendor, please refer to "Using predefined phone configurations" on page 48. With this method, a package of test scripts can be created and distributed via e-mail or the Internet.

Using predefined phone configurations

Willtek's Lector and Scriptor provide the possibility to load a file with predefined test scripts. Such a file may be distributed by a phone vendor or service center administrator. It contains the test script groups, subgroups and scripts required; these test script items will show up in addition to the ones already selectable when picking a test in the Running menu. From the available number of test scripts, the user can then activate or deactivate individual test script groups, e.g. if only a particular group of tests such as CDMA tests are required.



Loading a phone configuration file

In order to load (import) such a distribution of test scripts, proceed as follows:

1 Select **Program > Phones Config > Import**.
The Import Phone Configuration box appears.

2 Click on the **...** symbol and pick a drive, folder and filename containing the desired file; select **Open**.
The selected file is opened and the phone descriptions and test scripts items are activated. See sections below on how to select individual test script groups.

Activating and deactivating a test script group

If you want to see more or less test script groups from which a test script can be selected, proceed as follows:

1 Select **Program > Phones Config > Activate**.
The Activate Displayed Phone Configuration box appears.

2 Check the test script groups that you want to select from in the Running menu, and uncheck those that you do not want to see there anymore.

3 Click on **OK** to confirm your selection, or **Cancel** to undo the changes.
The available groups in the Running menu change accordingly.

Deleting a test script group

If you want to delete a test script group, proceed as follows:

Note

Deleting a test script group is an irreversible step. Once deleted, the test script group cannot be undeleted. If you just want it not to show up in the menu temporarily, follow the steps in section "Activating and deactivating a test script group".

1 Select **Program > Phones Config > Delete**.
The Delete Phone Configuration box appears.

2 Check the test script groups that you irrevocably want to delete.

3 Click on **OK** to confirm your selection, or **Cancel** to undo the changes.
The selected groups are deleted and will not be available anymore.

Compiling a test script package for distribution

With Scriptor you can put together a group of test scripts for distribution. You can pick the files needed, which are then compressed into a file. This file can be sent to Lector users who can then load the mobile phone configurations from that file.

The following conditions should be met on the PC that holds the test scripts to be distributed:

– The PC should have a 7315 Scriptor license.
– The script files to be distributed should be stored in a separate subfolder of the Script directory.

– The file names should differ from the standard script file names.
– Limit files can be added to the distribution, but should have a separate name (not the standard limit.lim file).

For each test script group, a separate package needs to be built. To compile a test script package for distribution, proceed as follows:

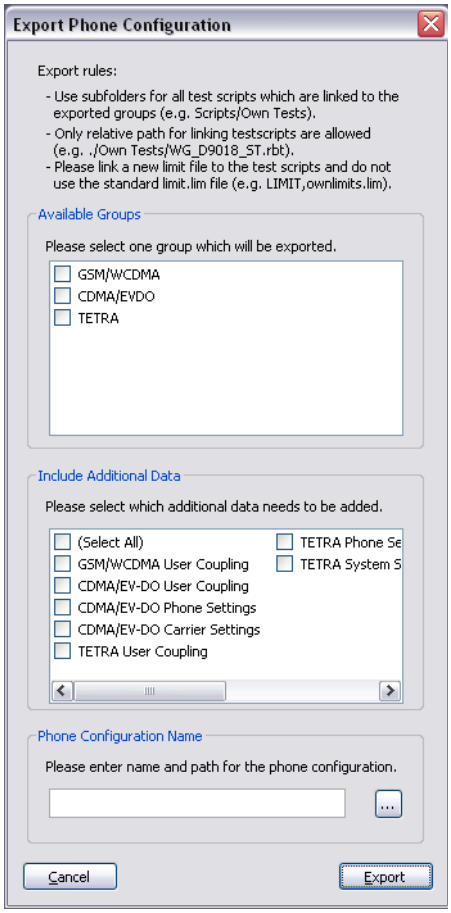
1 In 7315 Scriptor, click **Program > Phones Config > Export**.
The Export Phones Configuration menu appears.

2 In the Available Groups section, select a test script group.

3 In the Include Additional Data section, select one or more configuration categories that you want to distribute with the test scripts.

4 In the Phone Configuration Name section, enter a file name and folder to which the data shall be copied.

5 Click **Export**.
The data are stored in the selected file and folder. The file can be passed on for import as described in "Loading a phone configuration file" on page 49.



Updating the configuration from a network drive

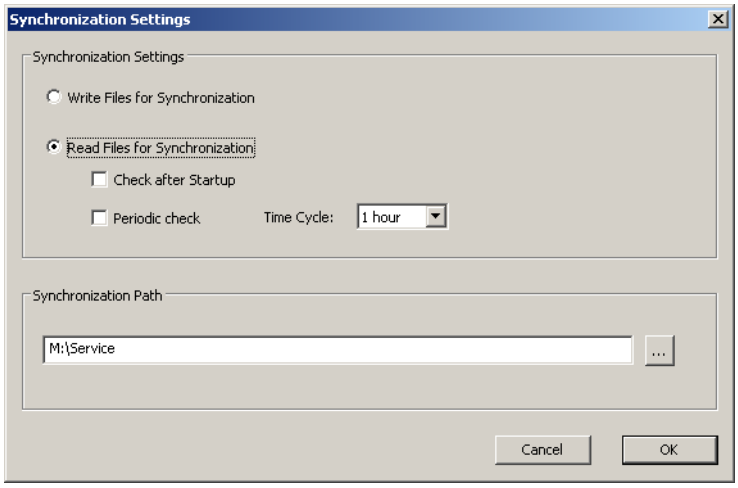
> ***Note***
>
> These features require 7312 Lector Enhanced or 7315 Scriptor.

If you have multiple computers running 7312 Lector Enhanced, there may be a central file server on which your organization maintains user-defined databases for test scripts, test limits, mobile phone configurations, channel definitions and user-defined coupling factors. From time to time, the locally stored databases should be updated from, or synchronized with, the central databases on that network drive.

Files that can be synchronized are listed in "User-defined configuration data files" on page 212.

> ***Note***
>
> This procedure overwrites the current configuration on the local hard disk with the ones on the network drive.

Setting up local synchronization



In order to be able to read the centrally stored configuration files, Lector Enhanced (or Scriptor) needs to know the location of the files on the network drive. Set up Lector Enhanced as follows:

1 Select **Extras > Synchronize > Sync Settings...** to open the Synchronization Settings pop-up menu.

2 Check the **Read Files for Synchronization** radio button.

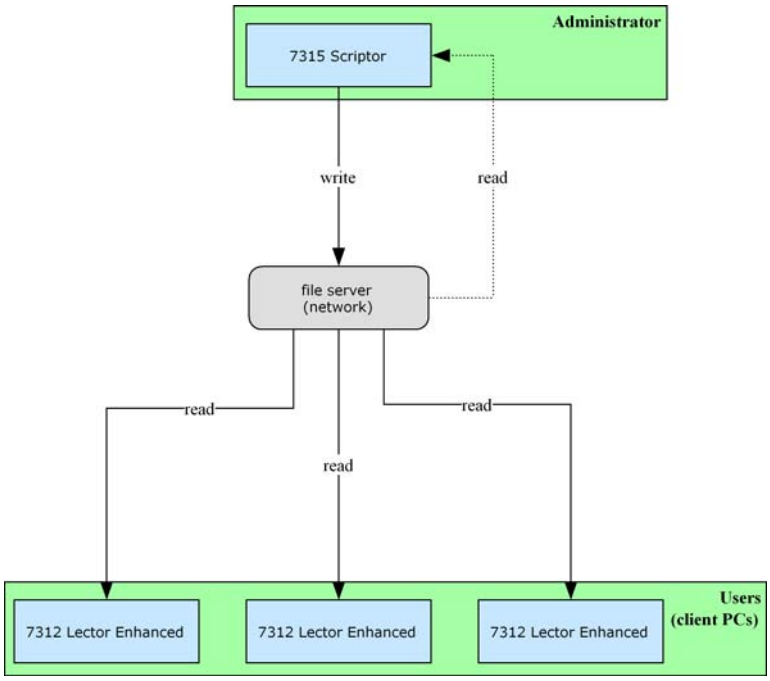
3 If you want Lector to look for local configuration updates each time Lector is started, check the **Check after Startup** box. If you do not want Lector to update the configuration each time it is started, uncheck the box.

4 If you want Lector to periodically search for configuration updates, check the **Periodic check** box and select an interval at which Lector should do it in the **Time Cycle** pull-down list.

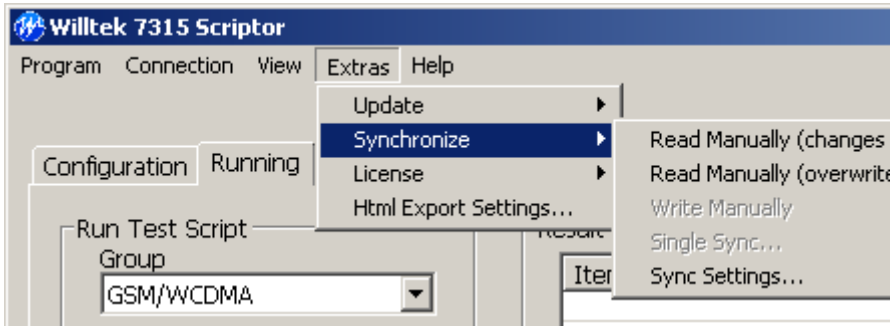
5 Click on the **...** button in the Synchronization Path section of the pop-up menu and select a network drive and folder where the user configuration data are stored. Confirm your choice by clicking **OK**.

6 Confirm your changes by clicking **OK**.

Please also refer to "Providing a reference configuration to multiple users" on page 210.



Manually starting a local update



You can start the local update of user-defined configuration data from a network drive at any time by selecting **Extras > Synchronize > Read Manually** or **Read Manually (overwrite all)**.
If a synchronization path has been set up properly as described in the section above, Lector or Scriptor will update the configuration on the local PC with the one found on the network drive.

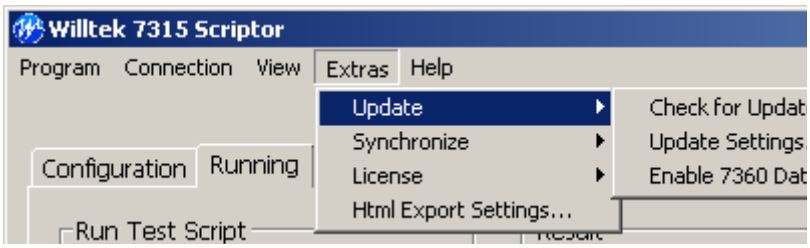
Note

The **Read Manually** command uses the date and time code to determine if the current file version should be replaced by a newer one.

The **Read Manually (overwrite all)** command replaces all the current files with a version from the network, independent of the date and time code.

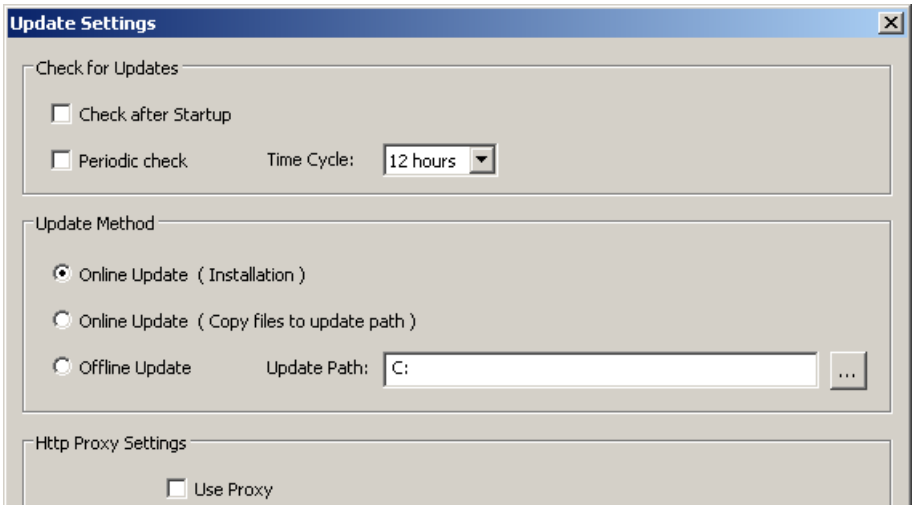
Updating the Lector and Scriptor software and the coupling factors

From time to time, Willtek may provide an updated software version, an updated help file, or the coupling factor tables (for the 7360 Coupling Factor Upgrade License) and script packages on the Internet. Lector and Scriptor can be set up to manually load these updates, or even load them automatically at given intervals. In service centers with multiple Lector or Scriptor installations, the updates can also be loaded from a folder on a network drive where the administrator stores them.



Setting up Lector and Scriptor to load configuration updates

Before an automatic update can be performed, the update should be configured. Lector and Scriptor can be set up to automatically search for configuration updates, and the update source and destination can be defined.



Configuring automatic updates

1 In Lector or Scriptor, select **Extras > Update > Update Settings**.
The Update Settings pop-up menu appears.

2 Check the ''Check after Start'' box if you want Lector or Scriptor to automatically search for configuration updates when the program is started.

3 Check the ''Periodic check'' and select the appropriate ''Time Cycle'' if you want Lector or Scriptor to automatically search for updates at given time intervals.

4 Confirm your changes by clicking on **OK**, or select **Cancel** to undo the changes.
If automatic update checks are enabled and Lector or Scriptor finds a new version, the red bar at the botttom will indicate it with a Warning symbol (see below). Click on the symbol to open the Online Update (Installation) menu.

Note that as part of the update checks, Lector and Scriptor can also receive messages for you. If a new message is available, a Letter symbol will appear on the red bar at the bottom.

Click on it to read the message.
If you want to read the last message again later on, select **Help > Last Information Message**.

Configuring the update source and destination

1 In Lector or Scriptor, select **Extras > Update > Update Settings**.
The Update Settings pop-up menu appears.

2 There are three possibilities for the data source and destination.
- If you want to download and install an update directly from Willtek's website, select "Online Update (Installation)" in the Update Method section of the pop-up menu.
At the time of the update, Lector or Scriptor will download all the configuration files from Willtek's website that have not yet been downloaded, and install them.
- If you want to load and install the update from a local server, select "Offline Update". Enter the network folder where updates are stored in the Update Path entry field.
At the time of the update, Lector or Scriptor will load and install all the configuration files from the local network folder that have not been loaded previously.
- As an administrator, if you want to download updates to make them available for all users on a local network, select "Online Update (Copy files to update path)". Also, enter the network folder where updates should be stored in the Update Path entry field.
At the time of the update, Lector or Scriptor will download all the configuration files from Willtek's website and store them in the update folder on the local computer network.

Note

If you want to download files from the web to a folder on the local network, you will need write-access rights for that folder.

Updating ProLock with new coupling factors

Advantages and prerequisites

Willtek's 2201 ProLock has an integrated database of coupling factors for a large number of mobile phones. With these factors, ProLock can take the attenuation over the air between the mobile phone and Willtek's 4916

Antenna Coupler into account in the measurements and in the RF power setup so that the results are correct. The integrated database is useful when operating ProLock in manual mode; Lector Enhanced or Scriptor can take care of the coupling factors when the tests are operated from the PC.

You can update Willtek's 2201 ProLock with the coupling factors of the latest phone models. The prerequisites are:-

- Willtek 2201 ProLock
- Willtek 7312 Lector Enhanced or 7315 Scriptor (license on a USB-based dongle)
- 7360 Coupling Factor Update License (license on a USB-based dongle)
- Internet access
- USB flash drive (delivered with the ProLock)

Procedure

The coupling factors in the 2201 ProLock can be updated as follows:

1 Connect the 2201 ProLock to the PC running Lector or Scriptor, either through TCP/IP, USB or RS-232, and switch it on.

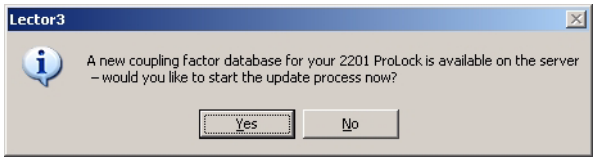
2 Connect the USB flash drive to the PC.

3 Ensure that the dongle is connected to the PC.

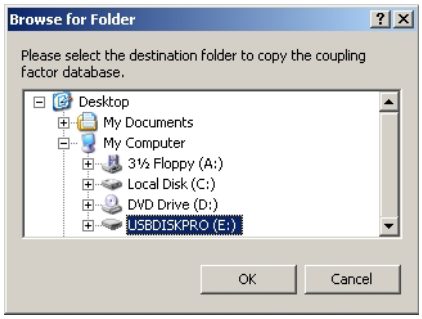
4 Start Lector Enhanced or Scriptor.

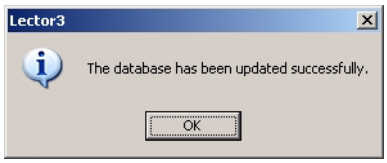
5 Ensure that in the **Extras > Update > Update Settings** menu, either **Online Update (Installation)** or **Offline Update** is enabled.

6 Select **Extras > Update > Check for 2201 CPL Update**.
Lector or Scriptor reads the current version of the coupling factor database from ProLock and compares it with the latest version from the server. If a new version is available, the following message will be displayed.



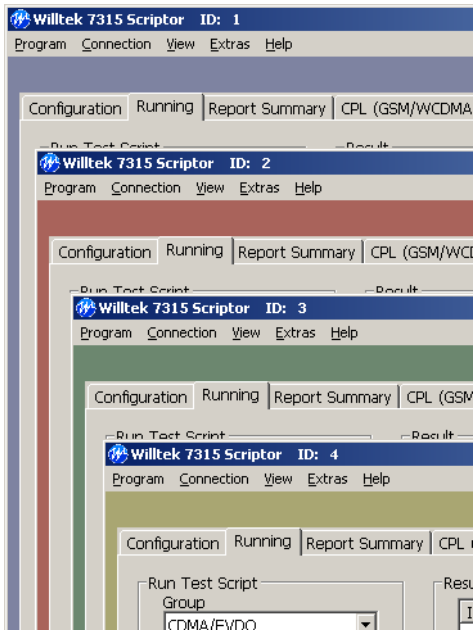
7 If you want to update ProLock's database, click on **Yes** to continue.
Follow the onscreen directions.
Lector or Scriptor will guide you through the update process.





Running multiple instances of Lector or Scriptor

Installing and identifying multiple instances



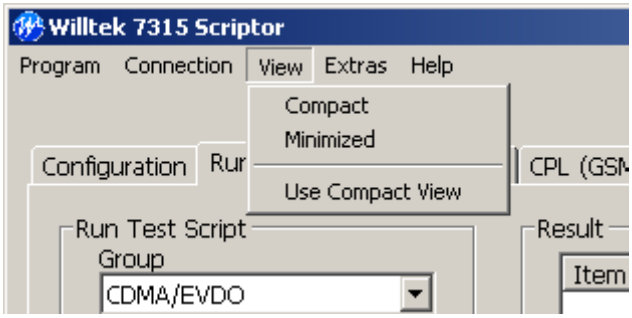
Service centers running a large number of tests everyday can increase their efficiency by having one operator testing multiple phones at the same time. What it needs is an appropriate number of test stations (e.g. 3100 Mobile Fault Finder with 4916 Antenna Coupler and 4921 RF Shield) and the same number of Lector (or Scriptor) installations that may run simultaneously on a single PC.

In order to identify the different Lector instances and keep them apart, you can give them different numbers (identifiers, see "Identifier" on page 40). The program windows will display the identifier in the top line, with different window colors as an additional means to separate them.

For the purpose of running several instances simultaneously, Lector (or Scriptor) must be installed into different folders with individual names for the program group. Up to four simultaneous installations are supported.

Applying a compact view

Instead of running multiple instances of Lector or Scriptor in four full-size windows, you can reduce the window size so that each window shows the most important information only. In order to reduce the window size, select **View > Compact** in each Lector or Scriptor window.



> ***Note***
>
> The compact view feature is available in 7312 Lector Enhanced and 7315 Scriptor only.

In order to return to the normal window size, click on the **Maximize** button (top-right corner of the window).

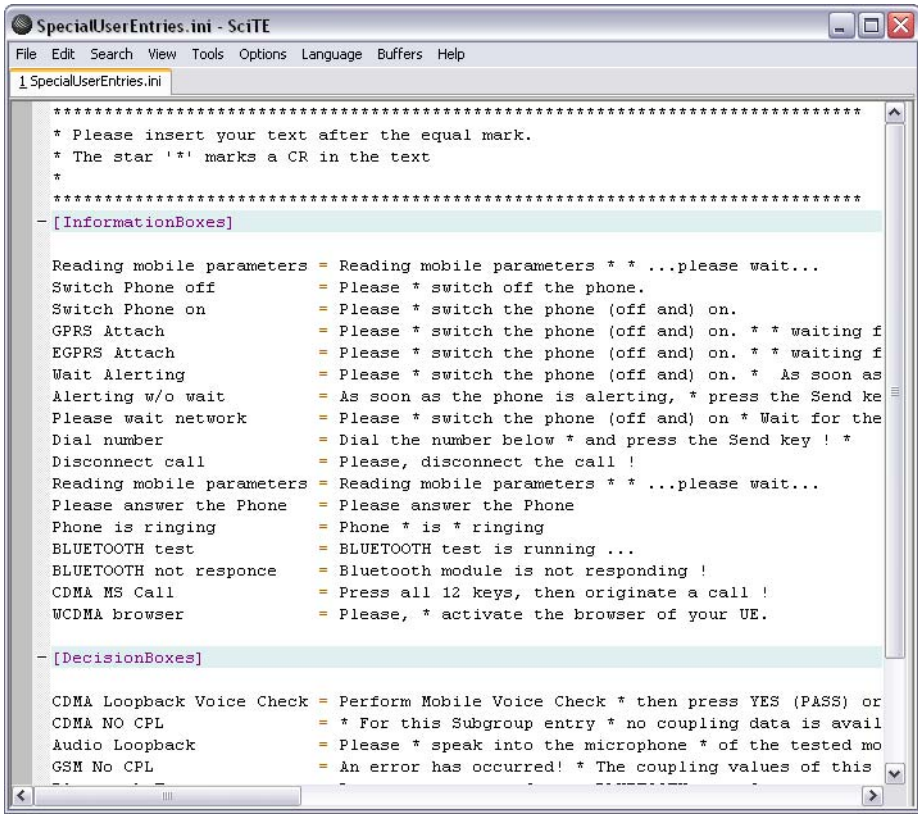
Enable **View > Use Compact View** if you want Lector Enhanced or Scriptor to automatically run in compact mode at startup. The Minimize and Maximize buttons in the top-right corner can be used to switch between compact and normal view.

Changing Lector and Scriptor messages

Lector and Scriptor display messages, e.g. prompting for action. The texts can be changed by the user, e.g. for localization.

The texts can be found and changed in file Data\Init\SpecialUserEntries.ini in the Lector and Scriptor installation folder. Willtek recommends to make a backup copy of the file before changing the messages with an editor.

The text in front of the equation mark must not be changed because it indicates to Lector or Scriptor which message the text belongs to.



Setting and Determining the Coupling Factor

5

This chapter describes different ways how to set up the coupling factors for mobile phones. Topics discussed in this chapter are as follows:

Introduction

There are several ways to connect the mobile phone to the tester: An RF cable, an antenna coupler like Willtek's 4916, and the 4916 Antenna Coupler in the 4921 RF Shield. Each coupling involves some attenuation of the RF signal which has to be taken into account in the RF measurements (transmit power, sensitivity).

The coupling factors or coupling data allow Lector and Scriptor to take the attenuation between the mobile phone and the tester into account. The signals between the two are attenuated both when the phone is connected via a cable (attenuation typically in the range 0 to 3 dB) or when it is connected via an antenna coupler (attenuation typically in the range 5 to 35 dB).

By specifying the coupling factor, Lector and Scriptor can take the raw power measurement values or settings and add or subtract the factor. The coupling factor or attenuation depends on the type of coupling (cable or antenna), the cables and coupler being used, the phone model and the frequency. The more exact the coupling factor is given, the more exact the test results are. You can, however, work with typical values, at the expense of measurement accuracy.

The coupling factor depends on the shape and material of the phone, its position relative to the antenna connected to the measuring instrument, the environment and the frequency.

For proper transmit power and receiver measurements, it is essential that any attenuation due to device coupling is compensated. As coupling is specific to a phone type, the coupling factors are stored with information about the mobile phone.

The following methods are available in Lector and Scriptor to determine the coupling factors:

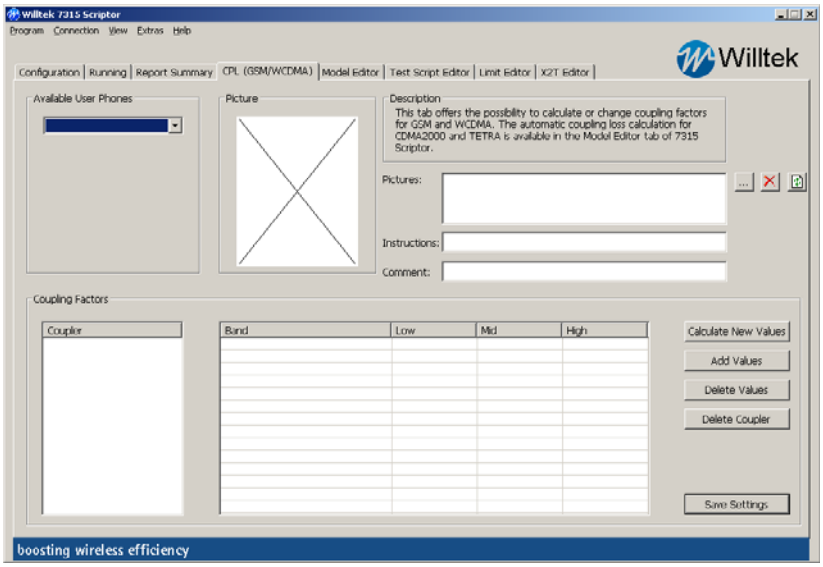
- Database of mobile phones delivered with Lector and Scriptor (Willtek database, see section "Coupling Factor Source" on page 36)
- Enhanced Willtek database of mobile phones based on the 7360 Coupling Factor Update License that can be purchased separately; contains most recent phone models and requires 7312 Lector Enhanced or 7315 Scriptor (Willtek database, see section "Coupling Factor Source" on page 36)
- Coupling Factor Wizard for GSM, GPRS, EDGE and WCDMA phones (user database, see section "Running the Coupling Factor Wizard for GSM, GPRS, EDGE and WCDMA" on page 61)
- Coupling Factor Wizard for CDMA and 1xEV-DO; only available with 7315 Scriptor (user database, see section "Running the Coupling Factor Wizard for CDMA, 1xEV-DO and TETRA" on page 65)

Running the Coupling Factor Wizard for GSM, GPRS, EDGE and WCDMA

The Coupling Factor Wizard helps you determine the correct coupling factors for the different frequency bands. All that is required is a mobile phone that is known to be good – a so-called ''golden phone''. The information is written into the user database of mobile phones.

To define the coupling loss values and other parameters of the phone, please proceed as follows:

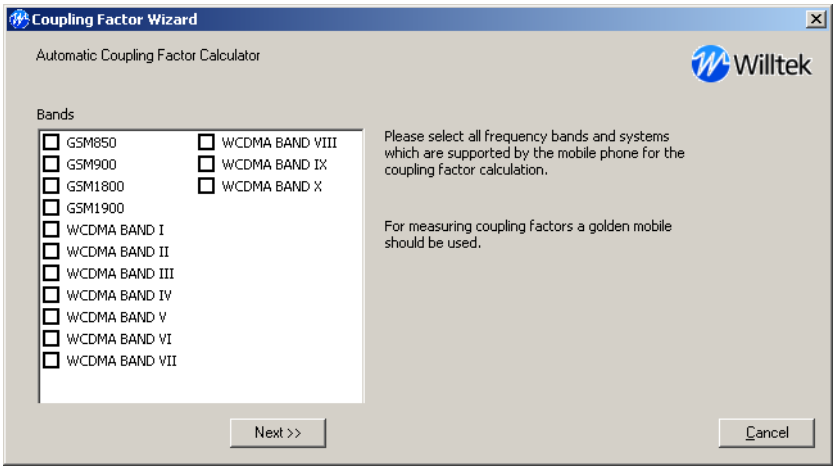
1 Select the CPL (GSM/WCDMA) tab.
The CPL (GSM/WCDMA) input/output section appears (see picture).



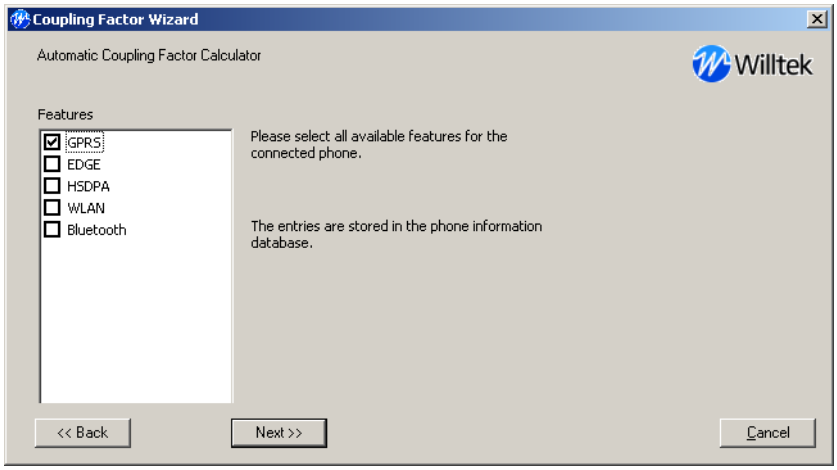
2 To start the Coupling Factor Wizard, click on **Calculate New Values**.
A new window with the Coupling Factor Wizard will pop up, see screenshot below.

Note

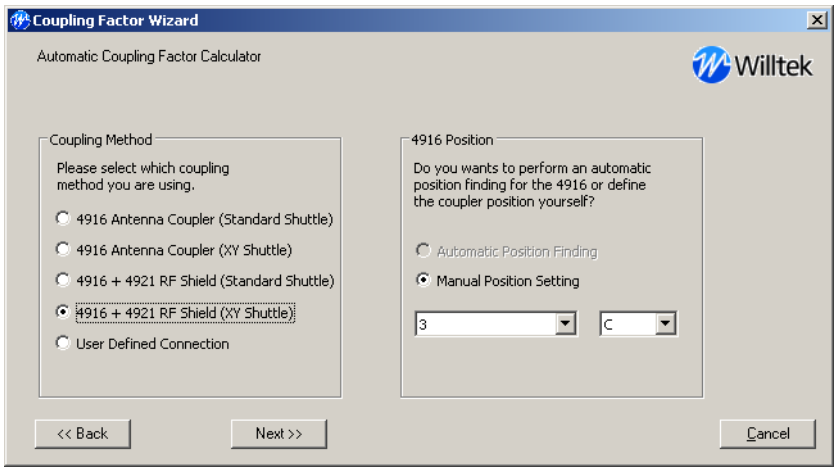
All coupling factor values previously measured and stored in the user database for that mobile phone type will be overwritten.



3 Select the wireless technologies supported by the phone, and click on **Next**.



4 Select additional technologies that the phone supports and that might be tested, then click on **Next**.



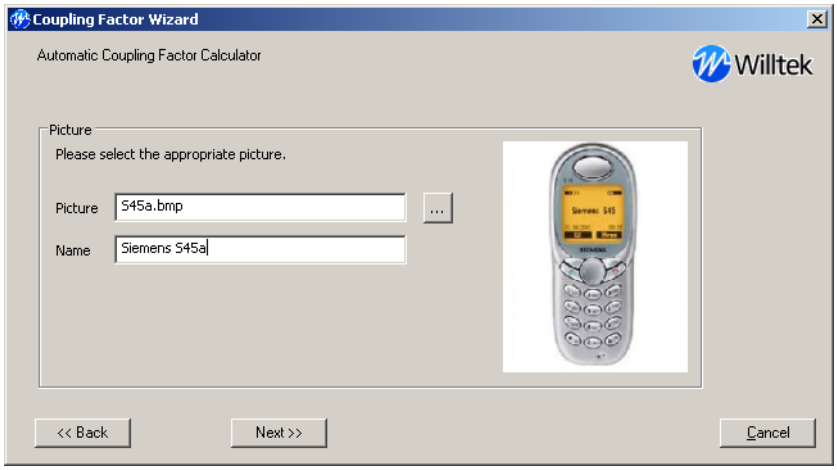
5 Select the coupling method. If you want to connect the phone to the tester via an RF cable or if you are using another coupling device that is not listed, choose ''User Defined Connection''.

6 If Willtek's 4916 Antenna Coupler is involved in the test you may either let the Coupling Factor Wizard select the best position for the antenna coupler shuttle (Automatic Position Finding), or you may select the position from the scroll field (Manual Position Finding; select ''No positioning used'' if the position does not matter). If you do not use a 4916, ignore these fields.

Note

Automatic position finding is only available in 7315 Scriptor.

7 Click **Next**.



8 In the next menu appearing, click on **...** to select one or two file name(s) for the picture(s) of the phone. Prior to that, you can store pictures in either BMP, JPG/JPEG or GIF format in folder Data\CPL_DB\Pictures of the program installation directory.
The selected picture is shown on the right-hand side.

9 In the Name field, assign a name to the phone – this name will appear on the screen during a test and also in the test log.

a Select up to two files with the picture(s) of the mobile phone.

b Click **Open** to confirm your choice.
The new picture is displayed in the Picture section. If more than one have been selected, click on the file name to see the corresponding picture.

Note

You can select one or two pictures, e.g. displaying the phone from the front and rear to show how a slider must be set up. During the test, the picture display will alternate between the two in 1-second intervals.

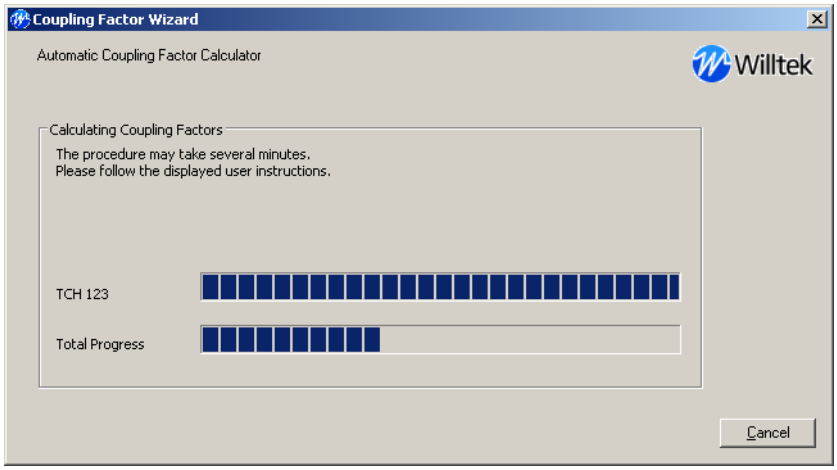
Note

Keep the **CTRL** key pressed to select multiple files.

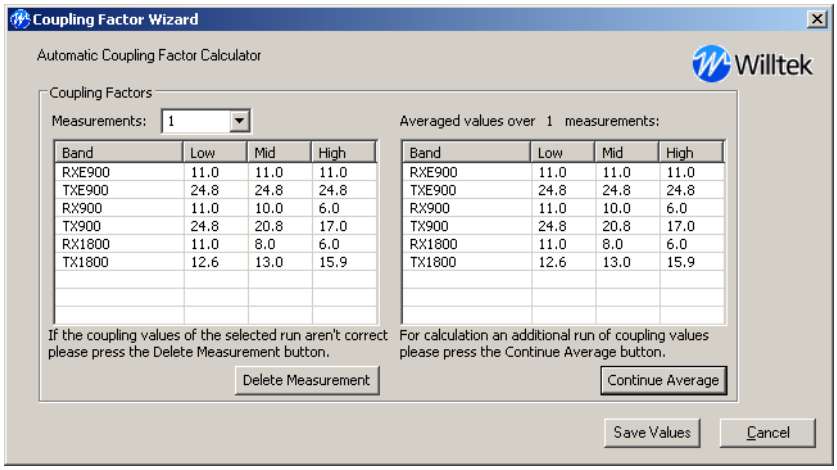
10 In the Instructions field, enter text that is to be displayed during the text, such as ''Open the flip phone''. The text can be up to 60 characters in length.

11 In the Comment field, you may enter text for your own purposes.

12 Click **Next**.
The Coupling Factor Wizard now determines the coupling factors with a number of measurements. Follow the onscreen instructions.



When completed, the Coupling Factor Wizard displays the coupling factors. The table on the left-hand side shows the results of a measurement and the right-hand side table displays coupling factors averaged over several measurements (if available).



13 In order to perform another measurement and allow Lector or Scriptor to average the results, click on **Continue Average**.
The measurements are restarted, i.e. step 12 is repeated. At the end, the new measurement results and previous results are averaged.

14 You can view a set of measurement results by selecting the appropriate measurement number in the Measurements selection field. Click on **Delete Measurement** to remove a set of results; they will be excluded from the averaging.

15 Click on the **Save Values** button to store the coupling data.
When completed, the Coupling Factor Wizard is terminated and the coupling factors are displayed on the Calculate CPL tab menu.

Note

The averaging can be used to get a better result for one phone, or to get an average over several phones.

Note

If you use GSM or WCDMA phones with different type approval codes (TAC) to take measurements, the averaged results will be stored for both TACs.

Note

You may have to repeat the measurements if the coupling values are too high because this usually means that the measurement was not successful. Scriptor will prompt you to repeat the measurements in such a case.

Running the Coupling Factor Wizard for CDMA, 1xEV-DO and TETRA

The Coupling Factor Wizard for CDMA and TETRA is part of the Model Editor menus. The Model Editor is available in 7315 Scriptor. Please refer to "Changing the coupling factors" on page 82.

Manually changing the coupling factors

GSM and WCDMA

You can change the coupling factors for GSM and WCDMA phones that are in the user database of phones. i.e. the mobile phone data must have been determined with the help of the Coupling Factor Wizard. To change the coupling factors, proceed as follows:

1 Click the **CPL (GSM/WCDMA)** tab.
The CPL (GSM/WCDMA) input/output section appears.

2 Select the phone in question from the Available User Phones scroll list.

3 Select the action below, depending on the desired change.

- In order to manually adjust the coupling values, select the coupler (on the left-hand side) and click on the respective value in the Low, Mid or High field for the band and direction at hand. The field changes into an entry field; enter the new value and confirm with the **ENTER** key.
- In order to re-calculate all coupling factors, click on **Calculate New Values**.
  The Coupling Factor Wizard runs again and all previous results are overwritten with the new coupling data.
- In order to calculate the coupling factors for a band previously not measured, or to re-calculate the coupling factors for one of the bands, remember the position on the coupler and click on **Add Values**.
  The Coupling Factor Wizard runs again, but without overwriting previous results for unselected bands.

NOTE

The Add Values button and functionality is available in 7312 Lector Enhanced and 7315 Scriptor only.

- In order to delete a row with coupling factors for a frequency band and direction, mark the appropriate row with the cursor, then click on **Delete Values**.
  The row disappears.
- In order to delete all the coupling factors related to a specific coupler, click on Delete Coupler.
  The coupler entry and the related coupling values disappear from the list.

4 Klick the **Save Settings** button to store the new coupling values.

CDMA, EVDO and TETRA

Phone definitions to these standards can only be created and edited using 7315 Scriptor. To change the coupling factors, proceed as follows:

1 Click the **Model Editor** tab.
The Model Editor input/output section appears.

2 Use the Group and Subgroup scroll lists to select the phone in question.

3 Click on the Coupling Factors tab within the Model Editor menu.
The coupling device and the coupling values appear.

4 Select the action below, depending on the desired change.

- In order to manually adjust the coupling values, select the coupler (on the left-hand side) and click on the respective value in the Low, Mid or High field for the band and direction in question. The field changes into an entry field; enter the new value and confirm with the **ENTER** key.
- In order to re-calculate all coupling factors, click on **Calculate New Values**.
  The Coupling Factor Wizard runs again and all previous results are overwritten with the new coupling data.
- In order to calculate the coupling factors for a band previously not measured, or to re-calculate the coupling factors for one of the bands, remember the position on the coupler and click on **Add Values**.
  The Coupling Factor Wizard runs again, but without overwriting previous results for unselected bands.
- In order to add a new band with coupling values to the table, klick the **Add Values Manually** button.
  A pop-up menu appears, prompting for band and coupler information. The appropriate information will be added to the table with default values. You can then manually change these values as explained above.
- In order to delete a row with coupling factors for a frequency band and direction, mark the appropriate row with the cursor, then click on **Delete Values**.
  The row disappears.

5 Klick the **Save Settings** button to store the new coupling values.

Setting Up Phone Models in Lector and Scriptor

6

This chapter describes how Lector and Scriptor can be configured to optimally fit the test needs. Topics discussed in this chapter are as follows:

Introduction

In order to define a new phone model in Lector and Scriptor, or to change or amend the configuration of an existing model, go to the **Model Editor** tab. This tab and the subsequent menu are only available in 7315 Scriptor.

Selecting a phone model

You can either select a new phone model description by creating one, or choose from the list of existing models or generic groups and subgroups.

Creating a new phone model description

1 To define a new model that was not previously available in Lector and Scriptor, click on the **New** button.

2 Select an existing Group name or enter a new one, e.g. the phone manufacturer's name.

3 In the Subgroup field, enter the name of the new phone model.

4 Next to the Pictures input field, click on **...** to select one or two file name(s) for the picture(s) of the phone to be displayed. Prior to that, you can store pictures in either BMP, JPG/JPEG or GIF format in the Data\CPL_DB\Pictures folder of the program installation directory. The menu displays the selected picture(s).

Note

You can select one or two pictures, e.g. displaying the phone from the front and rear to show how a slider must be set up. During the test, the picture display will alternate between the two in 1-second intervals.

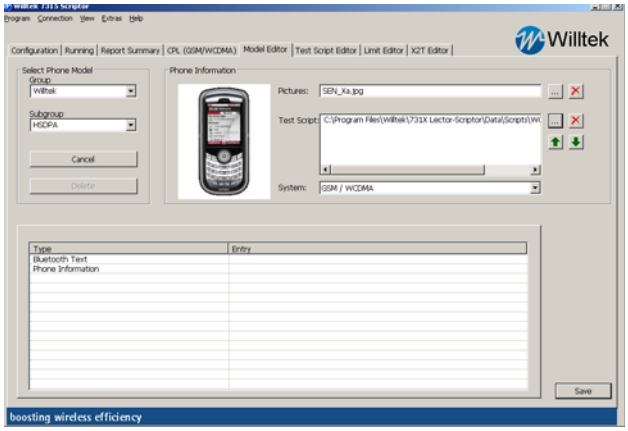
Note

Keep the **CTRL** key pressed to select multiple files.

5 Next to the Test Script input field, click on **...** to select one or multiple test script file(s) from the list. The list displays the available scripts available in the folder selected on the Configuration tab menu under **General > Test Script Path** (see "Test Script Path" on page 28), but test scripts may also reside in other folders.
For a list of test scripts and their respective systems and frequency bands, see "Selecting a test" on page 19.
You can also create your own test scripts according to your testing requirements. See Chapter 7 "Modifying and Creating Test Scripts" to learn more about it.
The selected test scripts are shown in the Test Script field. The sequence in which they appear can be changed with the arrow buttons on the right-hand side.

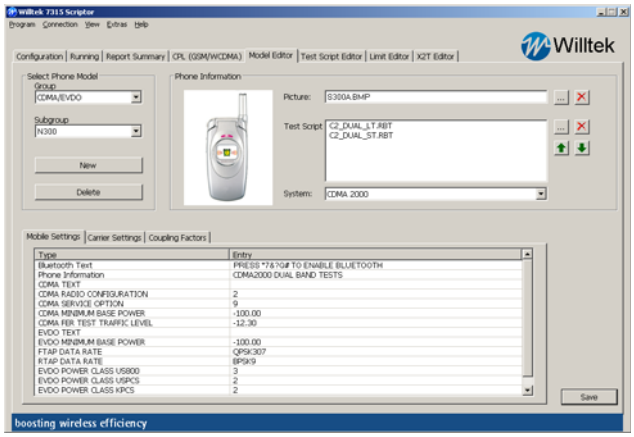
6 In the System scroll field, select the applicable system(s), GSM and/or WCDMA, or CDMA2000 (including 1xRTT and 1xEV-DO), or TETRA. Depending on the chosen system, the tabs below display parameter groups for either GSM and WCDMA phones, or for CDMA2000 phones, or for TETRA radios.

7 Click **Save** to store the current configuration.
The phone parameters are stored and can be retrieved with the Group and Subgroup scroll fields.



Selecting a model to change an existing description

To change or amend an existing phone model or generic description, select the phone according to the appropriate group and subgroup.



Changing the phone settings for GSM and WCDMA phone models

This section explains how you can affect mobile phone parameters for phones in the user database, i.e. phones that have been defined through either the Model Editor (in Scriptor) or through the Calculate CPL menu.

The place to change the parameters that Lector and Scriptor use for the selected phone is in the parameter fields in the bottom half of the Model Editor menu.

Bluetooth Text

The text entered in this field will be displayed when a Bluetooth test is started. It could contain information how to enable the Bluetooth feature in the phone.

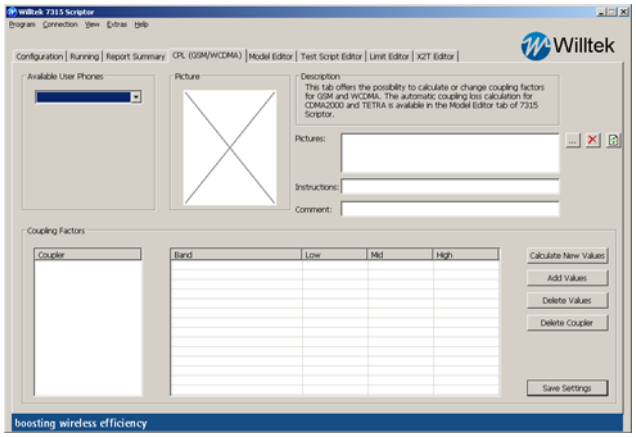
Phone Information

The text entered in this field will be displayed below the picture of the phone in the Running tab menu.

Changing the picture and information for GSM and WCDMA phones

When a test is called up, Lector or Scriptor displays a picture of a mobile phone (or alternate between two); the picture is linked to the TAC field of the IMEI. For phones in the user database, Scriptor allows you to define another picture to be displayed as follows:

1 Click on the CPL (GSM/WCDMA) tab.
The CPL (GSM/WCDMA) menu appears.



2 Select the phone model with the Group and Subgroup selection fields.
The configuration of the model appears, including the picture currently selected.

3 In order to select a new picture:

a In the line displaying ''Pictures'', click on **...**
A file selection menu appears.

b Select up to two files with the picture(s) of the mobile phone.

c Click **Open** to confirm your choice.
The new picture is displayed in the Picture section. If more than one have been selected, click on the file name to see the corresponding picture.

Note

You can select one or two pictures, e.g. displaying the phone from the front and rear to show how a slider must be set up. During the test, the picture display will alternate between the two in 1-second intervals.

Note

Keep the **CTRL** key pressed to select multiple files.

4 In order to remove the current picture without selecting a new one, click on the Delete button in the Picture line.

5 In the Instructions field, enter text that is to be displayed during the text, such as ''Open the flip phone''.

6 In the Comment field, you may enter text for your own purposes.

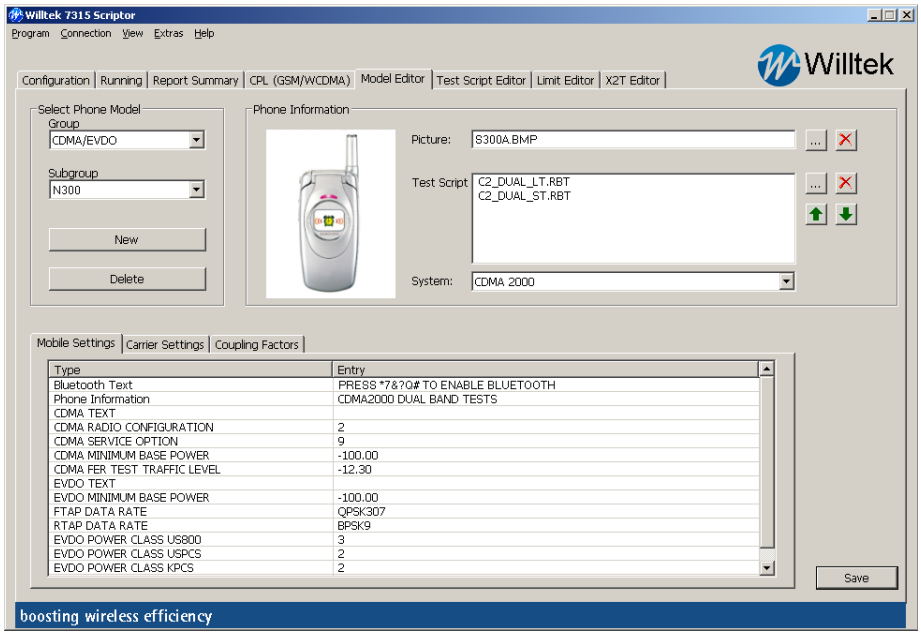
7 Click **Save Settings**.
The changes are saved and immediately available in the next test.

CDMA and 1xEV-DO phone models

Changing the phone settings

This section explains how you can affect mobile phone parameters for phones in the user database, i.e. phones that have been defined through the Model Editor in Scriptor.

The place to change the parameters that Lector and Scriptor use for the selected phone is in the parameter fields in the Mobile Settings tab in the Model Editor menu.



Bluetooth Text The text entered in this field will be displayed when a Bluetooth test is started. It could contain information how to enable the Bluetooth feature in the phone.

Phone Information The text entered in this field will be displayed below the picture of the phone in the Running tab menu. The text can be up to 60 characters in length.

CDMA TEXT The text entered in this field will be displayed in the Results section of the Running tab menu when a CDMA test is started. It is also stored in the test results log.

CDMA RADIO CONFIGURATION This is the radio configuration to be applied for the tests. Valid entries are in the range from 1 to 5.

CDMA SERVICE OPTION Valid entries for the service option depend on the radio configuration as follows:

Radio configuration	Service option
1 or 3 or 4	1 or 2 or 3 or 55
2 or 5	9 or 17 or 55 or 32768

CDMA MINIMUM BASE POWER The value constitutes the minimum signal power at the mobile's input for CDMA2000 1xRTT tests, in dBm.

CDMA FER TEST TRAFFIC LEVEL This value represents the forward channel signal power level for FER measurements, in dBm.

EVDO TEXT The text entered in this field will be displayed in the Results section of the Running tab menu when an EVDO test is started. It is also stored in the test results log.

EVDO MINIMUM BASE POWER The value constitutes the minimum signal power at the mobile's input, in dBm.

FTAP DATA RATE Forward data rate for the FTAP-based (Forward Test Application Protocol) test.

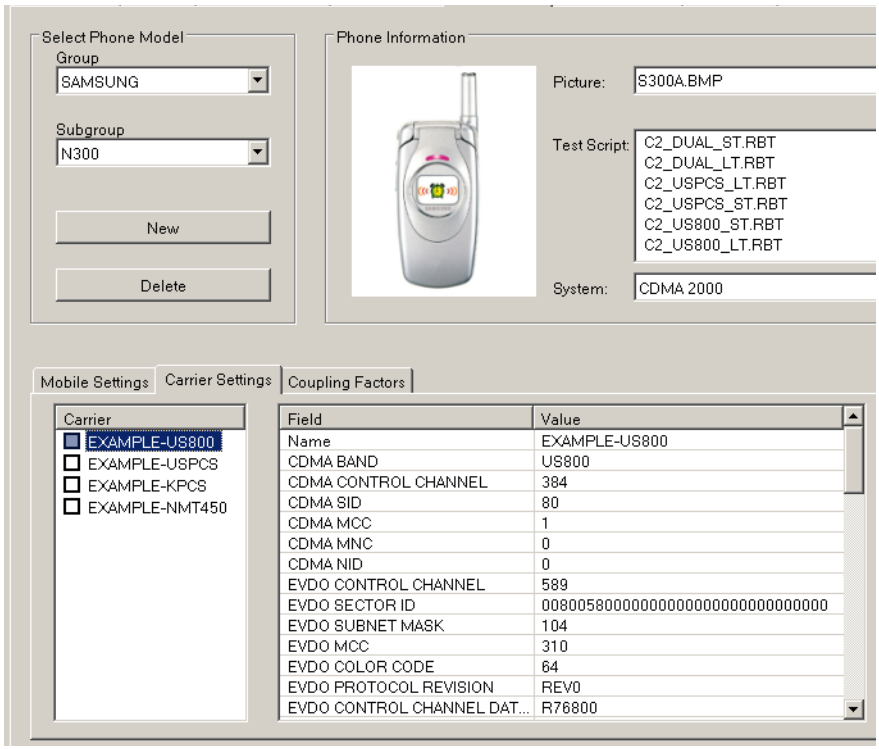
RTAP DATA RATE The data rate for the RTAP-based test. RTAP stands for Reverse Test Application Protocol.

EVDO POWER CLASS EVDO power class of the phone (Access Terminal, AT). Knowing the power class, the test software can check if the phone can transmit at its maximum power level.

As there are different CDMA/EVDO bands with different power classes, an individual EVDO power class can be defined for each frequency band (US-800, US-PCS, KPCS, NMT-450, AWS).

Changing the carrier settings

To change or add parameters that are specific to a carrier (network), click on the Carrier Settings tab in the Model Editor menu.



In order for the CDMA and EVDO phone to register with a network, that network must use certain parameters that are also programmed into the phone. These parameters include frequency band, SID and control channel frequency. So for the purpose of carrying out tests, the tester must use the network parameters that the phone is expecting. You can define and store different new carrier networks to use in your tests, or you can modify an existing network description. Note that when you edit or delete the network parameters for a carrier in the Model Editor menu, these changes will affect the carrier settings for all the phone models using that carrier.

Preselecting carriers

For each phone model, you can preselect the carrier networks that offer this type of phone: In the Carrier list on the Carrier Settings tab, check the applicable networks, then store the changes by clicking the **Save** button. (Exceptions: Preselection of the carriers is not possible if either there is only one carrier or the preselection has already been done in the test script (see SET_CARR command.)
The carriers are saved in the configuration of the model, and offered at the start of a test for that phone model.

Defining a new carrier network

1 On the Carrier Settings tab in the Model Editor menu, click the **New Carrier** button.
A box with an entry field opens, allowing you to enter a name for the new carrier.

2 Enter a name for the network carrier (such as Alltel, Sprint Nextel, Verizon Wireless), and click **OK**.
In the Carrier list, the new name appears. The list of fields and values is filled with the relevant parameters and arbitrary values.

3 Set up the fields (parameters). For more information about the parameters, see section "Modifying an existing carrier description" below.

Modifying an existing carrier description

You can define the network parameters that are used by the tester to simulate a particular carrier network. Note, however, that carrier changes made for one phone model in the Model Editor also apply to the carrier for all the other phone models as well.

The Field and Value scroll list displays the network parameters and their current settings for all the networks defined in Lector and Scriptor. To move to a particular network description, click on the network name in the Carrier list on the left-hand side.

Double-click on the field (parameter) name to change a parameter. The following subsections indicate the parameters and their respective meaning.

Name

This field contains the carrier network name chosen when the carrier definition was created, and cannot be changed.

CDMA BAND

From the scroll box, select the CDMA frequency band being used by the carrier network. Available frequency bands are AWS, KPCS (Korean PCS band), NMT450, US800 or USPCS. For a definition of the frequency bands and their respective channel numbers, see "CDMA and 1xEV-DO settings" on page 45.

CDMA CONTROL CHANNEL

Channel number for the CDMA control channel. This is the frequency carrier at which the instrument transmits the logical channels that the mobile requires to synchronize with the simulated network and to set up a call.

CDMA SID

The system identity (SID) is a number which identifies the subscriber's CDMA home system. Using a home SID allows operation with phones that are programmed for home-only operation.
Valid SIDs are in the range from 0 to 32767.

CDMA MCC

The mobile country code identifies the country in which the (simulated) network is located. Valid MCCs are in the range from 0 to 999.

CDMA MNC

The mobile network code identifies a network within a country. Valid MNCs are in the range from 0 to 99.

CDMA NID

The network identification (NID) number identifies the network. Valid NIDs are in the range from 0 to 65535.

EVDO CONTROL CHANNEL

Channel number for the EVDO control channel. This is the frequency carrier at which the instrument transmits the logical channels that the mobile requires to synchronize with the simulated network and to set up a data connection.

EVDO SECTOR ID

This parameter field allows for entering the 128 bit (32 hexadecimal characters) address of the sector ID of the simulated cell. The EVDO Sector ID can be entered in hexadecimal; for each of the 32 hexadecimal characters, you can use hex codes 0 to 9 and A to F.

EVDO SUBNET MASK

A network in EVDO can be divided into a maximum of 128 subnets. This is an important parameter that needs to match the mobile's preferred roaming list (PRL). Otherwise, it might not be possible to initiate a session. Valid entries are in the range from 0 to 127.

EVDO MCC

The country code identifies the network internationally. This is an important parameter that needs to match the mobile's preferred roaming list (PRL). Otherwise, it might not be possible to initiate a session. Valid entries are in the range from 0 to 999.

EVDO COLOR CODE

The EVDO color code identifies the network on a national level. This is an important parameter that needs to match the mobile's preferred roaming list (PRL). Otherwise, it might not be possible to initiate a session. Valid entries are in the range from 0 to 255.

EVDO PROTOCOL REVISION

The scroll list allows to select the protocol revision for testing. While Rev0 allows for a maximum forward data rate of 2456.7 kbps, RevA allows for 3072 kbps.

EVDO CONTROL CHANNEL DATA RATE

Data rate used by the instrument on the control channel. The scroll list allows to select between 38400 and 76800 kbps.

Deleting a carrier description

You can easily delete a carrier from the Carrier list in the Carrier Settings menu. Note, however, that the carrier is not available to any other mobile phone either.

1 Select the carrier to be deleted by clicking on it, then click the Delete Carrier button.
A box appears, displaying the selected carrier(s) and asking to confirm deletion.

2 Click **OK** to delete the carrier network description, or **No** to leave it.
The carrier name disappears from the Carrier list, and all the parameters for that carrier are deleted.

3 If the selected mobile phone (or group and subgroup combination) previously used the deleted carrier, click **Save** to store the new phone setup.

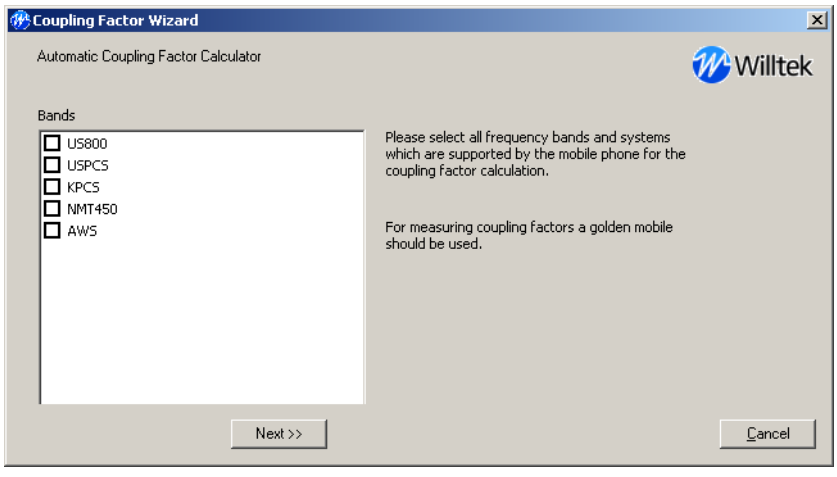
Determining the coupling factors

The coupling values can be determined by the Coupling Factor Wizard for CDMA and EVDO.

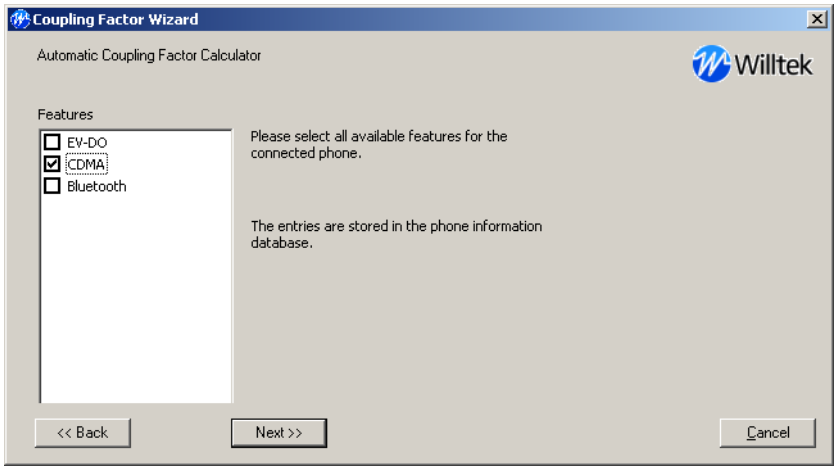
> ***Note***
>
> The Coupling Factor Wizard for CDMA and EVDO may take a long time to determine the coupling factors. Use an external power supply for the phone, or a fully loaded battery to avoid that the Wizard is aborted due to an empty battery.

1 Select the phone for which to determine the coupling (see "Selecting a phone model" on page 70 on how to do it).

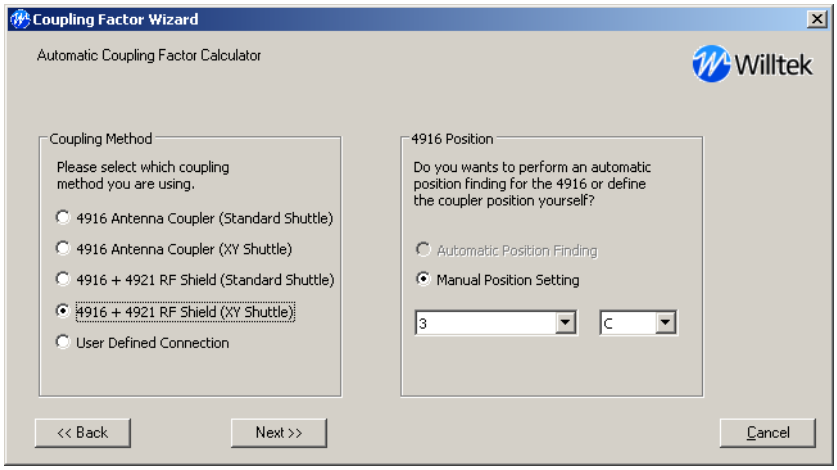
2 On the Coupling Factors tab within the Model Editor menu, click **Coupling Meas.**
The Coupling Factor Wizard appears.



3 In the Bands section, check the applicable frequency bands for the mobile phone, and click **Next**.
The Features page of the Coupling Factor Wizard appears.



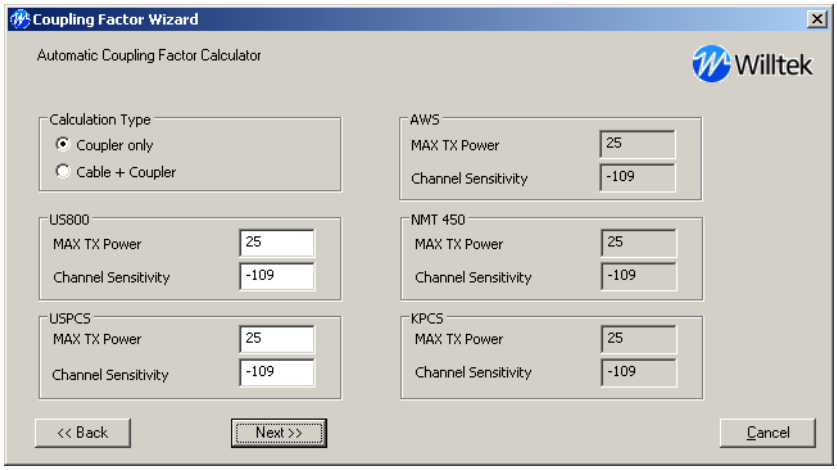
4 Select additional technologies that the phone supports and that might be tested, then click on **Next**.
The Coupling page of the Coupling Factor Wizard appears.



5 Select the coupling method. If you want to connect the phone to the tester via an RF cable or if you are using another coupling device that is not listed, choose ''User Defined Connection''.

6 If Willtek's 4916 Antenna Coupler is involved in the test you may either let the Coupling Factor Wizard select the best position for the antenna coupler shuttle (Automatic Position Finding), or you may select the position from the scroll field (Manual Position Finding; select ''No positioning used'' if the position does not matter). If you do not use a 4916, ignore these fields.

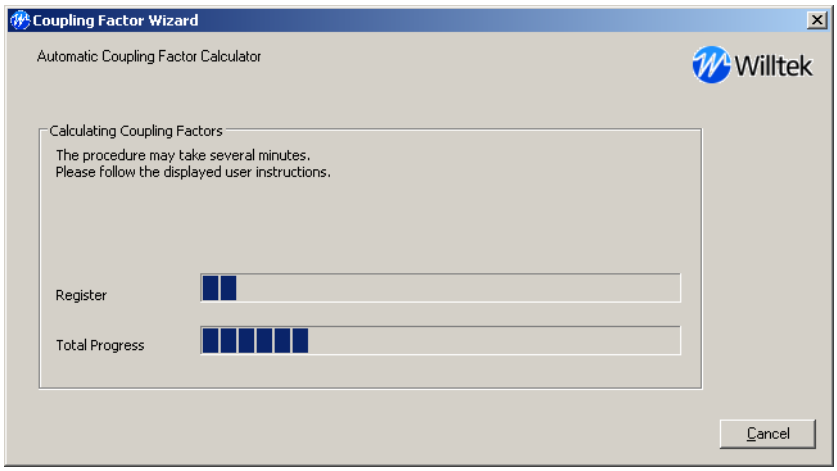
7 Click **Next**.
The Calculation Type page of the Coupling Factor Wizard appears.



8 In the Calculation Type section, click on **Cable + Coupler** if you want to determine the coupling values for an antenna coupler and if you also have an RF cable available. Otherwise, select **Coupler only**.

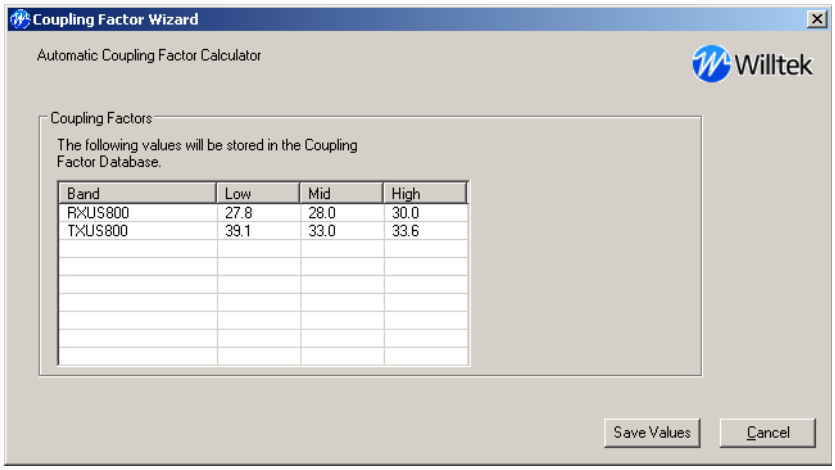
9 For the different frequency bands to be supported, carefully enter the respective maximum power (according to the power class for that band, in dBm) and the expected receiver sensitivity (usually –109 dBm).

10 Click **Next**.
The Coupling Factor Wizard now determines the coupling factors with a number of measurements. Follow the onscreen instructions.



When completed, the coupling factors are displayed.

11 You can click on the values in the Low, Mid and High columns to manually adjust the coupling values.



The table on the left-hand side shows the results of a measurement and the right-hand side table displays coupling factors averaged over several measurements (if available).

12 In order to perform another measurement and allow Lector or Scriptor to average the results, click on **Continue Average**.
The measurements are restarted, i.e. step 10 is repeated. At the end, the new measurement results and previous results are averaged.

13 You can view a set of measurement results by selecting the appropriate measurement number in the Measurements selection field. Click on **Delete Measurement** to remove a set of results; they will be excluded from the averaging.

Note

You may have to repeat the measurements if the coupling values are too high because this usually means that the measurement was not successful. Scriptor will prompt you to repeat the measurements in such a case.

Note

The averaging can be used to get a better result for one phone, or to get an average over several phones.

14 Click **Save Values** to store the coupling values.

15 Click **Cancel** to terminate the Coupling Factor Wizard.

Changing the coupling factors

1 Select the phone for which to determine the coupling (see "Selecting a phone model" on page 70 on how to do it).

2 Go to the Coupling Factors tab within the Model Editor menu.

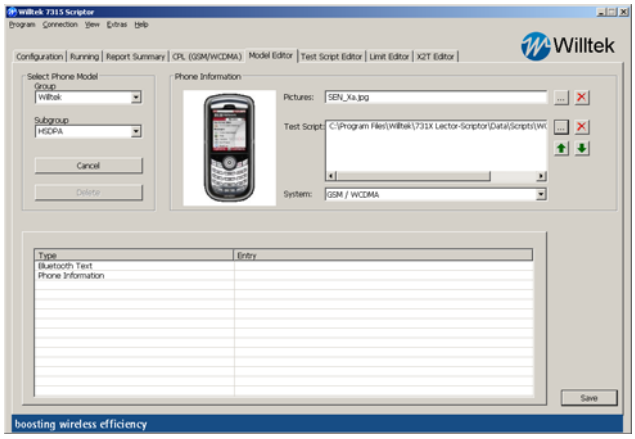
3 You can click on the values in the Low, Mid and High columns to manually adjust the coupling values.

4 Click **Save** to store the coupling values.

Changing the mobile phone picture

When a test is called up, Lector or Scriptor displays a picture (or two alternating pictures) of a mobile phone; the picture is linked to the Group and Subgroup. In Scriptor you can define another (or an additional) picture to be displayed as follows:

1 Click on the Model Editor tab.
The Model Editor menu appears.



2 Select the phone model with the Group and Subgroup selection fields.
The configuration of the model appears, including the picture currently selected.

3 In order to select a picture (or two):

a In the line displaying ''Pictures'', click on **...**
A file selection menu appears.

b Select up to two files with the picture(s) of the mobile phone.

c Click **Open** to confirm your choice.
The new picture is displayed in the Picture section. If more than one have been selected, click on the file name to see the corresponding picture.

Note

You can select one or two pictures, e.g. displaying the phone from the front and rear to show how a slider must be set up. During the test, the picture display will alternate between the two in 1-second intervals.

Note

Keep the **CTRL** key pressed to select multiple files.

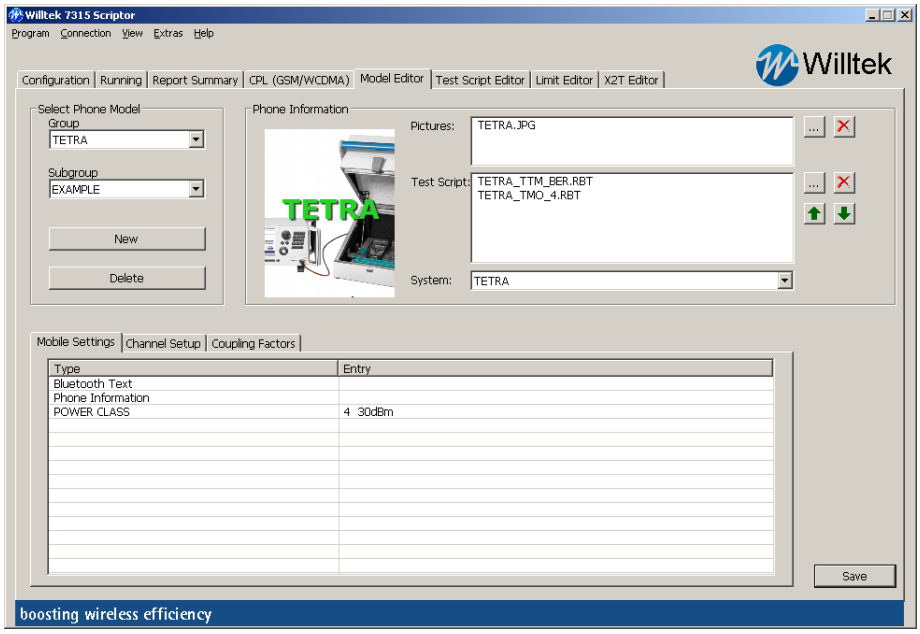
4 In order to remove the current picture without selecting a new one, click on the Delete button in the Picture line.

TETRA mobile station models

Changing the TETRA radio settings

This section explains how you can affect TETRA radio parameters for TETRA mobile stations in the user database, i.e. radios that have been defined through the Model Editor in Scriptor.

The place to change the parameters that Lector and Scriptor use for the selected TETRA radio is in the parameter fields in the Mobile Settings tab in the Model Editor menu.



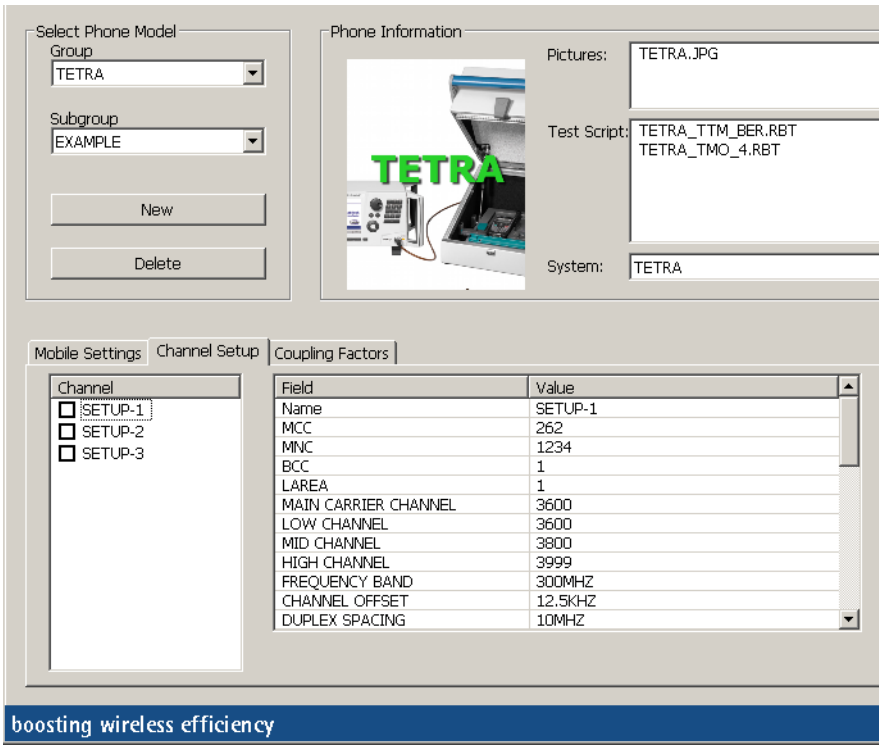
Bluetooth Text The text entered in this field will be displayed when a Bluetooth test is started. It could contain information how to enable the Bluetooth feature in the TETRA radio.

Phone Information The text entered in this field will be displayed below the picture of the TETRA radio in the Running tab menu. The text can be up to 60 characters in length.

POWER CLASS The power class determines the maximum power that the TETRA radio can transmit. The test software needs to know the power class so that it can set up and test the maximum power level correctly. Also, the limits are typically narrower at the highest power level.
The power class is expressed both as a number (with modifier L where necessary) and the nominal power level in dBm.

Defining the channel settings

TETRA radios are typically configured for a specific carrier (network). Click on the **Channel Setup** tab in the Model Editor menu to define or change the channel settings.



In order for the TETRA radio to register with a network, that network must use certain parameters that are also programmed into the mobile station. These parameters include frequency and network information. So for the purpose of carrying out tests, the tester must use the network parameters that the radio is expecting. You can define and store different new carrier networks to use in your tests, or you can modify an existing network description. Note that when you edit or delete the network parameters for a carrier in the Model Editor menu, these changes will affect the network settings for all the TETRA radio models using that carrier.

Preselecting networks

For each TETRA radio model, you can preselect the TETRA networks that offer this type of mobile station: In the Channel list on the Channel Setup tab, check the applicable setups, then store the changes by clicking the **Save** button. (Exceptions: Preselection of the carriers is not possible if either there is only one carrier or the preselection has already been done in the test script (see SET_CARR command.)
The carriers are saved in the configuration of the model, and offered at the start of a test for that TETRA radio model.

Defining a new carrier network

1 On the Channel Setup tab in the Model Editor menu, click the **New Channel Setup** button.
A box with an entry field opens, allowing you to enter a name for the new setup.

2 Enter a name for the setup (e.g. the name of the network), and click **OK**. In the Channel list, the new name appears. The list of fields and values is filled with the relevant parameters and arbitrary values.

3 Set up the fields (parameters). For more information about the parameters, see section "Modifying an existing carrier description" below.

Modifying an existing setup

You can define the network parameters that are used by the tester to simulate a particular TETRA network. Note, however, that network changes made for one mobile station model in the Model Editor also apply to the network for all the other TETRA radio models as well.

The Field and Value scroll list displays the network parameters and their current settings for all the networks defined in Lector and Scriptor. To move to a particular network description, click on the network name in the Channel list on the left-hand side.

Double-click on the field (parameter) name to change a parameter. The following subsections indicate the parameters and their respective meaning.

Name

This field contains the TETRA network name chosen when the network definition was created, and cannot be changed.

MCC

The mobile country code identifies the country in which the (simulated) network is located. Valid MCCs are in the range from 0 to 999.

MNC

The mobile network code identifies a network within a country. Valid MNCs are in the range from 0 to 16,383.

BCC

The Base station Color Code (BCC) is a number identifying a scrambling code that is used on all channels of the base station. The BCC can be chosen randomly. Valid entries are in the range from 0 to 63.

LAREA

The Location Area (LArea) identifies a cell. For TETRA mobile stations that are not restricted to a certain area, the location area can be freely chosen. Valid LArea codes are in the range from 0 to 16,383.

MAIN CARRIER CHANNEL

Channel number for the main control channel in TETRA. This is the frequency carrier at which the instrument transmits the logical channels that the mobile requires to synchronize with the simulated network and to set up a call.

LOW CHANNEL

The low channel entry is a channel number determining one of the three traffic channel frequencies for testing. TETRA channel numbers are in the range from 0 to 3999.

MID CHANNEL

The mid channel entry is a channel number determining one of the three traffic channel frequencies for testing. TETRA channel numbers are in the range from 0 to 3999.

HIGH CHANNEL

The high channel entry is a channel number determining one of the three traffic channel frequencies for testing. TETRA channel numbers are in the range from 0 to 3999.

FREQUENCY BAND

This selection field determines the frequency band in which the TETRA radio transmits and receives. Possible entries are 300 MHz, 400 MHz, 800 MHz and 900 MHz.

CHANNEL OFFSET

The channel offset is the offset of the carrier frequency relative to a multiple of 25 kHz. It is important to set the correct channel offset that is also programmed into the TETRA radio; otherwise the radio will not find the simulated TETRA network.
One of the following values can be selected: 0 kHz, 12.5 kHz, +6.25 kHz, –6.25 kHz.

DUPLEX SPACING

The duplex spacing is the difference between the uplink (mobile station transmit) frequency and the downlink (base station transmit) frequency. Most networks in teh 300 and 400 MHz range apply a duplex spacing of 10 MHz while networks operating in the 800 and 900 MHz bands typically apply 45 MHz duplex spacing.
One of the following values can be selected: 10 MHz or 45 MHz.

Deleting a channel setup

You can easily delete a network from the Channel list in the Channel Setup menu. Note, however, that the carrier is not either available to any other TETRA radio anymore.

1 Select the network to be deleted by clicking on it, then click the Delete Channel Setup button.
A box appears, displaying the selected setup(s) and asking to confirm deletion.

2 Click **OK** to delete the network description, or **No** to leave it.
The channel setup name disappears from the Channel list, and all the parameters for that network are deleted.

3 If the selected TETRA radio (or group and subgroup combination) previously used the deleted setup, click **Save** to store the new channel setup.

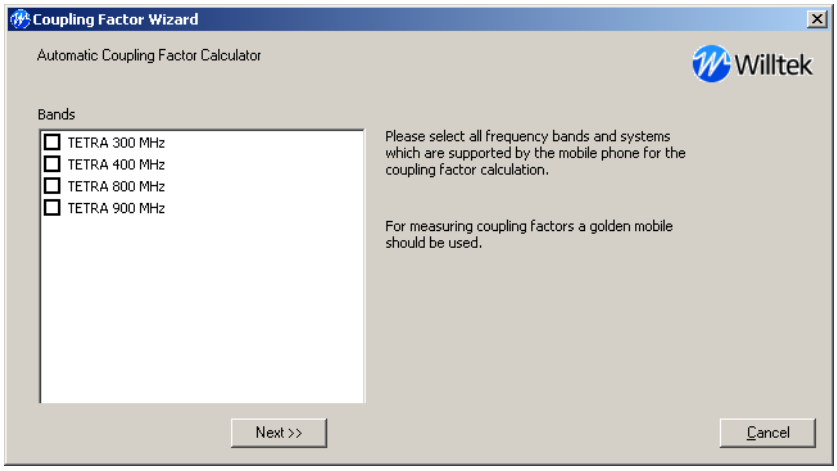
Determining the coupling factors

The coupling values can be determined by the Coupling Factor Wizard for TETRA radios.

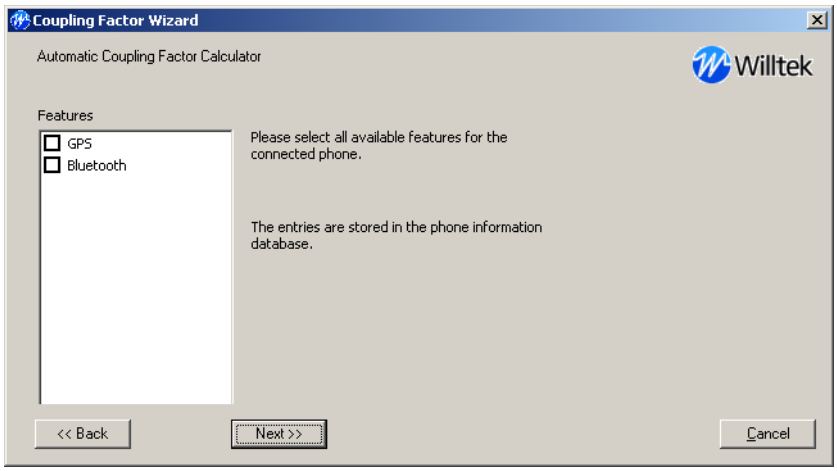
> ***Note***
>
> The Coupling Factor Wizard for TETRA may take a long time to determine the coupling factors. Use an external power supply for the radio, or a fully loaded battery to avoid that the Wizard is aborted due to an empty battery.

1 Select the TETRA radio for which to determine the coupling (see "Selecting a phone model" on page 70 on how to do it).

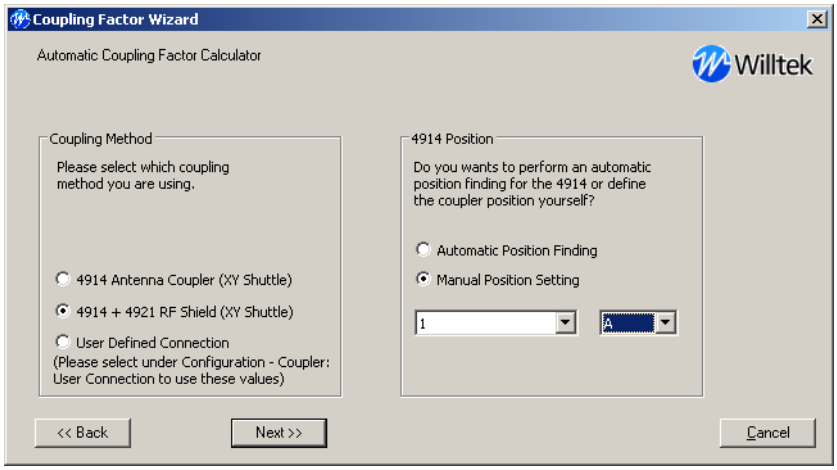
2 On the Coupling Factors tab within the Model Editor menu, click **Calculate New Values**.
The Coupling Factor Wizard appears.



3 In the Bands section, check the applicable frequency band(s) for the TETRA radio, and click **Next**.
The Features page of the Coupling Factor Wizard appears.



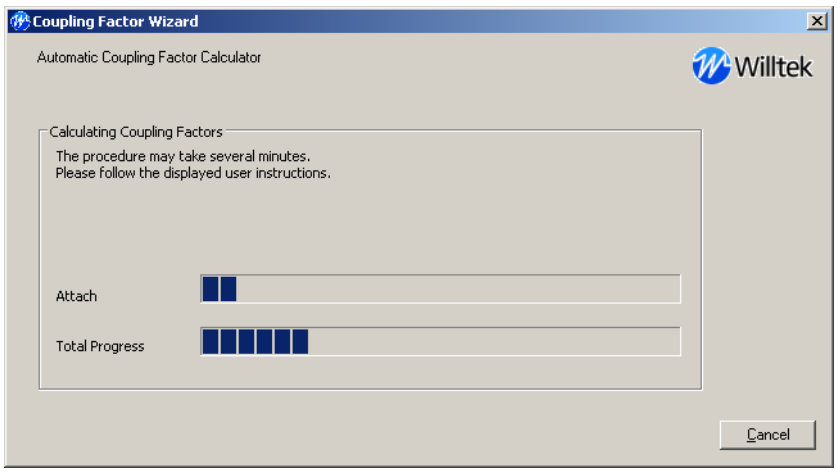
4 Select additional technologies that the mobile station supports and that you might want to be tested, then click on **Next**.
The Coupling page of the Coupling Factor Wizard appears.



5 Select the coupling method. If you want to connect the radio to the tester via an RF cable or if you are using another coupling device that is not listed, choose ''User Defined Connection''.

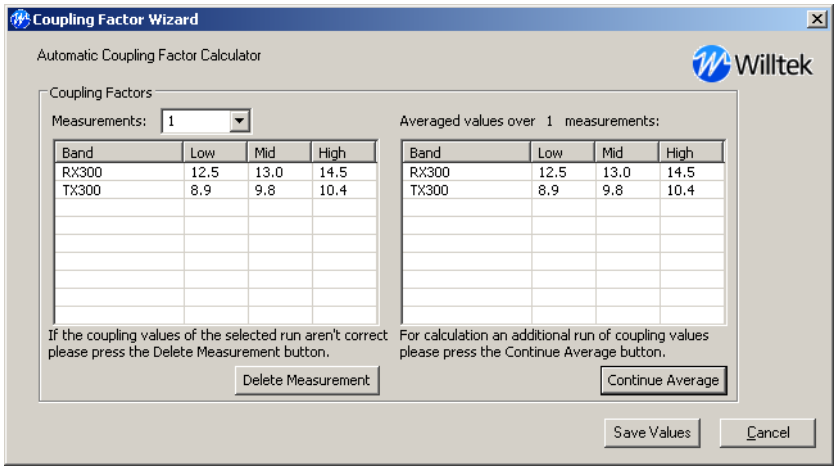
6 If Willtek's 4914 or 4916 Antenna Coupler is involved in the test you may either let the Coupling Factor Wizard select the best position for the antenna coupler shuttle (Automatic Position Finding), or you may select the position from the scroll field (Manual Position Finding; select ''No positioning used'' if the position does not matter). If you do not use a 4914 or 4916, ignore these fields.

7 Click **Next**.
The Coupling Factor Wizard now determines the coupling factors with a number of measurements. Follow the onscreen instructions.



When completed, the coupling factors are displayed.

8 You can click on the values in the Low, Mid and High columns to manually adjust the coupling values.



The table on the left-hand side shows the results of a measurement and the right-hand side table displays coupling factors averaged over several measurements (if available).

9 In order to perform another measurement and allow Lector or Scriptor to average the results, click on **Continue Average**.
The measurements are restarted, i.e. step 7 is repeated. At the end, the new measurement results and previous results are averaged.

10 You can view a set of measurement results by selecting the appropriate measurement number in the Measurements selection field. Click on **Delete Measurement** to remove a set of results; they will be excluded from the averaging.

Note

You may have to repeat the measurements if the coupling values are too high because this usually means that the measurement was not successful. Scriptor will prompt you to repeat the measurements in such a case.

Note

The averaging can be used to get a better result for one mobile station, or to get an average over several radios.

11 Click **Save Values** to store the coupling values.

12 Click **Cancel** to terminate the Coupling Factor Wizard.

Changing the coupling factors

1 Select the TETRA radio for which to determine the coupling (see "Selecting a phone model" on page 70 on how to do it).

2 Go to the Coupling Factors tab within the Model Editor menu.

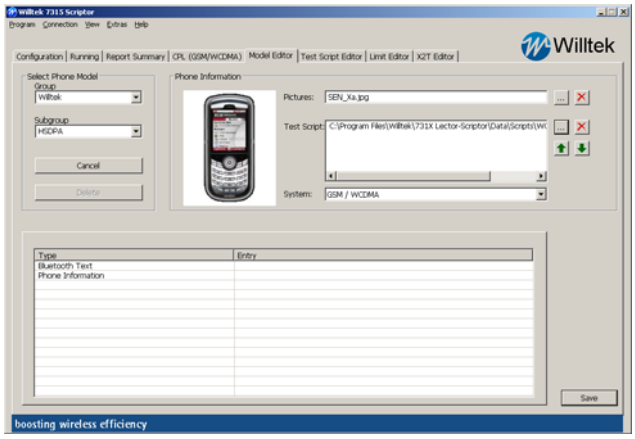
3 You can click on the values in the Low, Mid and High columns to manually adjust the coupling values.

4 Click **Save** to store the coupling values.

Changing the TETRA radio picture

When a test is called up, Lector or Scriptor displays a picture (or two pictures alternating) of a TETRA radio; the picture is linked to the Group and Subgroup. In Scriptor you can define another picture (or an additional one) to be displayed as follows:

1 Click on the Model Editor tab.
The Model Editor menu appears.



2 Select the TETRA radio model with the Group and Subgroup selection fields.
The configuration of the model appears, including the picture currently selected.

3 In order to select a picture (or two):

a In the line displaying ''Pictures'', click on **...**
A file selection menu appears.

b Select up to two files with the picture(s) of the mobile station.

c Click **Open** to confirm your choice.
The new picture is displayed in the Picture section. If more than one have been selected, click on the file name to see the corresponding picture.

Note

You can select one or two pictures, e.g. displaying the radio from the front and rear to show how the mobile station must be set up. During the test, the picture display will alternate between the two in 1-second intervals.

Note

Keep the **CTRL** key pressed to select multiple files.

4 In order to remove the current picture without selecting a new one, click on the Delete button in the Picture line.

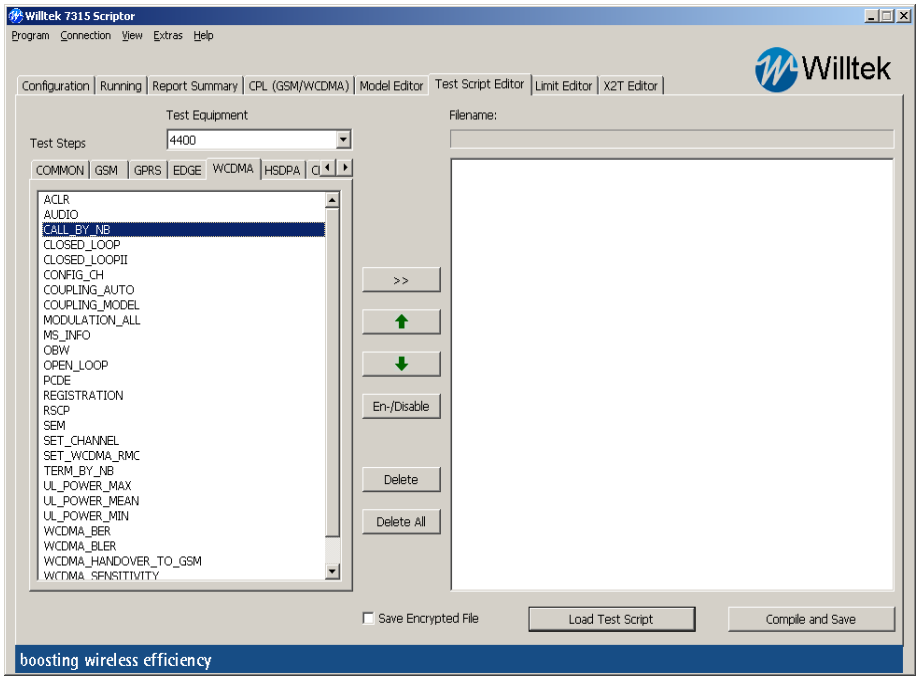
Modifying and Creating Test Scripts

7

This chapter describes how Lector and Scriptor can be configured to optimally fit the test needs. Topics discussed in this chapter are as follows:

Introduction

This chapter explains how test scripts can be edited with Scriptor from the Test Script Editor menu. The various test commands are grouped into common (general) commands and into commands for the different wireless access technologies, i.e. GSM, GPRS, EDGE, WCDMA, HSDPA, CDMA, AMPS, 1xEV-DO and TETRA.



The left-hand side shows a list of commands under the tabs for the different command groups. The available command groups and commands depend on the type of test instrument that you choose at the top of the menu. In the middle, there are buttons for different actions. The field on the right-hand side displays the test script currently being edited.

Loading and saving tests

Loading a test script

You can start from scratch with an empty script and add commands. Usually it is more convenient, however, to take and modify an existing test script. To load a test script from the hard disk, proceed as follows:

1 Click on the **Test Script Editor** tab.
The Test Script Editor menu opens. If you did not work with the editor since the last start of Scriptor, the right-hand side with the commands is empty.

2 Click on the **Load Test Script** button.
A file selector box opens, displaying the files and folders currently available in the default test script folder (see "Test Script Path" on page 28).

3 Use the mouse to navigate to and mark the desired test script, then click on **Open** (you may also navigate to a different folder).
The box disappears, and the test script is displayed on the right-hand side of the Test Script Editor. You can now make your changes (see "Editing the test script" on page 96). Do not forget to save the changes before closing Scriptor (see "Saving a test script" on page 95)!

Saving a test script

After editing a new test script or making changes to an existing test script, the script should be stored in a file so that it can be used by Lector and Scriptor.

1 In the Test Script Editor menu, click on **Compile and Save**.
Lector or Scriptor performs a sanity check on the script, e.g. it checks if there is a command to set up a voice or data call before measurements are initiated. If there are any errors, Lector or Scriptor will display a warning and ask if the test script should be stored despite the problem.
A box appears, displaying a test script folder and its files (see "Test Script Path" on page 28). If you previously loaded the file, the File Name field contains the file name of the test script previously loaded.

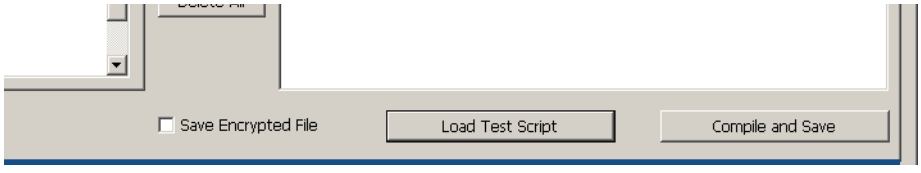
2 Select a file or enter a file name in the appropriate box, then click on **Save** (you may also navigate to a different folder).
If a file of that name already exists, Scriptor will ask you to confirm. The test script is then saved in the file.

Note on folders

Instead of using the drive and folder defined in the Test Script Path parameter of the **Configuration > General** menu, you can also store files in different locations. Lector and Scriptor remember a subfolder to the one set in the folder parameter as a relative path, while other directories are stored with their absolute location (drive and folder).

Encrypting test scripts

If you want to pass on a test script without giving away the source code of it, you can also save an encrypted version of it. Proceed as in "Saving a test script", but enable the Save Encrypted File check box.
Scriptor will save two versions of the file: an unencrypted RBT file (which can be used to archive and maintain the source code) and an encrypted RBE file (which can be passed on).



Editing the test script

Selecting the instrument model

Depending on the type of instrument, there are more or less commands and command groups available. Before editing the test script, the instrument model (e.g. 4400 or 4100) should be selected in the **Test Equipment** selection field.
When the file is saved, Scriptor performs a sanity check on the commands and their sequence, taking into account the capabilities of the selected instrument.

Adding a new command

The test commands (test steps) are explained in ''Test command reference – Common commands'' on page 99. To add a new test command, proceed as follows:

1 In the Test Script Editor, use the **UP** and **DOWN** cursor keys to move the highlight bar in the test script to the command above the position where the new command should be inserted.

2 Click on the Test Steps tab containing the new command to be inserted, and click on the new command.

3 Click on the **>>** button. Alternatively, double-click on the new command. The command is inserted in the test script on the right-hand side.

Alternatively, simply select the test step from the list on the left-hand side, and use the mouse to drag it to the position within the test script on the right-hand side where it should be inserted.

Copying, moving or deleting commands

Multiple commands from the test script on the right-hand side can be copied, moved or deleted easily using standard Windows mechanisms, e.g. by dragging and dropping commands or by pressing keys.

1 Select one or several commands. The selection can be extended to several commands by holding the **SHIFT** key or the **CTRL** key and marking more commands.

2 Proceed with one of the following steps depending on our intention:

- In order to delete the selected commands, press the **DEL** key or **CTRL-X**. Alternatively, you can right-click on one of the command and select **Delete** from the context menu that pops up.
- In order to move the selected commands, press **CTRL-X**, place the cursor on the command under which the deleted commands shall be inserted, and press **CTRL-V**. You can also open the context menu with a click on the right mouse button to delete and paste the

commands.
Or move the commands to the new position by dragging them with the mouse.

– In order to copy the selected steps to an additional position, press **CTRL-C**, place the cursor on the command under which the copied commands shall be inserted, and press **CTRL-V**. Instead pressing keys on the keyboard, you can use the context menu that appears if you right-click the mouse over the respective test script commands.

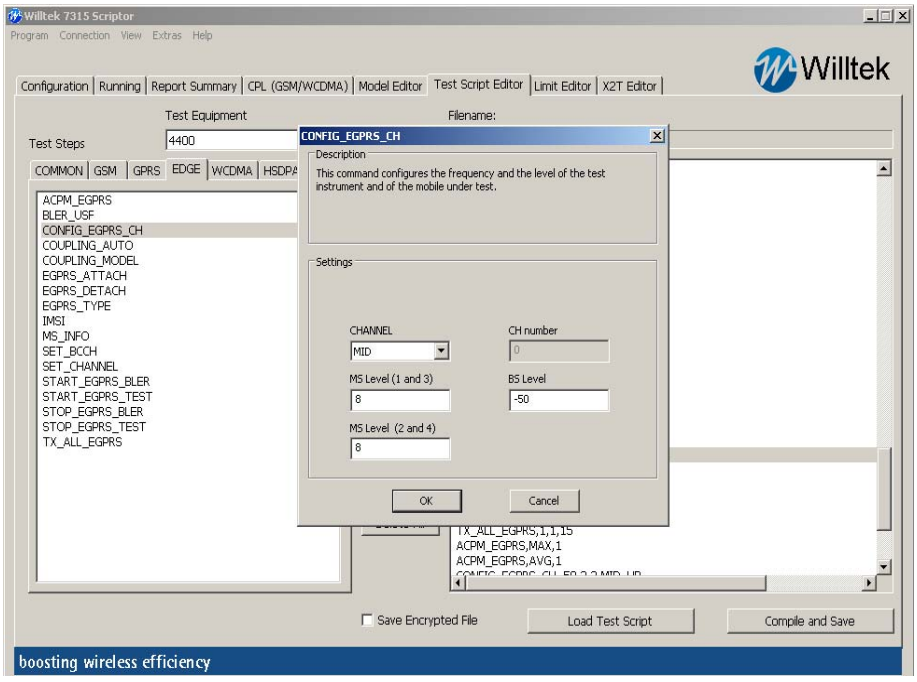
Editing test parameters

Many of the commands include one or multiple parameters separated by commas. The meaning of the test commands and their parameters is explained in "Test command reference – Common commands" on page 99. The parameters can be edited as follows:

1 In the section containing the test script currently being edited (right-hand side of the menu), double-click on the test command in question. A box containing a short description of the command and with entry fields for the test parameters opens.

2 Use the keyboard (including **DELETE** and **BACKSPACE** keys) to change the test parameters.

3 Confirm the changes by clicking **OK**.
The new test parameters are shown with the command.



Changing the sequence of commands

If you find that a test step is in the wrong position and should be moved further up or down, proceed as follows:

1 In the test script on the right-hand side, highlight the command to be moved.

2 Move the position by clicking the **Up** or **Down** button multiple times until the command is where you want it.

Enabling and disabling a command

Sometimes it can be useful to disable a command temporarily, for example for testing purposes. Scriptor supports this with the **En-/Disable** button. Just click on the command that you want to ''comment out'', and click on the **En-/Disable** button.
If the command was previously active, it becomes inactive by a comma in front of the command (text in the line behind a comma is not processed by the command interpreter). If the command was previously inactive, it becomes active again by removing the comma.

Deleting a command from the test script

Commands and their parameters can easily be removed from the text script: Place the highlight bar on the command to be removed, then click the **Delete** button.
The line command with the command in question disappears.

Deleting the entire test script

You can delete the whole test script by clicking on **Delete All**.
The section for the test script is emptied.

Note

All changes in the test script only become active after they are saved to a file.

Test command reference – Common commands

> ***Note***
> Parameters must be written in uppercase!

AUDIOOPTION	Description	Sets the audio frequency and volume at the AF out connector and takes a measurement. The result is displayed and logged in the results file.
	Parameters	AF-frequency,AF-volume AF-frequency – the audio frequency to be set, in hertz. AF-volume – the audio volume to be set, in % of the maximum volume.
	Notes	Requires a 4400 Series Mobile Phone Tester with the 4470 Audio Option installed.
	Example	AUDIOOPTION,1000,50
BLUETOOTH	Description	Performs a Bluetooth Go/NoGo test on the 3100 or the 4400 series instrument.
	Parameters	None.
	Notes	Requires the Bluetooth Connectivity Test Option to be installed in the test set if you are using a 3100 or a 4400 series instrument. If you are using a different test set, please see the BLUETOOTH_DIRECT command below. In addition, the Bluetooth Test parameter must be enabled in the Configuration > General menu for the test to be performed, see page 36.
	Example	BLUETOOTH
BLUETOOTH_DIRECT	Description	Performs a Bluetooth Go/NoGo test on the 4100, 4200 or 2201.
	Parameters	Port. Port – COM port number allocated to Willtek's Bluetooth USB device (4941 Bluetooth Hardware) on the PC.
	Notes	Requires the (dongle-based) 7361 Bluetooth Connectivity Test License to be installed in the PC running Lector Enhanced or Scriptor. In addition, the Bluetooth Test parameter must be enabled in the Configuration > General menu for the test to be performed, see page 36.
	Example	BLUETOOTH_DIRECT,1
CHECK_VERSION	Description	Compares the software version number of the instrument (e.g. the 4400 Mobile Phone Tester) with the version specified in the parameter. If the instrument bears an older

		version, the test is halted with an error message. Two version numbers can be specified as a minimum requirement: one for the old and one for the new control processor (PC) board.
	Parameters	Version1, Version2 Version1 – Minimum version number for the old control processor board. If you do not want the software to run with the old board, specify 9.99. Version2 – Minimum version number for the new control processor board.
	Example	CHECK_VERSION,6.20,11.20
CONTINUE_STOPWATCH	Description	Resumes time counting with the internal stopwatch after pausing. See also PAUSE_STOPWATCH command.
	Parameters	None.
	Notes	See also TIME_STAMP, RESET_STOPWATCH and PAUSE_STOPWATCH commands.
	Example	CONTINUE_STOPWATCH
COUPLING_DATA	Description	The coupling loss factors given by the parameters are taken into account, rather than using an existing coupling loss file. Up to ten frequency and attenuation pairs are possible in both the lower band from 800 to 1000 MHz and the upper band from 1700 to 2000 MHz. The factors are internally referenced by a name. The pairs (coupling loss points) characterize the behavior of the coupling loss over frequency.
	Parameters	Description,f1,a1,f2,a2,... Description – name for the coupling loss data, in quotation marks. f1, f2, ... – Frequency of the coupling loss point, in MHz a1, a2, ... – attenuation at the coupling loss point, in dB.
	Notes	See also COUPLING_LOSS command.
	Example	COUPLING_DATA,"setup-2",830.0,0.75,900.0,1.15,1750,2.35,1800,2.85,1850,3.35
COUPLING_LOSS	Description	Coupling loss factors are applied during the test; these factors are used to adjust the output power level and the power measurement. The file describes the frequency response of the uplink and the downlink frequencies used during test. You can use existing files or create, adjust or adapt your own coupling loss files, and then load the appropriate file with this command.
	Parameters	File_name File_name – the name of a coupling loss file.

	Notes	See also COUPLING_DATA command.
	Example	COUPLING_LOSS,"ev_dual.cpl"
DESCRIPTION	Description:	The description is written to the results file (if results are logged to a file).
	Parameters:	Label Label – Contains the label of a test.
	Note:	Do not separate words by comma because a comma is used to separate parameters.
	Example:	DESCRIPTION,Customer - final test
END_CMD	Description:	Closes a serial (RS-232) connection to an external device.
	Parameters:	None.
	Notes	See also INIT_CMD, SEND_CMD commands.
	Example:	END_CMD
FIXTEXT	Description:	User-defined text is displayed onscreen and in the test protocol.
	Parameters:	Text Text – Text to be displayed.
	Example:	FIXTEXT,This is an example text
IMEI_RDCMP	Description	This command can be used in test scripts (e.g. called up from the X2TEST procedure) where the IMEI is entered by the keyboard or a barcode reader. The command compares the IMEI entered with the one received when the phone registered with the network. If the two IMEIs do not match, an error message is displayed onscreen. The IMEI Comparison parameter must be enabled in the Configuration > General menu for the test to be performed, see page 36.
	Parameters	None.
	Example	MS_INFO IMEI_RDCMP
INIT_CMD	Description	Sets up the serial (RS-232) interface of the PC to initiate a connection.
	Parameters	COM-PORT – Number of the serial port in the PC to be used. Baudrate – Gross data rate for the serial interface, in kbit/s; allowable values are 300, 600, 1200, 1800, 2400, 4800, 9600, 19200. Handshake – Hardware or software handshake being used on the serial interface. Allowable entries: NONE, RTS, CTS,

		XON-XOFF. Timeout – Period in milliseconds until the PC software gives up connecting the remote device.
	Notes	See also SEND_CMD, END_CMD commands.
	Example	INIT_CMD,1,19200,NONE,1000 SEND_CMD,ATS0=1 END_CMD
LAP	Description	Starts and stops an internal stopwatch, e.g. to calculate the effective measurement time (without waiting for user inputs or network searching). The stopwatch can identify different time intervals. Use the TIME_STAMP command to stop the stopwatch and calculate the sum of all intervals.
	Parameters	IntervalNo – Number of the interval to start or stop. Mode – Action to perform, can take on the following values: START, STOP. The time intervals must not be overlapping.
	Notes	See also TIME_STAMP command.
	Example	LAP,1,START LAP,1,STOP LAP,2,START TIME_STAMP,''Test finished''
LIMIT	Description	This command specifies the file containing the test limits that are applicable during the test.
	Parameters	Limitfile Limitfile – Full file name containing the limits. The file must be located in the directory specified in the Configuration menu.
	Note	The limits file must be specified before any test is started.
	Example	LIMIT,limit.lim
MESSAGE	Description	Displays a message in a pop-up window.
	Parameters	MessageText MessageText – The text to be displayed.
	Notes	Do not separate words in the message text by comma because a comma is used to separate parameters. See also USER_INPUT, USER_QUERY commands.
	Example	MESSAGE,Test starts now
PAUSE	Description	Pauses execution and displays a ''Test paused'' box until the user clicks on the Continue button.
	Parameters	None.
	Example	PAUSE

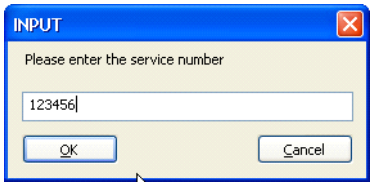
PAUSE_STOPWATCH	Description	This command stops the internal stopwatch without resetting it. The command to resume time counting is CONTINUE_STOPWATCH.
	Parameters	None.
	Notes	See also TIME_STAMP, RESET_STOPWATCH and CONTINUE_STOPWATCH commands.
	Example	PAUSE_STOPWATCH
POW_MEAS	Description	Starts a current measurement at the MS Power output.
	Parameters	Measurement_Type Measurement_Type – allowable settings are AVG for averaged results or PEAK for a peak measurement.
	Notes	Requires a 4400 Series Mobile Phone Tester with the MS Power Supply Option and the Current Measurement Option installed. The output power voltage should be set before starting tests, see POW_VOLT and POW_SUPPLY commands.
	Example	POW_MEAS,AVG
POW_SUPPLY	Description	Switches the MS Power Supply Option of the 4400 Series Mobile Phone Tester on or off.
	Parameters	State State – power supply state to switch to (ON or OFF).
	Notes	Requires the option to be installed.
	Example	POW_VOLT,3.5 POW_SUPPLY,ON
POW_VOLT	Description	Sets the voltage at the MS Power output connector of the 4400 Series Mobile Phone Tester.
	Parameters	Voltage Voltage – the voltage to be set in the power supply option.
	Notes	Requires a 4400 with the MS Power Supply Option installed.
	Example	POW_VOLT,3.5 POW_SUPPLY,ON
QUERY_CMD	Description	Sends a command or query to a device connected to the serial interface (RS-232), waits for the response and logs it in the results file. If the response is not as expected, the command or query is sent again until a timeout is reached.
	Parameters	Command,Printout,Response,Timeout Command – the command or query that is to be sent to the device. Printout – text that is written to the test protocol. In addition, a pass or fail statement will be printed.

		Response – the string that is expected to be sent back over the serial interface. If the actual return string is not the expected response then the command is resent. Timeout – time in seconds that Lector waits for the response or resends the command before proceeding with the test script. In case of a timeout, the Printout text will be written to the results file along with a Fail verdict.
	Notes	The serial connection must be opened with the INIT_CMD before.
	Example	INIT_CMD,1,19200,NONE,1000 QUERY_CMD,*OPC?,Operation complete,1,3 END_CMD
PUSH_RESULT	Description	This command is used at the end of the test to store the test results in a file and/or send them to a printer.
	Parameters	None.
	Example	PUSH_RESULT
REM	Description	Comment text within the text script, will not be executed.
	Parameters	Comment Comment – Text that is only visible while editing the test script.
	Example	REM,Data initalisation starts here
RESET_STOPWATCH	Description	The internal stopwatch is set to zero and restarted. It enables time measurements for certain parts of the test. This command is useful if e.g. the measurement time or the time the call needs to be established is of interest.
	Parameters	None.
	Notes	See also TIME_STAMP command.
	Example	RESET_STOPWATCH
SEND_CMD	Description	Sends a text string to an external device connected to the PC over the serial port (RS-232), e.g. to the mobile phone. The connection must be intialized (using the INIT_CMD) before anything can be sent.
	Parameters	String
	Notes	See also INIT_CMD, END_CMD commands.
	Example	INIT_CMD1,19200,NONE,1000 SEND_CMD,ATS0=1 END_CMD

SCPI_ASK	Description	Sends a query text string to the instrument (i.e. to the active device defined in **Connection > Define Interface**). Execution of the test script is halted until a response is received from the instrument. The response is written to the logfile (log.txt in the installation folder of Lector and Scriptor).
	Parameters	QueryString
	Notes	See also SCPI_CMD command.
	Example	SCPI_ASK,*IDN?
SCPI_CMD	Description	Sends a text string to the instrument (i.e. to the active device defined in **Connection > Define Interface**).
	Parameters	CommandString
	Notes	See also SCPI_ASK command.
	Example	SCPI_CMD,*CLS
SCPI_QUERY	Description	Sends a text string (query) to the instrument (i.e. to the active device defined in **Connection > Define Interface**), waits for the response and logs it in the results file. If the response is not as expected, the command or query is sent again until a timeout is reached.
	Parameters	Command,Printout,Response,Timeout Command – the command or query that is to be sent to the device. Printout – text that is written to the test protocol. In addition, a pass or fail statement will be printed. Response – the string that is expected to be sent back by the active device. If the actual return string is not the expected response then the command is resent. Timeout – time in seconds that Lector waits for the response or resends the command before proceeding with the test script. In case of a timeout, the Printout text will be written to the results file along with a Fail verdict.
	Notes	See also the SPCI_CMD, SCPI_ASK commands.
	Example	SCPI_QUERY,*OPC?,Operation complete,1,3
STOP	Description	Terminates execution of the test script.
	Parameters	None.
	Example	STOP
STORAGE_PATH	Description	Redefines the folder where result files are stored. The Result Folder Path parameter in the Configuration > General menu is overwritten by the new text string. – The command can

		be used e.g. to store result files depending on the test script being used. The results folder can be given as an absolute or relative address, but it must already exist.
	Parameters	Folder Folder – the (absolute or relative) path.
	Example	STORAGE_PATH,C:\temp
TEST_CHANNEL	Description	Specifies the name of a file containing the channel numbers to be used for testing. The file can be created from the Configuration > Test Channels tab and must be located in the Channels folder. See ''Frequency band settings'' on page 42 for more details.
	Parameters	Filename Filename – name of a text file.
	Example	TEST_CHANNEL,channel.tcf
TIME_STAMP	Description	This command effectively stops a timer that is started when the test script starts to run. The command can be used for the overall test time calculation. It stops the test run and the LAP timers, displays the resulting test time and the accumu-latedmeasurement time intervals found with LAP and places the instrument in idle mode. Other commands can restart (RESET_STOPWATCH), pause (PAUSE_STOPWATCH) or continue (CONTINUE_STOPWATCH) the timer. The command does not affect the LAP command which is used for a different set of timers.
	Parameters	Type Type – can take on the following value: ''Test finished''
	Notes	See also RESET_STOPWATCH, PAUSE_STOPWATCH, CONTINUE_STOPWATCH and LAP commands.
	Example	TIME_STAMP,Test finished
USER_INPUT	Description	Opens a pop-up menu with a query and the possibility for the user to enter text. The text is then copied to the result file.
	Parameters	QueryText,ResultFileText QueryText is the text appearing in the menu above the input field, and should specify what the user is asked to enter. The text should be entered without quotation marks and without a comma as part of the title. ResultFileText is the text appearing in the results log file in front of the text that the user has entered. The text should be entered without quotation marks and without a comma as part of the title.
	Notes	See also the USER_QUERY, MESSAGE commands.

Example USER_INPUT,Please enter the service number, Service number:



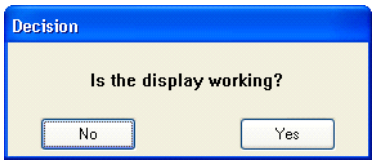
USER_QUERY

Description Opens a pop-up menu with a query (e.g. a yes/no decision). The answer is added to the result file.

Parameters QueryText,ResultFileText,LeftButtonText,RightButtonText
QueryText is the text appearing in the menu, and should be the question (or the decision to take). The text should be entered without quotation marks and without a comma as part of the title.
ResultFileText is the text appearing in the results log file in front of the text that the user has entered. The text should be entered without quotation marks and without a comma as part of the title.
LeftButtonText is the text appearing on the left-hand button in the pop-up menu, and should be very short.
RightButtonText is the text appearing on the right-hand button in the pop-up menu, and should be very short.

Notes See also the USER_INPUT, MESSAGE commands.

Example USER_QUERY,Is the display working?,Display is functional:,No,Yes



WAIT

Description Pauses execution of the test script for a given time.

Parameters Waittime
Waittime – time to pause execution, in milliseconds.

Example WAIT,250

Test command reference – GSM commands

ACPM_GSM	Description	Initiates a number of spectrum measurements, either spectrum due to modulation or spectrum due to switching transients.
	Parameters	Mode,Count,Measurements Mode – the measurement type. Set AVG for spectrum due to modulation or MAX for spectrum due to switching transients. Count – Specifies the number of measurements to be performed. Measurements – Specifies the channel offset frequencies at which the measurement is to be taken.
	Example	ACPM_GSM,AVG,5,0
AUDIO	Description	The speech loopback is activated and the incoming voice on the microphone of a mobile is echoed on the loudspeaker. The user is instructed to check whether both are working or not. Before using this command, the bit error rate loop must be opened first, otherwise speech loopback cannot work.
	Parameters	Signal Signal – LOOPBACK for speech loopback in the instrument.
	Notes	See also BER_LOOP command.
	Example	AUDIO,LOOPBACK
BER_LOOP	Description	When a BER loop is closed then the appropriate measurement is started and can run in parallel to other measurements. A call needs to be established first.
	Parameters	Type,Count,Delay Type = 0: Opens the BER loop. Type = 1: Residual BER (A-loop). Type = 2: Nonresidual BER (B-loop). Type = 3: Fast BER (C-loop). Count – Specifies the number of bits for comparison of received with transmitted bits. Delay – Specifies the round-trip delay, which is the delay of the bits until they are looped back to the test instrument. If set to 0 then the instrument determines the round-trip delay before starting a measurement.
	Notes	The BER loop requires a Test SIM (with network parameters MCC = 001, MNC = 01) to be used in the mobile phone, otherwise the phone will not close the BER loop. When the BER loop is switched on, the Audio speech loop is switched off automatically. See also RBER_ALL, FBER_ALL, AUDIO commands.
	Example	BER_LOOP,1,8200,0

CALL_BY_BS	Description	A base station call is initiated by the test program. If the mobile responds within 90 seconds the call will be established, otherwise a time-out is displayed and the test is stopped.
	Parameters	None.
	Notes	The base station simulation should be started before the phone is switched on: The phone may have scanned the BCCH frequency already, and it depends on the phone when it restarts the scan again, hence it may take a while until the network is found and the call is established. See also CALL_BY_MS, TERM_BY_MS, TERM_BY_BS commands.
	Example	CALL_BY_BS
CALL_BY_MS	Description	Prepares the tester for accepting an incoming call (originated by the phone). If a call is established within 90 seconds, the program continues the test; otherwise, a time-out is displayed and the test is stopped. The number to dial (see Parameters) is displayed and when the call is initiated by the phone, the number is compared with the received number.
	Parameters	Number Number – Phone number to dial (will be displayed onscreen).
	Notes	The base station simulation should be started before the phone is switched on: The phone may have scanned the BCCH frequency already, and it depends on the phone when it restarts the scan again, hence it may take a while until the network is found and the call is established. See also CALL_BY_BS, TERM_BY_MS, TERM_BY_BS commands.
	Example	CALL_BY_MS,+1234567890
CONFIG_BS_LEVEL	Description	Sets the power level transmitted by the instrument.
	Parameters	BS-Level BS-Level – power level of the instrument, in dBm.
	Notes	See also CONFIG_CH
	Example	CONFIG_BS_LEVEL,-70
CONFIG_CH	Description	This command sets the actual traffic channel frequency and the power level of the test instrument and the mobile under test.
	Parameters	BSLevel,MSLevel,TCH BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10. MSLevel – The MS level can be set as a power level step in

		the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band. TCH – Defines the number of the traffic channel by way of one of the following expressions: LOW, MID, HIGH for the lower band, LOW_UP, MID_UP, HIGH_UP for the higher band, and LOW_TRI, MID_TRI, HIGH_TRI for the third band in the triple-band case. This sets the traffic channel according to the settings in the applicable **Configuration > GSM** menu.
	Notes	See also GSM_TYPE, SET_CHANNEL, SET_BCCH, CONFIG_BS_LEVEL, CONFIG_TCH_MSLEVEL
	Example	CONFIG_CH,-60,10,LOW
CONFIG_TCH_MSLEVEL	Description	This command configures the TCH number and the power level to be applied by the phone.
	Parameters	TCH,MSLevel TCH – traffic channel frequency number MSLevel – The MS level can be set as a power level step in the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band.
	Notes	See also CONFIG_CH.
	Example	CONFIG_TCH_MSLEVEL,5,10
COUPLING_AUTO	Description	Uses the TAC (type approval code) of the phone to set the coupling factors for the mobile phone, according to the entry in the coupling factor databases. The factors are frequency-dependent, therefore the frequency band must be specified. If the phone's IMEI has not been read as yet, the command will query the phone.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_MODEL.
	Example	COUPLING_AUTO,900/1800
COUPLING_MODEL	Description	Uses the entry for the selected group and subgroup in the coupling factor databases to set the coupling factors. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_AUTO.
	Example	COUPLING_MODEL,900/1800

FBER_ALL

Description: The fast bit error rate measurement is performed. The BER loop has to be closed first. The number of bits to be taken into account are specified when the loop is closed.

Parameters: None.

Notes: See also BER_LOOP, RBER_ALL commands.

Example:
```
BER_LOOP,1,3,20000
FBER_ALL
```

GSM_SENSITIVITY

Description: Decreases the instrument's output power level in specified steps until the bit error rate (BER) exceeds a specified value.

Parameters:
STEP,BER
STEP – step size of the power decrease, in dB.
BER – bit error rate at which the test stops.

Example: GSM_SENSITIVITY,2,0.1

GSM_TYPE

Description: Sets or changes the configuration between GSM 900/1800 and 900/1900. May be used during the test of triple-band phones. The current TCH and the BCCH should to be in the 900 MHz band because channel numbers are the same in the 1800 and 1900 MHz bands.

Parameters:
Band
Band – Specifies the band combination to activate. Allowable values are 900 and 1900, where ''900'' stands for the 900/1800 combination and ''1900'' stands for 900/1900.

Notes: See also SET_BCCH, SET_CHANNEL, CONFIG_CH.

Example: GSM_TYPE,900

IMSI

Description: Sets the IMSI (International Mobile Station Identity) for tests starting with paging the phone.

Parameters:
Number
Number – 15-digit IMSI.

Example:
```
IMSI,001011234567890
CALL_BY_BS
```

MES_TADV

Description: The timing measurement is carried out on the transmitted burst. It describes the measured offset to the current setting of the Timing Advance parameter, in microseconds, and should be zero. A delay of one bit period corresponds to 3.69 µs.

Parameters: None.

Notes: See also SET_TADV command.

Example:
```
SET_TADV,10
WAIT,1000
MES_TADV
```

MS_INFO

Description: The tester is commanded to read information from the mobile. This includes the IMSI number, IMEI number, the MS Class, and the dialed number if it was an MS Call. The dialed number will show only blank characters if a BS Call was performed.
This command is usually carried out just after the call has been established to get this IMEI number (serial number of the phone). As a consequence, the test protocol can be allocated to the right mobile even if the test terminates abnormally.

Parameters: None.

Notes: See also MS_REPORT and MS_INFO_ALL commands.

Example:
CALL_BS_BS
MS_INFO

MS_INFO_ALL

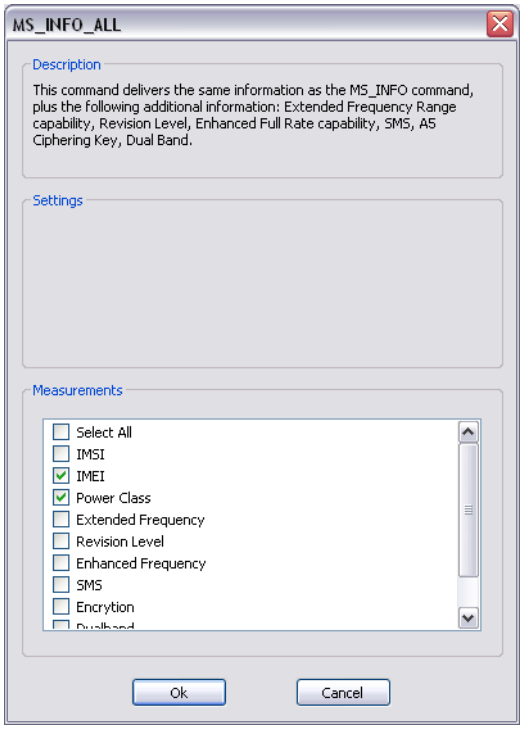
Description: This command delivers the same information as the MS_INFO command, plus the following additional information: Extended Frequency Range capability, Revision Level, Enhanced Full Rate capability, SMS, A5 Ciphering Key, Dual Band.

Parameters: Output
Output – This field indicates which parameters shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are:

- IMSI
- IMEI
- Power class
- Extended frequency range available
- Revision level
- Enhanced frequency
- SMS capabilities
- Encryption capabilities
- Dualband capability
- Dialed number

Notes: See also MS_INFO command.

Example:
MS_INFO_ALL, 6
Returns the IMEI and the power class.



MS_REPORT

Description: The measurement report from the mobile is read. It includes: RX Level, RX Quality, Power Control, Timing Advance.
The measurement itself is performed by the mobile.

Parameters: ExpRxQual, Output
ExpRxQual – The expected RX Quality value in the range from 0 (BER is lower than 0.2%) to 7 (BER is higher than 12.8%).
Output – This field indicates which parameters shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are:

- RX Level
- RX Quality

Notes: See also MS_INFO command.

Example: MS_REPORT,3,3

PHASE_MAX

Description: RMS-valued TX phase error measurements are performed as many times as given by the parameter and then the maximum is calculated. Could be carried out after TX_ALL measurement if maximum value is needed for RMS phase error only.

Parameters: Count
Count – Number of measurements to be carried out.

Notes: See also TX_ALL command.

	Example	PHASE_MAX,5
RBER_ALL	Description	RX-related measurements are performed: residual bit error rate, Class Ib, Class II and frame erasure rate. The number of bits to be taken into account is specified when the BER loop is closed.
	Parameters	Output Output – This field indicates which parameters shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – BER Class 2 – BER Class 1b – FER
	Notes	The BER loop has to be closed first. See also BER_LOOP, FBER_ALL, MS_REPORT commands.
	Example	BER_LOOP,1,8200,0 RBER_ALL BER_LOOP,0,0,0
SET_BCCH	Description	Sets the Broadcast Control Channel number.
	Parameters	BCCH BCCH – channel number of the Broadcast Control Channel. The channel numbers preloaded with the SET_CHANNEL command are addressed with BCCH for the value in the lower band, with BCCH_UP for the upper band and with BCCH_TRI for the third band in the triple-band case. This sets the Broadcast Control Channel number according to the settings in the applicable **Configuration > GSM** menu.
	Notes	The BCCH cannot be changed during an ongoing call. See also SET_CHANNEL, GSM_TYPE, CONFIG_CH.
	Example	SET_CHANNEL,GSM9001800 SET_BCCH,BCCH_UP CONFIG_CH,,,LOW
SET_CHANNEL	Description	The Low, Mid, High and BCCH channel numbers are predefined by this command, i.e. depending on the combination of frequency bands, the internal variables (such as LOW, MID, HIGH, BCCH for the lower band, LOW_UP, MID_UP, HIGH_UP, BCCH_UP for the upper band) are set. The real channel numbers can be modified by the user in the Configuration > Test Channels menu. This command has to be carried out before a channel setup is performed, usually at the beginning of a test script and when there is more

		than one set of (single, dual or triple-band) channels, e.g. in a quad-band test. Note that the actual channel must be set before a test is started (see CONFIG_CH, SET_BCCH).
	Parameters	Band Band – specifies the frequency bands used during the test. Allowable values: GSM850, GSM900, GSM8501900, GSM9001800, GSM9001900, E-GSM90018001900
	Example	SET_CHANNEL,GSM9001800 SET_BCCH,BCCH CONFIG_CH,,,LOW
SET_TADV	Description	Sets the Timing Advance to be applied by the phone while on a dedicated channel.
	Parameters	TA – Number in the range from 0 to 63 bits describing the Timing Advance in bit periods.
	Notes	After setting the Timing Advance the mobile may need some time for readjusting itself. See also MES_TADV.
	Example	SET_TADV,10 WAIT,1000 MES_TADV
SET_TSLOT	Description	Sets the time slot on which to apply the traffic channel.
	Parameters	Timeslot Timeslot – Slot number in the range from 2 to 6.
	Example	SET_TSLOT,5
TCH_TYPE	Description	Selects the type of voice traffic channel. The default is FR for Full Rate. The type of traffic channel cannot be changed while a call is established.
	Parameters	Codec Codec – type of voice channel. Allowable values are FR for full rate voice channel, and EFR for enhanced full rate.
	Example	TCH_TYPE,FR
TERM_BY_BS	Description	The test instrument initiates a call release.
	Parameters	None.
	Notes	See also TERM_BY_MS command.
	Example	CALL_BY_MS,+1234567890 FASTPOWER,10 TERM_BY_BS

TERM_BY_MS	Description	Prompts the user to initiate a call release on the phone (message "DISCONNECT" appears on the screen).
	Parameters	None.
	Notes	See also TERM_BY_BS command.
	Example	CALL_BY_BS TX_ALL,5 TERM_BY_MS
TRIPLEBAND	Description	The triple-band instruction is shown on the screen and the test is halted until the test is continued by pressing a button. It instructs the user to switch the mobile into PCS 1900 mode.
	Parameters	None.
	Notes	See also SET_CHANNEL, GSM_TYPE, CONFIG_CH, SET_BCCH commands.
	Example	TRIPLEBAND
TX_ALL	Description	All TX-related measurements are carried out; these are RMS and peak phase error, frequency error, TX power, template check, corner points and flatness.
	Parameters	Average, Output Average – Number of measurements to be carried out and averaged. Output – This field indicates which parameters shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – TX power – Template check – Frequency error – RMS phase error – Peak phase error – Timing advance
	Notes	See also TX_ALL_AVG, TX_POWER_AVG, PHASE_MAX commands.
	Example	TX_ALL,1,21
TX_POWER	Description	The TX Power of a mobile is measured only. No averaging or any other statistical evaluation is performed.
	Parameters	Average Average – Number of measurements to be carried out and averaged.

	Notes	See also TX_POWER_AVG, FASTPOWER, TX_ALL, TX_ALL_AVG commands.
	Example	TX_POWER,1
TX_TEMPLATE	Description	Compares the burst power shape of the phone with the template. The result is a Pass or Fail. This measurement is also performed with the TX_ALL command.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also TX_ALL command.
	Example	TX_TEMPLATE

Test command reference – GPRS commands

ACPM

Description: Initiates a number of spectrum measurements while a GPRS uplink channel is active (initiated by the START_BLER_USF command), either spectrum due to modulation or spectrum due to switching transients.

Parameters: Mode, Count, Output
Mode – AVG or MAX, where AVG performs modulation spectrum measurements and MAX performs switching transients measurements.
Count – Number of measurements to be carried out.
Output – This field indicates which measurements at frequency offsets from the carrier shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are:

- +/-100 kHz
- +/-200 kHz
- +/-250 kHz
- +/-400 kHz
- +/-600 kHz
- +/-800 kHz
- +/-1000 kHz
- +/-1200 kHz
- +/-1400 kHz
- +/-1600 kHz
- +/-1800 kHz

Notes: See also START_BLER_USF and STOP_BLER_USF commands.

Example:
```
START_BLER_USF,100
BLER_USF
ACPM,MAX,5,1156
STOP_BLER_USF
```

BLER_USF

Description: Starts a BLER-USF measurement after an GPRS uplink channel has been set up with the START_BLER_USF command. The latter is also used to set the number of samples for the BLER-USF measurement.

Parameters: None.

Notes: See also START_BLER_USF and STOP_BLER_USF commands.

Example:
```
START_BLER_USF,100
BLER_USF
STOP_BLER_USF
```

CONFIG_GPRS_CH	Description	This command configures the frequency and the levels of the test instrument and of the mobile under test, in particular for multislot operation.
	Parameters	BSLevel,MSLevel1,MSLevel2,TCH BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10. MSLevel1 – The MS level in the first time slot can be set as a power level step in the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band. MSLevel2 – The MS level in the second time slot can be set as a power level step in the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band. TCH – Defines the number of the traffic channel by way of one of the following expressions: LOW, MID, HIGH. This sets the traffic channel according to the settings in the applicable **Configuration > GSM** menu.
	Notes	See also GPRS_TYPE, SET_CHANNEL, SET_BCCH
	Example	CONFIG_GPRS_CH,-50,8,8,MID
COUPLING_AUTO	Description	Uses the TAC (type approval code) last found to set the coupling factors for the mobile phone, according to the entry in the coupling factor databases. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_MODEL.
	Example	COUPLING_AUTO,900/1800
COUPLING_MODEL	Description	Uses the entry for the selected group and subgroup in the coupling factor databases to set the coupling factors. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_AUTO.
	Example	COUPLING_MODEL,900/1800
GPRS_ATTACH	Description	Initiates a GPRS Attach procedure. The mobile phone must be attached before a connection can be set up and measurements be performed.
	Parameters	None.
	Notes	See also GPRS_DETACH command.

	Example	GPRS_ATTACH TX_ALL_USF GPRS_DETACH
GPRS_DETACH	Description	Initiates a GPRS Detach procedure. The phone should be detached from the simulated network after tests have been performed.
	Parameters	None.
	Notes	See also GPRS_ATTACH command.
	Example	GPRS_ATTACH TX_ALL_USF GPRS_DETACH
GPRS_TYPE	Description	Sets or changes the configuration between GSM 900/1800 and 900/1900. May be used during the test of triple-band phones. The current TCH and the BCCH should to be in the 900 MHz band because channel numbers are the same in the 1800 and 1900 MHz bands.
	Parameters	Band Band – Specifies the band combination to activate. Allowable values are 900 and 1900, where ''900'' stands for the 900/1800 combination and ''1900'' stands for 900/1900.
	Notes	See also SET_BCCH, SET_CHANNEL, CONFIG_CH.
	Example	GPRS_TYPE,900
IMSI	Description	Sets the IMSI (International Mobile Station Identity) for tests starting with paging the phone.
	Parameters	Number Number – 15-digit IMSI.
	Example	IMSI,001011234567890 CALL_BY_BS
SET_BCCH	Description	Sets the Broadcast Control Channel number.
	Parameters	BCCH BCCH – channel number of the Broadcast Control Channel.
	Notes	The BCCH cannot be changed during an ongoing call. See also SET_CHANNEL, GPRS_TYPE.
	Example	SET_BCCH,63
SET_CHANNEL	Description	The Low, Mid, and High channels are defined by this command. The real channel numbers can be modified by the user in the Configuration > Test Channels menu. This command has to

		be carried out before a channel setup is performed, usually at the beginning of a test script and when the frequency band is changed in a multi-band test.
	Parameters	Band Band – specifies the frequency bands used during the test. Allowable values: GSM850, GSM900, GSM8501900, GSM9001800, GSM9001900, E-GSM9001800, E-GSM9001900, E-GSM90018001900
	Example	SET_CHANNEL,E-GSM9001800
START_BLER_USF	Description	Activates a GPRS uplink channel so that BLER-USF and transmitter measurements become possible. The actual measurement is started with BLER_USF, and the channel is released with STOP_BLER_USF.
	Parameters	Samples, Slots Samples – Number of samples for a BLER measurement. Slots – Number of time slots used on the uplink.
	Notes	See also BLER_USF and STOP_BLER_USF commands.
	Example	START_BLER_USF,100,2 BLER_USF STOP_BLER_USF
START_GPRS_TEST	Description	Activates a GPRS uplink channel so that transmitter measurements become possible. The actual measurement is started with BLER_USF, and the channel is released with STOP_GPRS_TEST.
	Parameters	Slots Slots – Number of time slots used in the uplink.
	Notes	See also STOP_GPRS_TEST command.
	Example	START_GPRS_TEST,2 TX_ALL_GPRS,10,1 STOP_GPRS_TEST
STOP_BLER_USF	Description	Releases the GPRS channel that was previously activated with the START_BLER_USF command.
	Parameters	None.
	Notes	See also START_BLER_USF and BLER_USF commands.
	Example	START_BLER_USF,100,2 BLER_USF STOP_BLER_USF
STOP_GPRS_TEST	Description	Releases the uplink channel previously established with the START_GPRS_TEST command.
	Parameters	None.

	Notes	See START_GPRS_TEST command.
	Example	START_GPRS_TEST,2 TX_ALL_GPRS,10,1 STOP_GPRS_TEST
TX_ALL_GPRS	Description	Initiates a number of transmitter measurements while a GPRS uplink channel is active (initiated by the START_BLER_USF command). The measurements are: Phase Error RMS, Phase Error Peak, Frequency Error, TX Power, Timing Advance, Template Check.
	Parameters	Average, Timeslot, Output Average – Number of measurements to be carried out and averaged. Timeslot – Number of time slot to be measured. Output – This field indicates which measurements shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – TX power – Template check – Frequency error – RMS phase error – Peak phase error – Timing advance
	Notes	See also START_GPRS_TEST and STOP_GPRS_TEST
	Example	START_GPRS_TEST,2 TX_ALL_GPRS,10,1,21 STOP_GPRS_TEST
TX_ALL_USF	Description	Initiates a number of transmitter measurements while a GPRS uplink channel is active (initiated by the START_BLER_USF command). The measurements are: Phase Error RMS, Phase Error Peak, Frequency Error, TX Power, Timing Advance, Template Check.
	Parameters	Count, Timeslot, Output Count – Number of measurements to be carried out. Timeslot – Number of time slot to be measured. Output – This field indicates which measurements shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test

script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are:

- TX power
- Template check
- Frequency error
- RMS phase error
- Peak phase error
- Timing advance

Notes — See also START_BLER_USF and STOP_BLER_USF commands.

Example

```
START_BLER_USF,100,2
BLER_USF
TX_ALL_USF,10,1,13
STOP_BLER_USF
```

Test command reference – EDGE commands

ACPM_EGPRS

Description: Initiates a number of spectrum measurements while an EGPRS uplink channel is active (initiated by the START_EGPRS_TEST command), either spectrum due to modulation or spectrum due to switching transients.

Parameters: Mode, Count, Output
Mode – AVG or MAX, where AVG performs modulation spectrum measurements and MAX performs switching transients measurements.
Count – Number of measurements to be carried out.
Output – This field indicates which measurements at frequency offsets from the carrier shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are:

- +/-100 kHz
- +/-200 kHz
- +/-250 kHz
- +/-400 kHz
- +/-600 kHz
- +/-800 kHz
- +/-1000 kHz
- +/-1200 kHz
- +/-1400 kHz
- +/-1600 kHz
- +/-1800 kHz

Notes: See also START_EGPRS_TEST and STOP_EGPRS_TEST commands.

Example:
```
START_EGPRS_TEST
ACPM,AVG,3,546
STOP_EGPRS_TEST
```

BLER_USF

Description: Starts a BLER-USF measurement. The number of samples and the number of time slots is defined in the START_EGPRS_BLER command which also sets up the channel.

Parameters: None.

Notes: See also START_EGPRS_BLER, STOP_EGPRS_BLER

Example:
```
START_EGPRS_BLER,100,1
BLER_USF
STOP_EGPRS_BLER
```
Sets up an uplink EGPRS channel on one time slot, performs a measurement over 100 USF messages, and releases the channel.

CONFIG_EGPRS_CH	Description	This command configures the frequency and the level of the test instrument and of the mobile under test.
	Parameters	BSLevel,MSLevel1,MSLevel2,TCH BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10. MSLevel1 – The MS level on the first time slot can be set as a power level step in the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band. MSLevel2 – The MS level on the second time slot can be set as a power level step in the range from 5 to 19 in the lower band, and from 0 to 15 in the upper band. TCH – Defines the number of the traffic channel by way of one of the following expressions: LOW, MID, HIGH. This sets the traffic channel according to the settings in the applicable **Configuration > GSM** menu.
	Notes	See also EGPRS_TYPE, SET_CHANNEL, SET_BCCH
	Example	CONFIG_EGPRS_CH,-60,10,8,5
COUPLING_AUTO	Description	Uses the TAC (type approval code) last found to set the coupling factors for the mobile phone, according to the entry in the coupling factor databases. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_MODEL.
	Example	COUPLING_AUTO,900/1800
COUPLING_MODEL	Description	Uses the entry for the selected group and subgroup in the coupling factor databases to set the coupling factors. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_AUTO.
	Example	COUPLING_MODEL,900/1800
EGPRS_ATTACH	Description	Initiates an EGPRS Attach procedure. The mobile phone must be attached before a connection can be set up and measurements be performed.
	Parameters	None.
	Notes	See also EGPRS_DETACH command.
	Example	EGPRS_ATTACH

EGPRS_DETACH	Description	Initiates an EGPRS Detach procedure. The phone should be detached from the simulated network after tests have been performed.
	Parameters	None.
	Notes	See also EGPRS_ATTACH command.
	Example	EGPRS_DETACH
EGPRS_TYPE	Description	Sets or changes the configuration between GSM 900/1800 and 900/1900. May be used during the test of triple-band phones. The current TCH and the BCCH should to be in the 900 MHz band because channel numbers are the same in the 1800 and 1900 MHz bands.
	Parameters	Band Band – Specifies the band combination to activate. Allowable values are 900 and 1900, where ''900'' stands for the 900/1800 combination and ''1900'' stands for 900/1900.
	Notes	See also SET_BCCH, SET_CHANNEL, CONFIG_EGPRS_CH.
	Example	EGPRS_TYPE,900
IMSI	Description	Sets the IMSI (International Mobile Station Identity) for tests starting with paging the phone.
	Parameters	Number Number – 15-digit IMSI.
	Example	IMSI,001011234567890 CALL_BY_BS
SET_BCCH	Description	Sets the Broadcast Control Channel number.
	Parameters	BCCH BCCH – channel number of the Broadcast Control Channel.
	Notes	The BCCH cannot be changed during an ongoing call. See also SET_CHANNEL, GPRS_TYPE.
	Example	SET_BCCH,63
SET_CHANNEL	Description	The Low, Mid, and High channels are defined by this command. The real channel numbers can be modified by the user in the Configuration > Test Channels menu. This command has to be carried out before a channel setup is performed, usually at the beginning of a test script and when the frequency band is changed in a multi-band test.

	Parameters	Band Band – specifies the frequency bands used during the test. Allowable values: GSM850, GSM900, GSM8501900, GSM9001800, GSM9001900, E-GSM9001800, E-GSM9001900, E-GSM90018001900
	Example	SET_CHANNEL,E-GSM9001800
START_EGPRS_BLER	Description	This command initiates an EGPRS uplink channel, enabling EDGE BLER-USF and transmitter measurements.
	Parameters	Samples,Slots Samples – Number of samples (USF messages) to be used. Slots – Number of time slots to be measured.
	Notes	See also BLER_USF, STOP_EGPRS_BLER
	Example	START_EGPRS_BLER,100,1 BLER_USF STOP_EGPRS_BLER Sets up an uplink EGPRS channel on one time slot, performs a measurement over 100 USF messages, and releases the channel.
START_EGPRS_TEST	Description	This command activates an EGPRS uplink channel, enabling EDGE transmitter measurements.
	Parameters	Slots Slots – Number of time slots to be measured.
	Notes	See also STOP_EGPRS_TEST command.
	Example	START_EGPRS_TEST,2 TX_ALL_EGPRS,10,1 STOP_EGPRS_TEST
STOP_EGPRS_BLER	Description	This command releases an EGPRS uplink channel previously set up with the START_EGPRS_BLER command.
	Parameters	None.
	Notes	See also START_EGPRS_BLER, BLER_USF
	Example	START_EGPRS_BLER,100,1 BLER_USF STOP_EGPRS_BLER Sets up an uplink EGPRS channel on one time slot, performs a measurement over 100 USF messages, and releases the channel.
STOP_EGPRS_TEST	Description	Releases the EGPRS uplink channel previously set up with the START_EGPRS_TEST command.
	Parameters	None.
	Notes	See also START_EGPRS_TEST command.

	Example	START_EGPRS_TEST,2 TX_ALL_EGPRS,10,2 STOP_EGPRS_TEST
TX_ALL_EGPRS	Description	Starts a number of transmitter measurements on the EGPRS uplink channel previously set up with the START_EGPRS_TEST command. The measurement parameters are: TX Power, Template Check, Error Vector Magnitude RMS, Error Vector Magnitude Peak.
	Parameters	Average,Timeslot,Output Average – Number of measurements to be carried out and averaged. Timeslot – Uplink time slot to be measured. Output – This field indicates which measurements shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – TX power – Template check – RMS error vector magnitude – Peak error vector magnitude
	Notes	See also START_EGPRS_TEST and STOP_EGPRS_TEST commands.
	Example	START_EGPRS_TEST TX_ALL_EGPRS,10,1,9 STOP_EGPRS_TEST

Test command reference – WCDMA commands

ACLR	Description	Initiates an adjacent channel leakage ratio (ACLR) measurement; the results, in dBc, are averaged for each of the four adjacent channels (±5 and ±10 MHz).
	Parameters	Count Count – Number of measurements to be carried out.
	Example	ACLR,1
AUDIO	Description	The speech loopback is activated and the incoming voice on the microphone of a mobile is echoed on the loudspeaker. The is instructed to check whether both are working or not. Before using this command, the bit error rate loop must be opened first, otherwise speech loopback cannot work. A speech call must be active.
	Parameters	Signal Signal – LOOPBACK for speech loopback in the instrument.
	Example	CALL_BY_NB,SPEECH AUDIO,LOOPBACK
CALL_BY_NB	Description	CallType
	Parameters	CallType CallType = SPEECH: a voice channel is set up, the instrument loops back the voice data (echo function). CallType = LOOPBACK: a reference measurement channel RMC is set up and the data sent by the tester should be looped back by the phone.
	Notes	See SET_WCDMA_RMC, TERM_BY_NB commands.
	Example	CALL_BY_NB,SPEECH
CLOSED_LOOP	Description	The instrument sends a number of 1 dB power up or down commands in the closed loop power control to increase the power level by 10 dB nominally. The mobile phone should increase or decrease the power level in steps of 1 dB. The tester measures the step width and records the actual minimum and maximum step width. The power level is then directed to the original power level and the procedure repeats if more than one measurement is requested.
	Parameters	Direction,Count Direction – Can take on the values UP or DOWN for power steps up or down, respectively. Count – Number of measurements to be carried out.
	Notes	See also CLOSED_LOOPII
	Example	CLOSED_LOOP,UP,5

CLOSED_LOOPII	Description	The instrument sends a number of 1 dB power up or down commands in the closed loop power control to increase the power level by 10 dB nominally. The mobile phone should increase the power level in steps of 1 dB. The tester measures the overall power change (nominally 10 dB). The power level is then directed to the original power level and the procedure repeats if more than one measurement is requested.
	Parameters	Direction,Count Direction – Can take on the values UP or DOWN for power steps up or down, respectively. Count – Number of measurements to be carried out.
	Notes	See also CLOSED_LOOP
	Example	CLOSED_LOOPII,DOWN,1
CONFIG_CH	Description	This command configures the frequency and the power level of the test instrument and of the mobile under test.
	Parameters	BSLevel,MSLevel,TCH BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10. MSLevel – The MS level can be set in dBm. TCH – Channel; use HIGH, MID or LOW to reference the channel numbers, or enter an uplink channel number.
	Note	This command is also used for other access technologies.
	Examples	CONFIG_CH,-60,-30,LOW CONFIG_CH,-70,-35,9750
COUPLING_AUTO	Description	Uses the TAC (type approval code, part of the IMEI) last found to set the coupling factors for the mobile phone, according to the entry in the coupling factor databases. The factors are frequency-dependent, therefore the frequency band must be specified.
	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900. For the purpose of WCDMA testing, use the WCDMA value.
	Notes	This command is also used for other access technologies.
	Example	COUPLING_AUTO,WCDMA
	Notes	See also COUPLING_MODEL.
	Example	COUPLING_AUTO,900/1800
COUPLING_MODEL	Description	Uses the entry for the selected group and subgroup in the coupling factor databases to set the coupling factors. The factors are frequency-dependent, therefore the frequency band must be specified.

	Parameters	Mode Mode – Allowable entries are WCDMA, 850, 850/1900, 900, 900/1800, 1800, 1900.
	Notes	See also COUPLING_AUTO.
	Example	COUPLING_MODEL,WCDMA
MODULATION_ALL	Description	Initiates a number of measurements of the modulation quality parameters. The results are averaged.
	Parameters	Average Average – Number of measurements to be carried out and averaged. Output – This field indicates which measurements shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – RMS phase error – Peak phase error – Frequency error – RMS magnitude error – Peak magnitude error – RMS error vector magnitude – Peak error vector magnitude – Rho – I/Q offset – I/Q imbalance
	Example	MODULATION_ALL,10,69
MS_INFO	Description	The tester is commanded to read information from the mobile. This includes the IMSI number, IMEI number, the MS Class, and the dialed number if it was an MS Call. The dialed number will show only blank characters if a BS Call was performed. This command is usually carried out just after the call has been established to get this IMEI number (serial number of the phone). As a consequence, the test protocol can be allocated to the right mobile even if the test terminates abnormally.
	Parameters	None.
	Example	REGISTRATION, MS_INFO
OBW	Description	Initiates a number of occupied bandwidth (OBW) measurements; the results of the OBW (in MHz) are averaged.

	Parameters	Average Average – Number of measurements to be carried out and averaged.
	Example	OBW,1
OPEN_LOOP	Description	This command initiates a single open-loop power measurement.
	Parameters	None.
	Example	OPEN_LOOP
PCDE	Description	Initiates a number of peak code domain error (PCDE) measurements; the results are averaged.
	Parameters	Average Average – Number of measurements to be carried out and averaged.
	Example	PCDE,5
REGISTRATION	Description	Initiates registration or unregisters the mobile phone (required at the beginning and end of a test connection).
	Parameters	RegType RegType = YES: Invites the mobile phone to register. RegType = CLEAR: Clears the current registration.
	Example	REGISTRATION,YES CALL_BY_NB,LOOPBACK UL_POWER_MAX TERM_BY_NB,LOOPBACK REGISTRATION,CLEAR
RSCP	Description	Takes a sample of the received signal code power reported by the mobile phone.
	Parameters	None.
	Example	RSCP
SEM	Description	Initiates a number of spectrum emission mask (SEM) measurements; the results are compared to a template and if one area in all the measurements hits the template, the result is FAIL, otherwise PASS.
	Parameters	Count Count – Number of measurements to be carried out.
	Example	SEM,3
SET_CHANNEL	Description	Prepares the HIGH, MID, LOW channel variables for WCDMA (or another frequency band).

	Parameters	ChannelAllocation ChannelAllocation – specifies the frequency band(s) to be tested. Allowable inputs are: E-GSM9001800, E-GSM9001900, GSM850, GSM8501900, GSM1900, GSM9001800, GSM 9001900, WCDMA. For WCDMA testing, use WCDMA.
	Note	This command is also used for other access technologies.
	Example	SET_CHANNEL,WCDMA
SET_WCDMA_RMC	Description	Sets the type of Reference Measurement Channel to be used.
	Parameters	RMC RMC – specifies the data rate of the Reference Measurement Channel, in kbit/s. Allowable inputs are: 12, 64, 144, 386.
	Example	SET_WCDMA,12
TERM_BY_NB	Description	This command initiates the test instrument to terminate an ongoing connection (call).
	Parameters	CallType CallType = SPEECH: a voice channel was set up. CallType = LOOPBACK: a reference measurement channel RMC was set up and the loopback is released.
	Notes	See also CALL_BY_NB command.
	Example	CALL_BY_NB,LOOPBACK TERM_BY_NB,LOOPBACK
UL_POWER_MAX	Description	Directs the mobile phone to transmit at its maximum power level, takes a number of measurements and averages the results.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also UL_POWER_MIN, UL_POWER_MEAN commands.
	Example	UL_POWER_MAX,10
UL_POWER_MEAN	Description	Takes a number of measurements of the current uplink power level and calculates the average value of the results.
	Parameters	Count Count – Number of measurements to be taken and averaged.
	Example	UL_POWER_MEAN,10

UL_POWER_MIN	Description	Directs the mobile phone to transmit at its minimum power level, takes a number of measurements and averages the results.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also UL_POWER_MAX, UL_POWER_MEAN commands.
	Example	UL_POWER_MIN,5
WCDMA_BER	Description	Sets the output power of the instrument to the level specified, and takes a number of BER measurements. The results are averaged.
	Parameters	Average,BSLevel Average – Number of measurements to be carried out and averaged. BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10.
	Example	WCDMA_BER,3,-106.7
WCDMA_BLER	Description	Sets the output power of the instrument to the level specified, and takes a number of BLER measurements. The results are averaged.
	Parameters	Samples,BSLevel Samples – Number of samples (blocks) that the instrument transmits to test the receiver. BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10.
	Example	SET_WCDMA_RMC,12 CALL_BY_NB,LOOPBACK WCDMA_BLER,100,-106.7 TERM_BY_NB,LOOPBACK
WCDMA_HANDOVER_TO_GSM	Description	Performs an inter-RAT handover from WCDMA to GSM.
	Parameters	Band,BSLevel,MSLevel,TCH, CallType Band – Allowable entries are GSM850, GSM8501900, GSM900, GSM9001800, GSM1800, GSM1900. BSLevel – Defines the level received from the simulated GSM base station in dBm, in the range from –120 to –10. MSLevel – The MS level on the GSM channel can be set in dBm. TCH – Channel; use HIGH, MID or LOW to reference the channel numbers. CallType – Allowable entries are Voice and RMC. This parameter lets you select between a voice channel and a reference measurement channel (RMC).
	Notes	A voice call must be active during the handover. If the phone is in idle mode, a WCDMA speech call will be set up. The call must not be in loopback mode!

	Example	CALL_BY_NB,SPEECH WCDMA_HANDOVER_TO_GSM,GSM9001800,-60,5,LOW, VOICE
WCDMA_SENSITIVITY	Description	Performs a receiver sensitivity measurement by decreasing the power (Ior) in defined steps until a certain bit error rate (BER) is exceeded.
	Parameters	StepSize,BERvalue StepSize – After each BER measurement, the power level, Ior, is decreased by this value, given in dB. BERvalue – The measurement is stopped and the current Ior value is noted when this BER value, expressed as a percentage, is exceeded.
	Example	WCDMA_SENSITIVITY,1,0.1 The instrument performs BER measurements, decreases its output power level by 1 dB between each measurement until the measurement result exceeds 0.1%.
WCDMA_TYPE	Description	Prepares the tester for WCDMA tests (initialization).
	Parameters	Band – Defines the WCDMA band in the range from 1 to 10.
	Example	WCDMA_TYPE,1

Test command reference – HSDPA commands

CALL_BY_NB	Description	CallType
	Parameters	CallType,TestMode,LoopbackType CallType = SPEECH: a voice channel is set up, the instrument loops back the voice data (echo function). CallType = LOOPBACK: a reference measurement channel RMC is set up and the data sent by the tester should be looped back by the phone. CallType = HSDPA-LOOPBACK: loopback measurements on HSDPA channels. TestMode – can take on the values BER or BER+BLER. These are two different test modes for HSDPA; some phones only support one method. The TestMode parameter is required only with CallType = HSDPA-LOOPBACK. LoopbackType = MAX-THROUGHPUT: the maximum data throughput rate is tested in HSDPA. LoopbackType = TX-MEAS: the transmitter measurements can be performed while in HSDPA loopback mode. LoopbackType = MAX-INPUT-LEVEL: the HSDPA receiver measurement is performed at an input level of –25 dBm.
	Notes	See TERM_BY_NB command. Due to power level restrictions in the tester, the MAX-INPUT-LEVEL loopback test is not supported in conjunction with the 4916 Antenna Coupler.
	Example	CALL_BY_NB,SPEECH
CONFIG_CH	Description	This command configures the frequency and the power level of the test instrument and of the mobile under test.
	Parameters	BSLevel,MSLevel,TCH BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10. MSLevel – The MS level can be set in dBm. TCH – Channel; use HIGH, MID or LOW to reference the channel numbers, or enter an uplink channel number.
	Note	This command is also used for other access technologies.
	Examples	CONFIG_CH,-60,-30,LOW CONFIG_CH,-70,-35,9750
HSDPA_ACLR	Description	Initiates an adjacent channel leakage ratio (ACLR) measurement; the results, in dBc, are averaged for each of the four adjacent channels (±5 and ±10 MHz).
	Parameters	Count Count – Number of measurements to be carried out.
	Example	HSDPA_ACLR,1

HSDPA_ATTACH

Description: Initiates an HSDPA Attach. The Attach is a prerequisite for setting up a connection and performing subsequent measurements. If the wireless device does not attach within the timeout limit specified, the HSDPA Attach fails.

Parameters: Timeout
Timeout = `number` (valid range 1to 1000): uses the timeout value specified in seconds.

Example: HSDPA_ATTACH,140

HSDPA_BLER

Description: Sets the output power of the instrument to the level specified, and takes a number of BLER measurements. The results are averaged.

Parameters: Samples,BSLevel
Samples – Number of samples (blocks) that the instrument transmits to test the receiver.
BSLevel – Defines the base station level (RF output level of the instrument) in dBm, in the range from –120 to –10.

Example:
CALL_BY_NB,LOOPBACK
HSDPA_BLER,100,-106.7
TERM_BY_NB,LOOPBACK

HSDPA_MODULATION_ALL

Description: Initiates a number of measurements of the modulation quality parameters. The results are averaged.

Parameters: Average
Average – Number of measurements to be carried out and averaged.
Output – This field indicates which measurements shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section.
Parameters that can be affected are:

- RMS phase error
- Peak phase error
- Frequency error
- RMS magnitude error
- Peak magnitude error
- RMS error vector magnitude
- Peak error vector magnitude
- Rho
- I/Q offset
- I/Q imbalance

Example: HSDPA_MODULATION_ALL,10,69

HSDPA_OBW

Description: Initiates a number of occupied bandwidth (OBW) measurements; the results of the OBW (in MHz) are averaged.

	Parameters	Average Average – Number of measurements to be carried out and averaged.
	Example	HSDPA_OBW,1
HSDPA_POWER_MAX	Description	Directs the mobile phone to transmit at its maximum power level, takes a number of measurements and averages the results.
	Parameters	Count Count – Number of measurements to be carried out.
	Example	HSDPA_POWER_MAX,10
HSDPA_TYPE	Description	Initializes the tester for HSDPA tests, in particular for the WCDM and HSDPA frequency band.
	Parameters	Band Band – Allowable entries are 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.
	Example	HSDPA_TYPE,1
MS_INFO	Description	The tester requests information from the wireless device and forwards it to Lector and Scriptor. Information gathered includes IMSI, IMEI, MS class and, for an MS call, the dialed number (left blank for a BS call).
	Parameters	None.
	Example	MS_INFO
SET_CHANNEL	Description	The Low, Mid, and High channels are defined by this command. The real channel numbers can be modified by the user in the Configuration > Test Channels menu. This command has to be carried out before a channel setup is performed, usually at the beginning of a test script and when the frequency band is changed in a multi-band test.
	Parameters	Band Band – specifies the frequency bands used during the test. Allowable values: GSM850, GSM900, GSM8501900, GSM9001800, GSM9001900, E-GSM9001800, E-GSM9001900, E-GSM90018001900, WCDMA
	Example	SET_CHANNEL,WCDMA
TERM_BY_NB	Description	This command initiates the test instrument to terminate an ongoing connection (call).

	Parameters	CallType CallType = SPEECH: a voice channel was set up. CallType = LOOPBACK: a reference measurement channel RMC was set up and the loopback is released.
	Notes	See also CALL_BY_NB command.
	Example	CALL_BY_NB,LOOPBACK TERM_BY_NB,LOOPBACK
THROUGHPUT	Description	This command performs the maximum throughput test. The result is obtained in terms of Mbit/s, and depends on the UE Category, see Table 13 on page 183.
	Parameters	None.
	Example	CALL_BY_NB,LOOPBACK THROUGHPUT TERM_BY_NB,LOOPBACK

Test command reference – CDMA commands

AREA_CODE_LESS_THAN_OR_EQUAL	Description	This command checks the area code of the phone's MIN. If the area code exceeds the value entered, the test will fail. The command should be applied immediately after setting up a call.
	Parameters	MaximumMIN MaximumMIN – The highest value that the MIN of the phone under test may take on.
	Notes	See also **ESN_MEID_NOT_ALL_0, ESN_MEID_NOT_ALL_F.**
	Example	CDMA_CALL_BY_BS AREA_CODE_LESS_THAN_OR_EQUAL,201
CDMA_CALL_BY_BS	Description	This command is used to page the mobile. Once the mobile is on a call registration information is retrieved from the mobile and printed. The optional parameter can be used to stop the printing of the registration information. This may be desirable if this information has already been printed by some other means.
	Parameters	[NotPrintMobileInfo] NotPrintMobileInfo = 0: prints the registration information. The value is automatically set to 0 if it is not specified. NotPrintMobileInfo = 1: does not print the mobile registration information on the test printout.
	Example	CDMA_CALL_BY_BS This will cause the mobile to be paged, and the registration information will be printed since the optional parameter has not been used.
CDMA_CALL_BY_MS	Description	This command prepares the tester for an incoming CDMA call. With this function the operator is prompted to press all 12 keys on the mobile and originate a call. If the call is successful the digits dialed are printed. If the keypad test is enabled the presence of all 12 digits in the sequence dialed are tested for.
	Parameters	KeypadTest KeypadTest = number. 0 = Do not perform a keypad test. 1 = Perform a keypad test
	Example	CDMA_CALL_BY_MS,0 The operator will be prompted to originate a call from the mobile, and the keypad test will not be performed.

CDMA_FER_SETUP

Description: This command can be used to enable and use the FER, conf. level and frames parameters found in the 4400 manual mode FER menu. This allows for the control of the maximum number of frames that will be transmitted to the mobile during an FER test as well as the pass/fail parameters.

Parameters: MaxFram,ConfLev,LimLev,EnabOnOff
MaxFram = NULL: the frame error rate (FER) maximum frame count remains unchanged.
MaxFram = `number`: sets the frame error rate (FER) maximum frame count to the number specified (100 to 10000).
MaxFram = CONFIG: sets the frame error rate (FER) maximum frame count to the values specified in the applicable limits file.
ConfLev = NULL: the frame error rate (FER) pass/fail confidence level remains unchanged.
ConfLev = `number`: sets the frame error rate (FER) pass/fail confidence level to the number specified (90.0 to 100.0%).
ConfLev = CONFIG: sets the frame error rate (FER) maximum frame count to the values specified in the applicable limits file.
LimLev = NULL: the frame error rate (FER) pass/fail limit remains unchanged.
LimLev = `number`: sets the frame error rate (FER) pass/fail limit to the number specified (0.0 to 5.0%).
LimLev = CONFIG: sets the frame error rate (FER) maximum frame count to the values specified in the the applicable limits file.
EnabOnOff = NULL: the frame error rate (FER) pass/fail limit enable status remains unchanged.
EnabOnOff = ON: enables the frame error rate (FER) pass/fail limit.
EnabOnOff = OFF: disables the frame error rate (FER) pass/fail limit

Example: CDMA_FER_SETUP,200,100,,ON
The maximum FER test frame count is set to 200, the confidence level is set to 100% ensuring that all 200 frames will be transmitted, the pass/fail limit is not changed and the limit status is enabled.

CDMA_FER_VERR

Description: The instrument has the ability to perform RX and TX measurements concurrently, drastically reducing test times. This command utilizes this capability and allows TX vector error test and a mobile power test to be performed during a frame error rate (FER) test. The maximum power and minimum power tests run during FER utilize all up and all down power control bits respectively. Average power is run in accordance with the open loop estimate formula. A single occurrence of the TX vector error and power measurement is performed. The Count parameter controls the number of FER measurements performed.

Parameters

Count,BSLevel,TCHLevel[,AddTest] [,PowerControlReset] [,PrintOut]
Count = NULL: Count is set to 1.
Count = `number`: Count is set to number (1 to 100).
BSLevel = NULL: the 4400 RF output level remains unchanged.
BSLevel = MIN: sets the 4400 RF output level to the minimum base power specified.
BSLevel = `number`: sets the 4400 RF output level to the specified number in dBm (–120.0 to –10.0).
TCHLevel = NULL: the 4400 traffic channel level remains unchanged.
TCHLevel = CONFIG: sets the 4400 traffic channel level to the FER test traffic level specified.
TCHLevel = `number`: sets the 4400 traffic channel level (in dBm) to the number specified (–5.0 to –32.0).
AddTest = NULL: AddTest is set to 0.
AddTest = `number`: (7 if not supplied) additional TX tests are performed concurrently to frame error rate (FER) as follows:
0 = No TX tests
1 = TX vector error
2 = TX max power
3 = TX vector error and max power
4 = TX minimum power
5 = TX vector error and minimum power
6 = TX average power
7 = TX vector error and average power
PowerControlReset = NULL: PowerControlReset is set to FALSE.
PowerControlReset = FALSE: no power control reset of the mobile is performed at the conclusion of the FER test (default if not supplied).
PowerControlReset = TRUE: a power control reset of the mobile is performed at the conclusion of the FER test.
PrintOut = `number`: In the Test Script Editor, double-click on the **CDMA_FER_VERR** command and in the dialog box popping up, click on **Select**. You can now check the measurements that you want to appear in the results section:

- Waveform quality (rho)
- Frequency error
- Time error
- Carrier feedthrough
- IQ imbalance
- Peak phase error
- RMS phase error
- RMS vector error
- Peak magnitude error
- RMS magnitude error
- RF power

Examples

CDMA_FER_VERR,1,MIN,CONFIG
This command performs a single FER sensitivity test (the instrument's RF output level is set to the minimum base

power specified), and all of the TX tests listed under the Printout parameter (2047). The RF power test is average power, so the closed loop power control is not changed during the test.

CDMA_FER_VERR,1,-25,CONFIG,4
This command performs a single FER dynamic range test (the instrument's RF output level is set to –25 dBm), and a Minimum RF power test. Closed loop power control is set to all down bits during the test and is returned to the previous mode once the test is complete. The vector error tests are performed, but do not appear on the printout.

CDMA_FER_VERR,1,MIN,CONFIG,3
This command performs a single FER sensitivity test (the instrument's RF output level is set to the minimum base power specified), and all of the TX tests listed under the Printout parameter (2047). The RF power test is max power, so the closed loop power control is all up. A power control reset is not performed at the conclusion of the test, but the power control mode is returned to its initial state. All of the vector error tests are reported on the printout.

CDMA_FER_VERR,1,MIN,CONFIG,3,TRUE
This command performs a single FER sensitivity test (the 4400 RF output level is set to the minimum base power specified in the mobile settings), and all of the TX tests listed under the Printout parameter (2047). The RF power test is max power, so the closed loop power control is all up. A power control reset is performed at the conclusion of the test, and the power control mode is returned to its initial state. All of the vector error tests are reported on the printout.

CDMA_FER_VERR,1,MIN,CONFIG,3,TRUE,1163
This command performs a single FER sensitivity test (the 4400 RF output level is set to the minimum base power specified in the mobile settings), and all of the TX tests listed under the Printout parameter (2047). The RF power test is max power, so the closed loop power control is all up. A power control reset is performed at the conclusion of the test, and the power control mode is returned to its initial state. The vector error tests reported are RF power, rms vector error, carrier feedthrough, frequency error, and waveform quality (rho) (1024 + 128 + 8 + 2 + 1).

CDMA_HOFF_TRAF

Description: This command performs a handoff, and allows for changes in the band, channel, radio configuration, and service option. Changes in all four of these parameters are not recommended.

Parameters: Band,Chan,Rcon,Sopt
Band = NULL: the band is not changed.
Band = PRIMARY: sets the band to the first band in the dual-band test.

		Band = SECONDARY: sets the band to the second band in the dual-band test. Band = US800: sets the band to the US 800 MHz cellular band. Band = USPCS: sets the band to the US PCS 1900 MHz band. Band = KPCS: sets the band to the Korean PCS 1700 MHz band. Band = NMT450: sets the band to the 450 MHz band. Band = AWS: sets the band to the AWS band. Chan = NULL: the channel remains unchanged. Chan = CONTROL: sets the channel to the same value as the control channel. Chan = LOW, MID, HIGH: sets the channel to the value set for one of the channels in the long test. Chan = TRAFFIC: sets the channel to the value set in the traffic channel for the short test. Chan = `number`: sets the channel to this number (must be a valid channel number for the band selected) Rcon = NULL: the radio configuration remains unchanged. Rcon = CONFIG: sets the radio configuration to the value set. Rcon = `number`: sets the radio configuration to the value specified (range 1 to 5). Sopt = NULL: the service option remains unchanged. Sopt = CONFIG: sets the service option to the value set. Sopt = `number`: sets the radio configuration to the value specified (1, 2, 3, 9, 17, 55, 32768)
	Example	CDMA_HOFF_TRAF,US800,MID,, This command performs a handoff to the US 800 (cellular) band with the channel specified for the long test middle channel. The Rcon and Sopt are left empty, indicating that the current settings should be maintained.
CDMA_LEVEL	Description	This command sets the instrument's RF output level to the BaseLevel value. If BaseLevel is not supplied then no change is made.
	Parameters	BaseLevel BaseLevel = NULL: the 4400 RF output level remains unchanged. BaseLevel = MINIMUM: sets the instrument's RF output level to the minimum base power specified. BaseLevel = `number`: sets the instrument's RF output level to the specified number in dBm (–120.0 to –10.0).
	Example	CDMA_LEVEL,-40 The instrument's RF output level is set to –40.0 dBm.
CDMA_NETWORK	Description	Enables the CDMA mode of the instrument.
	Parameters	None.
	Example	CDMA_NETWORK

CDMA_POW

Description: This command performs a number (Count) of open loop power measurements on the mobile. If Count is greater than 1, minimum, maximum and average values are reported. If Count is NULL or 1 then the single measurement value is reported. The limits are determined by the open loop estimate formula.

Parameters: Count
Count = NULL: Count is set to 1
Count = number: (1 to 100)

Example: CDMA_POW,10
10 open loop power measurements are made and the maximum, minimum and average values are reported.

CDMA_POWER_CONTROL

Description: This command is used to set the closed loop power control mode of the instrument. The instrument can send all power up bits, all power down bits, or a specific number of power up or power down bits to the mobile. It can send alternating power up and power down bits to the mobile. It can also send the appropriate number of power up or power down bits to actively set the mobile output power to the correct level as determined by the open loop estimate formula (active).
The optional second parameter (reset) can be used in the alternating or active power control mode to reset the mobile output power to the value determined by the open loop estimate formula. This is a single shot operation. Once the reset is complete, the instrument returns to the alternating or active power control mode.

Parameters: PowCtrlCmd,[PowCtrlCmd]
PowCtrlCmd = UP: all power control bits are set to up.
PowCtrlCmd = DOWN: all power control bits are set to down.
PowCtrlCmd = ALTERNATING: alternating power control bits.
PowCtrlCmd = ACTIVE: active power control.
PowCtrlCmd = `number`: a specific number of down or up power control bits (–100 to +100 but not 0).
PowCtrlCmd = RESET: causes a power control reset procedure to be performed on the mobile.

Example: CDMA_POWER_CTRL, ALT,RESET
The instrument is set to the alternating power control mode, and the mobile is sent the appropriate number of power up or power down bits necessary to correct its power output as determined by the open loop estimate formula. Once the reset is complete, the instrument remains in the alternating mode.

CDMA_REL_BY_BS

Description: This command performs a base station release.

Parameters: None.

	Example	CDMA_REL_BY_BS This will cause the instrument to release the call to the mobile.
CDMA_TX_WQU	Description	This command performs a number of (Count) TX waveform quality measurements. If Count is not supplied it is set to 1. If Count is greater than 1 maximum, minimum, and average values are reported. Only the tests included in Printout are reported. The RF power test performed is open loop. Limits for RF power are based on the open loop estimate formula.
	Parameters	Count[,Printout] Count = NULL: Count is set to 1 Count = number: (1 to 100) Printout: Select the tests that are to be printed in the printout. In the Test Script Editor, open the CDMA_TX_WQU dialog box and click on Select to choose from the following measurements: Waveform quality (rho) Frequency error Time error Carrier feedthrough IQ imbalance Peak phase error RMS phase error RMS vector error Peak magnitude error RMS magnitude error RF power
	Example	CDMA_TX_WQU,,3 Since Count is not supplied, tests are reported as single values. Only waveform quality (rho) and frequency error are reported.
CDMA_TRAF	Description	This command sets the CDMA traffic channel parameters (Band, RF Channel, Radio Configuration, and Service Option) to explicit values (numbers).
	Parameters	Band,Chan,Rcon,Sopt Band = NULL: the band remains unchanged. Band = PRIMARY: sets the band to the first band in the dual-band test. Band = SECONDARY: sets the band to the second band in the dual-band test. Band = CELLULAR: sets the band to the US 800 MHz cellular band. Band = PCS: sets the band to the US PCS 1900 MHz band. Band = KOREAN: Set the band to the Korean PCS 1700 MHz band. Band = NMT450: sets the band to the 450 MHz band. Band = AWS: sets the band to the AWS band. Chan = NULL: the channel remains unchanged.

		Chan = CONTROL: sets the channel to the same value as the control channel. Chan = LOW, MID, HIGH: Set the channel to the value set for one of the channels in the long test. Chan = TRAFFIC: sets the channel to the value set in the traffic channel for the short test. Chan = `number`: sets the channel to this number (must be a valid channel number for the band selected). Rcon = NULL: the radio configuration remains unchanged. Rcon = CONFIG: sets the radio configuration to the preset value. Rcon = `number`: sets the radio configuration to the value specified (range 1 to 5). Sopt = NULL: the service option remains unchanged. Sopt = CONFIG: sets the service option to the preset value. Sopt = `number`: sets the radio configuration to the value specified (1, 2, 3, 9, 17, 55, 32768).
	Example	CDMA_TRAF, PRIME,LOW,CONFIG,CONFIG Sets the CDMA traffic band to the first band selected for a dual-band test. Sets the CDMA traffic channel to the low channel value selected for the long test. Sets the CDMA traffic radio configuration and service option to the values selected.
CDMA_VOICE_CHECK	Description	This performs a voice loopback check. The operator is prompted to perform a voice check and provide a pass/fail decision.
	Parameters	None.
	Example	CDMA_VOICE_CHECK
CHANGE_CCCH	Description	This command is used to set the CDMA control channel parameters (Band, RF Channel, SID, RF Level, MCC, MNC, and NID) to explicit values (numbers) or values set in the carrier settings file.
	Parameters	Band,Chan,SID,Level,MCC,MNC,NID Band = NULL: the band remains unchanged. Band = PRIMARY: sets the band to the first band in the dual-band test. Band = SECONDARY: sets the band to the second band in the dual-band test. Band = CELLULAR: sets the band to the US 800 MHz cellular band. Band = PCS: sets the band to the US PCS 1900 MHz band. Band = KOREAN: sets the band to the Korean PCS 1700 MHz band. Band = NMT450: sets the band to the 450 MHz band. Band = AWS: sets the band to the AWS band. Chan = NULL: the channel remains unchanged. Chan = CONTROL: sets the channel to the same value as the control channel.

		Chan = LOW, MID, HIGH: sets the channel to the value for one of the channels in the long test. Chan = TRAFFIC: sets the channel to the value of the traffic channel for the short test. Chan = number: sets the channel to this number (must be a valid channel number for the band selected). SID = NULL: the SID remains unchanged. SID = SID: sets the SID to the preset value. SID = number: sets the SID to the value specified (0 to 32768). Level = NULL: the RF level of the control channel. Level = number: sets the RF level of the control channel to the value specified, in dBm (–120 to 0). MCC = NULL: the mobile country code remains unchanged. MCC = number: sets the mobile country code to the value specified (0 to 999). MCC = CONFIG: sets the mobile country code to the value set in the carrier settings file. MNC = NULL: the mobile network code remains unchanged. MNC = number: sets the mobile network code to the value specified (0 to 99). MNC = CONFIG: sets the mobile network code to the value set in the carrier settings file. NID = NULL: the network ID remains unchanged. NID = number: sets the network ID to the value specified (0 to 65535). NID = CONFIG: sets the network ID to the value set in the carrier settings file.
	Example	CHANGE_CCCH,CELL,384,,-60,,, Sets the CDMA control channel to the cellular band channel 384. The SID (left empty) used is from the carrier settings file. The RF level is set to –60 dBm. The MCC, MNC, and NID are not changed.
COUPLING_AUTO	Description	This command activates usage of the user database for CDMA and EVDO. Coupling factors according to the selected Group and Subgroup will be applied.
	Parameters	Mode Mode – must be set to CDMA/EVDO.
	Example	COUPLING_MODE,CDMA/EVDO
ESN_MEID_NOT_ALL_0	Description	This command checks the identity of the phone. If the ESN or MEID contains all Fs then the test fails. The command should be applied immediately after setting up a call.
	Parameters	None.
	Notes	See also **ESN_MEID_NOT_ALL_0, AREA_CODE_LESS_THAN_OR_EQUAL.**
	Example	CDMA_CALL_BY_BS ESN_MEID_NOT_ALL_F

ESN_MEID_NOT_ALL_F

Description: This command checks the identity of the phone. If the ESN or MEID contains all zeros then the test fails. The command should be applied immediately after setting up a call.

Parameters: None.

Notes: See also **ESN_MEID_NOT_ALL_F, AREA_CODE_LESS_THAN_OR_EQUAL.**

Example:
CDMA_CALL_BY_BS
ESN_MEID_NOT_ALL_0

MEASUREMENT_HEADERS

Description: This command places the following text line into a printout:
BS (dBm) Ch. LL UL Measured
This line indicates the instrument's RF output level, channel, lower limit, upper limit, and measured value of subsequent tests.

Parameters: None.

Example: MEASUREMENT_HEADERS

MS_REG

Description: This forces the mobile phone to perform a registration. This will provide the instrument with the information necessary to page the mobile.

Parameters: None.

Example:
MS_REG
Forces the mobile phone to register.

SET_AWGN

Description: This command is used to turn the additive white gaussian noise (AWGN) generator on or off and to set its level relative to the instrument's RF output level.

Parameters:
Mode,Level
Mode = NULL: the AWGN state remains unchanged.
Mode = ON: turns the AWGN on.
Mode = OFF: turns the AWGN off.
Level = NULL: the AWGN level remains unchanged.
Level = `number`: sets the AWGN level to the value specified (–10.0 to +5.0 dB).

Example:
SET_AWGN,ON,0
The AWGN generator is turned on and the level is set to 0 dB relative to the instrument's RF output level.

SET_CARR

Description: Used to preselect the carrier or carrier network(s) for testing. If the carrier networks are already preselected with this command, the user will not be offered a wider choice of networks as described in "Preselecting carriers" on page 76.

Parameters:
Carrier
Carrier – The name of a carrier network from the existing set of carriers on the instrument.

Example SET_CARR,EXAMPLE_US800

Test command reference – AMPS commands

AMPS_HOFF	Description	This command sets the parameters for an AMPS channel and initiates a handover from CDMA to AMPS.
	Parameters	Channel,MAC,SAT Channel – SKIP or SAME: The AMPS traffic channel uses the same centre frequency as the previous traffic channel. Channel – TRAFFIC: The AMPS traffic channel is set to the MID channel frequency in the previously active CDMA band. Channel – CONTROL: The AMPS traffic channel is set to the control channel defined in the carrier settings. Channel – LOW, MID, or HIGH: The AMPS traffic channel is set to the low, mid or high channel as defined in the respective **Configuration > CDMA** menu. MAC – SKIP or SAME: Leaves the MAC field as is. MAC – (number from 0 to 7): Sets the MAC field accordingly. The MAC field determines the transmit power level of the mobile phone. SAT – SKIP or SAME: Leaves the SAT frequency setting as is. SAT = 0 or 5970: Sets the SAT frequency to 5970 hertz. SAT = 1 or 6000: Sets the SAT frequency to 6000 hertz. SAT = 2 or 6030: Sets the SAT frequency to 6030 hertz.
	Example	AMPS_HOFF,MID,2,6000
AMPS_STD_TX	Description	Starts standard transmitter measurements of the AMPS signal. The measurements include Frequency Error, RF Power, SAT Frequency Error, SAT Deviation. The results are averaged over a number of measurements.
	Parameters	Count,Printout Count – Number of measurements to be carried out. Printout – The tests that are to be printed in the print out. Open the AMPS_STD_TX command dialog box and click on **Select** to check the desired measurements: RF frequency error RF power SAT frequency error SAT deviation
	Example	AMPS_STD_TX,5,15

Test command reference – EVDO commands

CDMA_MS_REG_2ND_TESTSET	Description	Forces a CDMA registration on the other testset in an EVDO Hybrid Mode test. The registration attempt times out and is considered as failed after the specified period. Synchronization of the two test sets is achieved through the serial interface, which should be initialized using the INIT_CMD command (see page 101) before the registration command.
	Parameters	Timeout Timeout = number (range 1 to 400): Use the timeout value specified in seconds.
	Notes	See also INIT_CMD, EVDO_SYNC.
	Example	INIT_CMD,1,19200,NONE,1000 EVDO_SYNC CDMA_MS_REG_2ND_TESTSET,30
COUPLING_AUTO	Description	This command activates usage of the user database for CDMA and EVDO. Coupling factors according to the selected Group and Subgroup will be applied.
	Parameters	Mode Mode – must be set to CDMA/EVDO.
	Example	COUPLING_MODE,CDMA/EVDO
EVDO_CHANGE_CCH	Description	This command sets the EVDO control channel parameters (band, RF channel, sector ID, RF level, subnet mask, mobile country code, color code, and protocol revision) to explicit values (numbers).
	Parameters	Band, Chan, Sector_ID, Level, SubNetMask, MCC, Color_Code, Protocol, DRate Band = NULL: the band remains as is. Band = PRIMARY: sets the band to the first band in the Dual Band test in the carrier settings file. Band = SECONDARY: sets the band to the second band in the Dual Band test in the carrier settings file. Band = US800: sets the band to the US-800 (cellular) band. Band = USPCS: sest the band to the US PCS (1900 MHz) band. Band = KPCS: sets the band to the Korean PCS (1700 MHz) band. Band = NMT450: sets the band to the NMT-450 band. Band = AWS: sets the band to the AWS band. Chan = NULL: the channel remains as is. Chan = CONTROL: sets the channel to the same value as the control channel in the carrier settings file. Chan = LOW or MID or HIGH: sets the channel to the value set in the mobile settings file for one of the channels in the long

test.
Chan = TRAFFIC: sets the channel to the value set in the settings file for the short test traffic channel.
Chan = number: sets the channel to this number (must be a valid channel number for the band selected).
Sector_ID = NULL: the Sector ID remains unchanged.
Sector_ID = SECTOR_ID or CONFIG: uses the sector ID from the settings file.
Sector_ID = hex number: sets the sector ID to the hexadecimal value specified (1 to 32 characters).
Level = NULL: the RF level of the control channel remains unchanged.
Level = number: sets the RF level of the control channel to the value specified, in dBm (valid range: –120 to 0).
SubNetMask = NULL: the subnet mask remains unchanged.
SubNetMask = SUBNET_MASK or CONFIG: uses the subnet mask from the settings file.
SubNetMask = number: sets the subnet mask of the control channel to the value specified (valid range: 0 to 128).
MCC = NULL: the mobile country code remains unchanged.
MCC = MCC or CONFIG: uses the mobile country code from the settings file.
MCC = number: sets the mobile country code to the value specified (valid range: 0 to 999).
Color_Code = NULL: the color code remains unchanged.
Color_Code = COLOR_CODE or CONFIG: uses the color code from the settings file.
Color_Code = number: sets the color code to the value specified (range: 0 to 255).
Protocol = NULL: the protocol revision setting is not changed.
Protocol = PROTOCOL_REV or CONFIG: uses the protocol revision from the settings file.
Protocol = REV0: sets the protocol revision to Revision 0.
Protocol = REVA: sets the protocol revision to Revision A.
DRate = NULL: the FTAP data rate remains unchanged.
DRate = CONFIG: sets the FTAP data rate to the value specified in the mobile settings file.
DRate = number: 0 < number < 50: QPSK 38.4 kbps
50 < number < 100: QPSK 76.8 kbps
100 < number < 200: QPSK 153.6 kbps
200 < number < 500: QPSK 307.2 kbps
500 < number < 700: QPSK 614.4 kbps
700 < number < 1000: EPSK 921.6 kbps
1000 < number < 1500: QPSK 1228.8 kbps
1500 < number < 2000: EPSK 1843.2 kbps
2000 < number < 2700: QAM 2457.6 kbps
2700 < number < 3300: QAM 3072 kbps

Example EVDO_CHANGE_CCH,US800,384,CONFIG,-60,NULL,NULL,NULL, NULL
Sets the EVDO control channel to the US-800 band channel

384, and the RF Level to –60 dBm. The sector ID (CONFIG) used is from the settings file. Mobile country code, color code and protocol revision are not changed.

EVDO_CLOSE_CONNECT

Description: This command is used close an EVDO connection. If the EVDO connection does not close within the timeout limit specified, the EVDO Close Connection fails.

Parameters: [Timeout]
Timeout = NULL or CONFIG: the default timeout value of 30 seconds is used.
Timeout = `number` (range 0 to 100): Use the timeout value specified in seconds.

Example: EVDO_CLOSE_CONNECT,DEF
Closes an EVDO connection using the default timeout value of 30 seconds.

EVDO_CLOSE_SESSION

Description: This command is used close an EVDO session. If the EVDO session does not close within the timeout limit specified, the EVDO Close Session fails.

Parameters: [Timeout]
Timeout = NULL or CONFIG: the default timeout value of 30 seconds is used.
Timeout = `number` (range 0 to 100): Use the timeout value specified in seconds.

Example: EVDO_CLOSE_SESSION,DEF
Closes an EVDO session using the default timeout value of 30 seconds.

EVDO_CONNECT

Description: This command opens a connection with the mobile and activates the forward and reverse traffic channels. The test application protocol is set to RTAP or FTAP as specified. If the connection does not open within the timeout specified the EVDO Connect fails.

Parameters: [Timeout[,TAP]]
Timeout = NULL or CONFIG: the default timeout value of 30 seconds is used.
Timeout = `number` (range 0 to 100): the timeout value specified in seconds is used.
TAP = NULL: the Test Application Protocol RTAP remains unchanged.
TAP = FTAP or RX: sets the test application protocol to FTAP.
TAP = RTAP or TX: sets the test application protocol to RTAP.

Example: EVDO_CONNECT,DEF,RTAP
Opens an EVDO connection using the default timeout value of 30 seconds and RTAP test application protocol.

EVDO_FTAP_PARAMS

Description: This command is used to set EVDO TAP parameters FTAP data rate, ACK channel fixed bit mode, the percentage of packets to address to the mobile, and limited TAP to explicit values (numbers) or values set in the mobile settings file.

Parameters: DRate,AckBitFixMode,Packet_Percent,LimitedTAP
DRate = NULL: the FTAP data rate remains unchanged.
DRate = CONFIG: sets the FTAP data rate to the value specified in the mobile settings file.
DRate = `number`: 0 < number < 50: QPSK 38.4 kbps
50 < number < 100: QPSK 76.8 kbps
100 < number < 200: QPSK 153.6 kbps
200 < number < 500: QPSK 307.2 kbps
500 < number < 700: QPSK 614.4 kbps
700 < number < 1000: EPSK 921.6 kbps
1000 < number < 1500: QPSK 1228.8 kbps
1500 < number < 2000: EPSK 1843.2 kbps
2000 < number < 2700: QAM 2457.6 kbps
2700 < number < 3300: QAM 3072 kbps
AckBitFixMode = NULL: the ACK channel fixed bit mode remains unchanged.
AckBitFixMode = 1 or ON: sets the ACK channel fixed bit mode ON.
AckBitFixMode = 0 or OFF: sets the ACK channel fixed bit mode OFF.
Packet_Percent = NULL: the percentage of packets to address to the mobile remains unchanged.
Packet_Percent = `number` (range 0 to 100): changes the percentage of packets to address the mobile to the value specified.
LimitedTAP = NULL: the Limited TAP parameter remains unchanged.
LimitedTAP = 1 or ON: sets the Limited TAP ON.
LimitedTAP = 0 or OFF: sets the Limited TAP OFF.

Example: EVDO_FTAP_PARAMS,,,50,OFF
Set´s the percentage of packets to address to the mobile to 50%, and the Limited TAP OFF. Does not change the FTAP data rate or Ack channel bit fixed mode.

EVDO_HOFF

Description: This command performs an EVDO handoff to the band and channel specified.

Parameters: Band,Channel
Band = NULL: the band remains as is.
Band = PRIMARY: sets the band to the first band in the Dual Band test in the carrier settings file.
Band = SECONDARY: sets the band to the second band in the dualband test in the carrier settings file.
Band = US800: sets the band to the US-800 (cellular) band.
Band = USPCS: sest the band to the US PCS (1900 MHz) band.
Band = KPCS: sets the band to the Korean PCS (1700 MHz) band.

		Band = NMT450: sets the band to the NMT-450 band. Band = AWS: sets the band to the AWS band. Chan = NULL: the channel remains as is. Chan = CONTROL: sets the channel to the same value as the control channel in the carrier settings file. Chan = LOW or MID or HIGH: sets the channel to the value set in the mobile settings file for one of the channels in the long test. Chan = TRAFFIC: sets the channel to the value set in the mobile settings file for the short test traffic channel. Chan = `number`: sets the channel to this number (must be a valid channel number for the band selected).
	Example	EVDO_HOFF,SEC,TRAFFIC Handoff to the fast test traffic channel on the second band in a dualband test.
EVDO_LEVEL	Description	This command is used to set the EVDO BS Level to explicit values (numbers) or values set in the mobile settings file.
	Parameters	Level Level = NULL: the EVDO BS Level remains unchanged. Level = MINIMUM or MIN: changes the EVDO BS Level to the Minimum BS Level specified in the mobile settings file. Level = `number`: sets the EVDO BS Level to the value specified (range from –120 to 0 dBm).
	Example	EVDO_LEVEL,-85 Sets the EVDO BS Level to –85 dBm.
EVDO_MEASUREMENT_HEADERS	Description	This command is only performed if an EVDO test is active. It is skipped if a CDMA test is active. This line indicates the 4400 RF Out level, channel, lower limit, upper limit, and measured value of subsequent tests on the print-out (if printing is requested).
	Parameters	None.
	Example	EVDO_MEASUREMENT_HEADERS
EVDO_MOBILE_ID	Description	This command queries and prints the desired information about the mobile phone. An EVDO session must be open before this command can be performed. The mobile power class information specified in the mobile settings file is always printed. If no printout value is specified the hexadecimal and decimal hardware values are printed.
	Parameters	[Print_Val] Print_Val = CONFIG: sets the print out value to 3 (this is the default value assumed when the parameter is omitted). Print_Val = ALL: sets the print out value to 63. Print_Val = `number`: The Mobile ID parameters that are to be printed in the print out. This number is the sum of the following numbers. Only add up the numbers of the Mobile

ID parameters desired in the printout:
1: the 32-bit hardware value for the AT as a hexadecimal value.
2: the 32-bit hardware value for the AT as a decimal value.
4: the 24-bit hardware ID type for the AT.
8: the 32-bit session seed value for the AT as a hexadecimal value.
16: the UATI color code associated with the subnet to which the UATI belongs.
32: the lower 24 bits of the UATI assigned by the AN.

Example: EVDO_MOBILE_ID,DEF
Prints the hexadecimal and decimal hardware values and mobile power classes.

EVDO_NETWORK

Description: Enables the 1xEV-DO mode of the instrument.

Parameters: None.

Example: EVDO_NETWORK

EVDO_OPEN_SESSION

Description: This command is used to open an EVDO session. If the EVDO session does not open within the timeout limit specified, the EVDO Open Session fails.

Parameters: [Timeout]
Timeout = NULL or CONFIG: the default timeout value of 30 seconds is used.
Timeout = `number` (valid range 0 to 100): uses the timeout value specified in seconds.

Example: EVDO_OPEN_SESSION,DEF
Opens an EVDO session using the default timeout value of 30 seconds.

EVDO_PER

Description: This command performs the packet error rate (PER) test. This test currently forces FTAP.
If PowType is set to any legal value other than NO_TX a TX quality and RF power measurement is also performed. All of the parameters for this command apply to this TX quality and RF power measurement. There is no averaging of PER measurements. The PER test is performed at the BS level specified. If the BS level specified is greater than –50 dBm the power control is temporarily set to All Up. The pre-test BS level and power control type are reset at the end of the test. A power control reset is also performed if specified.

Parameters: Count,BSLevel,PowType,PowerControlReset,PrintOut
Count = NULL: Count is set to 1.
Count = number (range 1 to 100)
BSLevel = NULL: the EVDO BS level remains unchanged.
BSLevel = MINIMUM or MIN: change the EVDO BS level to the Minimum BS level specified in the mobile settings file.
BSLevel = `number`: sets the EVDO BS level to the value spec-

		ified, in dBm (range –120 to 0). PowType = NO_TX: an EVDO TX quality test is not performed during the PER measurement. PowType = MAX: an EVDO maximum RF power test is performed during the PER measurement. PowType = MIN: an EVDO minimum RF power test is performed during the PER measurement. PowType = AVG or AVERAGE: an EVDO average (open loop estimate) RF power test is performed during the PER measurement. PowerControlReset = NULL or FALSE: a power control reset is not performed at the end of the test. PowerControlReset = TRUE: a power control reset is performed at the end of the test. PrintOut = CONFIG: sets the Print Out value to 1031. PrintOut = `number`: Open the EVDO_PER command dialog box, select **Manual** and click on the **Select** button to check the measurements desired in the results: Waveform quality (rho) Frequency error Time error Carrier feedthrough IQ imbalance Peak phase error RMS phase error RMS vector error Peak magnitude error RMS magnitude error RF power
	Example	EVDO_PER,,MIN,NO_TX,TRUE,DEF Performs a PER test only (no TX quality is performed) at the minimum BS level.
EVDO_PER_SETUP	Description	This command is used to set Packet Error Rate Test parameters Maximum Frames, Confidence Level and Pass/Fail Limit Level, to explicit values (numbers) or values set in the limits file.
	Parameters	MaxFram,ConfLev,LimLev,EnabOnOff MaxFram = NULL: the Packet Error Rate Maximum Frames remains unchanged. MaxFram = CONFIG: sets the Packet Error Rate Maximum Frames to the value specified in the limits file. MaxFram = `number` (range 10 to 10000) ConfLev = NULL: the Packet Error Rate Confidence Level remains unchanged. ConfLev = CONFIG: sets the Packet Error Rate Confidence Level to the value specified in the limits file. ConfLev = number (valid range: 90 to 1000) LimLev = NULL: the Packet Error Rate Pass / Fail Limit Level remains unchanged. LimLev = CONFIG: sets the Packet Error Rate Rate Pass / Fail

		Limit Level to the value specified in the limits file. LimLev = number (valid range: 0 to 5) EnabOnOff: Unused.
	Example	EVDO_PER_SETUP,DEF,DEF,DEF,ON Sets all Packet Error Rate test parameters to the values specified in the limits file.
EVDO_POWER_CONTROL	Description	This command is used to set the closed loop power control mode of the 4400. The 4400 can send all Power Up bits, all Power Down bits, or a specific number of Power Up or Power Down bits to the mobile. It can send alternating Power Up and Power Down bits to the mobile. It can also send the appropriate number of Power Up or Power Down bits to actively set the Mobile output power to the correct level as determined by the open loop estimate formula (Active). The Optional second parameter (Reset) can be used in the Alternating or Active power control mode to reset the mobile output power to the value determined by the open loop estimate formula. This is a single shot operation. Once the reset is complete the 4400 returns to the Alternating or Active power control mode.
	Parameters	PowCtrlCmd[,ResetOption] PowCtrlCmd = UP: all Up power control bits PowCtrlCmd = DOWN: all Down power control bits PowCtrlCmd = ALT: alternating power control bits PowCtrlCmd = ACT: active power control number (range –100 to +100 but not 0): a specific number of Down or Up power control bits ResetOption = RESET: causes a Power Control Reset procedure to be performed on the mobile.
	Notes	The ResetOption parameter is optional.
	Example	EVDO_POWER_CTRL,ALT,RESET The 4400 is set to the Alternating power control mode, and the mobile is sent the appropriate number of power Up or power Down bits necessary to correct its power output as determined by the open loop estimate formula. Once the reset is complete, the 4400 remains in the Alternating mode.
EVDO_SHUTDOWN	Description	Switches the simulated 1xEV-DO network completely off.
	Parameters	None.
	Notes	See also EVDO_NETWORK.
	Example	EVDO_SHUTDOWN

EVDO_SYNC

Description: This command initiates a time-of-day synchronization of the two test sets in an EVDO Hybrid Mode test setup. Synchronization is achieved through the serial interface, which should be initialized using the INIT_CMD command (see page 101) before synchronization.

Parameters: None.

Notes: See also INIT_CMD, CDMA_MS_REG_2ND_TESTSET

Example:
```
INIT_CMD,1,19200,NONE,1000
EVDO_SYNC
```

EVDO_TRAF

Description: This command is used to set EVDO traffic channel, TAP data rate and mobile power class to explicit values (numbers) or values set in the mobile settings file.

Parameters: Band,Chan,Ftap_Data_Rate,Rtap_Data_Rate,Power_Class
Band = NULL: the band remains as is.
Band = PRIMARY: sets the band to the first band in the Dual Band test in the carrier settings file.
Band = SECONDARY: sets the band to the second band in the Dual Band test in the carrier settings file.
Band = US800: sets the band to the US-800 (cellular) band.
Band = USPCS: sest the band to the US PCS (1900 MHz) band.
Band = KPCS: sets the band to the Korean PCS (1700 MHz) band.
Band = NMT450: sets the band to the NMT-450 band.
Band = AWS: sets the band to the AWS band.
Chan = NULL: the channel remains as is.
Chan = CONTROL: sets the channel to the same value as the control channel in the carrier settings file.
Chan = LOW or MID or HIGH: sets the channel to the value set in the settings file for one of the channels in the long test.
Chan = TRAFFIC: sets the channel to the value set in the settings file for the short test traffic channel.
Chan = `number`: sets the channel to this number (must be a valid channel number for the band selected).
Ftap_Data_Rate = NULL: the FTAP data rate remains unchanged.
Ftap_Data_Rate = CONFIG: sets the FTAP data rate to the value specified in the settings file.
Ftap_Data_Rate = `number`: 0 < number < 50: QPSK 38.4 kbps
50 < number < 100: QPSK 76.8 kbps
100 < number < 200: QPSK 153.6 kbps
200 < number < 500: QPSK 307.2 kbps
500 < number < 700: QPSK 614.4 kbps
700 < number < 1000: EPSK 921.6 kbps
1000 < number < 1500: QPSK 1228.8 kbps
1500 < number < 2000: EPSK 1843.2 kbps
2000 < number < 2700: QAM 2457.6 kbps
2700 < number < 3300: QAM 3072 kbps
Rap_Data_Rate = NULL: the RTAP data rate remains

unchanged.
Rap_Data_Rate = CONFIG: sets the RTAP data rate to the value specified in the settings file.
Rap_Data_Rate = `number`: 0 < number < 15: BSK 9.6 kbps
15 < number < 30: BSK 19.2 kbps
30 < number < 60: BSK 38.4 kbps
60 < number < 100: BSK 76.8 kbps
100 < number < 200: BPSK 153.6 kbps
200 < number < 300: QPSK 230 kbps
300 < number < 400: QPSK 307 kbps
400 < number < 500: QPSK 460 kbps
500 < number < 800: QPSK 614 kbps
800 < number < 1000: QPSK 921 kbps
1000 < number < 1500: QPSK 1228 kbps
1500 < number < 2000: EPSK 1843 kbps
Power_Class = NULL: the mobile power class remains unchanged.
Power_Class = POWER_CLASS or CONFIG: sets the mobile power class to the value specified in the mobile settings file.
Power_Class = number: sets the mobile power class to the value specified. The valid range is 1 to 5.

Example

EVDO_TRAF,PRIMARY,TRAFFIC,CONFIG,CONFIG,CONFIG
Sets the traffic band to the first band in a dual band test, and the channel, TAP data rates and mobile power class to the values specified in the mobile settings file.

EVDO_TX_WQU

Description

This command performs TX quality and RF power measurements. This test currently checks the test application protocol and changes it to RTAP if it is currently set to FTAP. The tests are performed at the BS level specified. The Count value allows averaging to be performed. reported are always the average of the measurements. When max power is specified, all power Up control bits are sent to the mobile. When min power is specified all power Down bits are sent. All of the tests shown are always performed, but only the tests specified in the Printout parameter are reported. The power control type and BS level are reset to the pre-test values after the test is performed. If specified a power control reset is performed at the end of the test.

Parameters

Count,BSLevel,PowType,PowerControlReset,PrintOut
Count = NULL: Count is set to 1
Count = `number` (range 1 to 100)
BSLevel = NULL: the EVDO BS level remains unchanged.
BSLevel = MINIMUM or MIN: changes the EVDO BS level to the minimum BS level specified in the settings file.
BSLevel = `number`: sets the EVDO BS level to the value specified, in dBm (valid range from –120 to 0).
PowType = MAX: performs an EVDO Maximum RF Power test.
PowType = MIN: performs an EVDO Minimum RF Power test.
PowType = AVG or AVERAGE: performs an EVDO Average (Open Loop Estimate) RF Power test.

		PowerControlReset = NULL or FALSE: does not perform a Power Control Reset at the end of the test. PowerControlReset = TRUE: performs a Power Control Reset at the end of the test. PrintOut = CONFIG: prints RF power and Carrier feedthrough in the results. PrintOut = `number`: Selec the tests to be printed in the print out. Waveform quality (rho) Frequency error Time error Carrier feedthrough IQ imbalance Peak phase error RMS phase error RMS vector error Peak magnitude error RMS magnitude error RF power
	Example	EVDO_TX_WQU,10,MIN,MAX,TRUE,DEF Performs max power and waveform quality test at the minimum RF level using a count of 10. Perform a power control reset at the end of the test. Use the default printout (1031 = 1024 + 4 + 2 + 1). This will print rho, frequency error, time error and RF power.
EVDO_USE_STATUS_WAIT	Description	When EVDO_Stat_Wait is set to 0 the Event registers of the instrument are not used. When EVDO_Stat_Wait is set to 1 the Event registers are used during TX Quality and PER measurements. Initializes the algorithm to wait for transmitter and PER measurement results to become available.
	Parameters	EVDO_Stat_Wait EVDO_Stat_Wait = 0: The 4400 Event Status registers are not used to determine when EVDO measurement events occur. This is the recommended method. EVDO_Stat_Wait = 1: The 4400 Event Status registers are used during EVDO tests to determine when measurements occur.
	Example	EVDO_USE_STATUS_WAIT,0
HARDWARE_ID_NOT_ALL_0	Description	This command checks the hardware ID of the phone. If the ID contains all zeros then the test fails. The command should be applied immediately after the EVDO_MOB_ID command.
	Parameters	None.
	Notes	See also HARDWARE_ID_NOT_ALL_F
	Example	EVDO_MOB_ID HARDWARE_ID_NOT_ALL_0

HARDWARE_ID_NOT_ALL_F	Description	This command checks the hardware ID of the phone. If the ID contains all Fs then the test fails. The command should be applied immediately after the EVDO_MOB_ID command.
	Parameters	None.
	Notes	See also HARDWARE_ID_NOT_ALL_0
	Example	EVDO_MOB_ID HARDWARE_ID_NOT_ALL_F

SET_CARR	Description	Used to preselect the carrier or carrier network(s) for testing. If the carrier networks are already preselected with this command, the user will not be offered a wider choice of networks as described in "Preselecting carriers" on page 76.
	Parameters	Carrier Carrier – The name of a carrier network from the existing set of carriers on the instrument.
	Example	SET_CARR,EXAMPLE_US800

Test command reference – TETRA commands

COUPLING_AUTO	Description	This command activates usage of the user database for TETRA. Coupling factors according to the selected Group and Subgroup will be applied.
	Parameters	Mode Mode – must be set to TETRA.
	Example	COUPLING_MODE,TETRA
SET_TETRA_SYSTEM	Description	Loads the TETRA channel setup (defined in the model editor) for subsequent tests. If the channel setup name is given as a parameter, this setup will be used immediately. If the parameter is set to VAR and there is more than one TETRA channel setup, a pop-up menu will ask which one to use.
	Parameters	ChannelSetup ChannelSetup – enter VAR if to be hand-picked by the user, otherwise the setup name should be entered.
	Example	TETRA_TYPE,TMO SET_TETRA_SYSTEM,SETUP-3 TETRA_CONFIG_CH,-80.0,2,LOW
TETRA_BER	Description	Starts a BER measurement when the TETRA radio is on a traffic channel with the BER loop closed. This command can be run in parallel with other measurements (TETRA_TX_ALL).
	Parameters	Frames,Count,BS-Level,Measurements Frames – number of frames over which one measurement is performed. Count – number of BER measurements to be performed. BS-Level – power level during the measurement. Measurements – types of measurements to be performed (BER Class 0, BER Class 1, BER Class 2 and/or MER).
	Notes	See also TETRA_TX_ALL command.
	Example	TETRA_TYPE,TTM SET_TETRA_SYSTEM,SETUP-3 TETRA_CALL_BY_BS,INDIVIDUAL_DUPLEX TETRA_TX_ALL,10,21 TETRA_BER,10,1,-112,0 TETRA_TERM_BY_BS
TETRA_CALL_BY_BS	Description	Initiates a mobile-terminated call. If the TETRA radio does not respond within 90 seconds, a timeout occurs and the test is stopped.

	Parameters	CallType CalllType – INDIVIDUAL_DUPLEX (the only supported call type).
	Example	TETRA_TYPE,TMO SET_TETRA_SYSTEM,SETUP-3 TETRA_CALL_BY_BS,INDIVIDUAL_DUPLEX
TETRA_CALL_BY_MS	Description	Prepares the tester for a mobile-initiated call. If the TETRA radio does not call within 90 seconds, a timeout occurs and the test is stopped.
	Parameters	PhoneNumber PhoneNumber – expected dialed number.
	Example	TETRA_TYPE,TMO SET_TETRA_SYSTEM,SETUP-3 TETRA_CALL_BY_MS,1234567890
TETRA_CONFIG_BS_LEVEL	Description	Sets the power level of the (simulated) base station.
	Parameters	BS-Level BS-Level – new output power level of the instrument, in dBm, in the range from –122.0 to –40.0 dBm.
	Notes	See also TETRA_CONFIG_CH
	Example	TETRA_CONFIG_BS_LEVEL,-80
TETRA_CONFIG_CH	Description	Sets the base station power level, the traffic channel time slot and traffic channel for the call.
	Parameters	BS-Level,Timeslot,Channel BS-Level – new output power level of the instrument, in dBm, in the range from –122.0 to –40.0 dBm. Timeslot – Time slot to be used, in the range from 2 to 4. Channel – LOW or MID or HIGH for a predefined channel, or channel number to be used.
	Notes	See also TETRA_CONFIG_BS_LEVEL command.
	Example	TETRA_CONFIG_CH,-80.0,2,LOW
TETRA_PAGING_SENSITIVITY	Description	Starts a test to determine the paging sensitivity of the TETRA radio. In each test step, the BS power level is decreased until a defined sensitivity level (BER level) has been reached.
	Parameters	StartLevel,Step,StopLevel StartLevel – the BS power level at which the test starts, in dBm. StopLevel – power level at which the test stops. Step – step size of the power decrease, in dB.

	Example	TETRA_TYPE,TMO SET_TETRA_SYSTEM,SETUP-3 TETRA_CALL_BY_BS,INDIVIDUAL_DUPLEX TETRA_PAGING_SENSITIVITY,-106.0,-120.0,1.0
TETRA_TERM_BY_BS	Description	Initiates a call release by the base station (i.e. the instrument).
	Parameters	None.
	Notes	See also TETRA_TERM_BY_MS, TETRA_CALL_BY_BS
	Example	TETRA_CALL_BY_MS,1234567890 TETRA_TX_ALL TETRA_TERM_BY_BS
TETRA_TERM_BY_MS	Description	Prompts the user to release the call on the TETRA radio.
	Parameters	None.
	Notes	See also TETRA_TERM_BY_BS, TETRA_CALL_BY_MS
	Example	TETRA_CALL_BY_BS,INDIVIDUAL_DUPLEX TETRA_TX_ALL TETRA_TERM_BY_MS
TETRA_TX_ALL	Description	All TX-related measurements are carried out; these are TX power, template check, frequency error, RMS and peak vector error, frame alignment and residual carrier power.
	Parameters	Average, Output Average – Number of measurements to be carried out and averaged. Output – This field indicates which parameters shall be presented in the Result section on the Running menu and in the test protocol. Double-click on the command in the test script section of the Test Script Editor menu, and check the test parameters you want to see in the results section. Parameters that can be affected are: – TX power – Template check (PTT) – Frequency error – RMS phase error – Peak phase error – Timing advance (frame alignment) – Residual carrier power
	Example	TX_ALL,10,21
TETRA_TYPE	Description	Initializes the instrument for either Trunked Mode Operation (TMO) or TETRA Test Mode (TTM). If the test mode is selected, the type of BER loop should be given in addition.

Parameters	Mode,BER-Type Mode – TMO or TTM. BER-Type – RESIDUAL or NONRESIDUAL.
Notes	TETRA_BER, SET_TETRA_SYSTEM
Example	TETRA_TYPE,TMO SET_TETRA_SYSTEM,SETUP-3

Defining Test Limits

8

This chapter describes how the test limits can be changed in 7315 Scriptor. Topics discussed in this chapter are as follows:

Introduction

This chapter explains how test limits can be set up from the Limit Editor tab. Once a limits file is loaded, the various test parameters are basically grouped by the different access technologies. The test limits can be stored in a file from the Limit Editor. They can be loaded and used for a test from within the test script.

The sections below explain the test parameters in more detail. In order to change a parameter, proceed as follows:

1 In order to change an upper or lower limit, click the **Limit Editor** tab.
The menu displays tabs for the access technologies supported by Lector and Scriptor. The values shown are taken from the default file, limit.lim.

2 If you want to change the values from another limits file, select a different file in the Filename field.

3 Select the wireless access technology by clicking on the appropriate tab.
The appropriate list of test parameters as supported by Lector and Scriptor is displayed.

4 Click on the Min or Max value for the test parameter you want to change.
The values becomes editable. The Min value characterises the lower limit and the Max value characterises the upper limit.

5 Edit the value and confirm the change with **RETURN**.
The new value is displayed as part of the test parameter table.

6 Click **Save** to store the changes.
A ''Save file as...'' box appears.

7 Enter a file name (or select an existing one to overwrite the file) and click **OK**.
The current limit settings are stored in that file.

Reloading default limit values

If you made changes to your limit values and you would like to return to the default values, just click on the **All Limits back to default** button.
All limit parameters in the onscreen list are replaced by their factory defaults. Click on **Save** to store them in a file.

Changing the limits for GSM transmitter tests

Use the GSM-TX tab menu to alter the upper and lower limits for the following GSM parameters.

Phase Error RMS The RMS (root-mean square) value of the phase error is a measure for the modulation quality, expressing the mean difference between the modulated signal and the perfect signal (in degrees, rms-valued).

Phase Error Peak The peak phase error is a measure for the modulation quality, and is the maximum phase error detected within a burst (in degrees).

Frequency Error The frequency error expresses the mobile's carrier offset to the expected frequency, in Hz.

The limits may vary between different frequency bands. Lector and Scriptor can differentiate between three frequency bands: GSM 850 and 900, GSM 1800, and GSM 1900.

Power Level In GSM, the power level is controlled by the base station (or the test instrument) by way of the power control.

In the GSM 850 and GSM 900 frequency bands, the power control levels 5 to 19 are used, and can be translated into nominal output power levels (in dBm) according to Table 10. In the GSM 1800 and GSM 1900 bands, the power control levels 0 to 15 apply according to Table 11. Both tables also list the tolerances according to the GSM specifications.

You may want to apply wider tolerances if the coupling loss is not known exactly.

Table 10 GSM 850 and GSM 900 power control levels

Power control level	Nominal output power (dBm)	Tolerance (dB)
5	33	±3
6	31	±3
7	29	±3
8	27	±3
9	25	±3
10	23	±3
11	21	±3
12	19	±3

Table 10 GSM 850 and GSM 900 power control levels (Continued)

Power control level	Nominal output power (dBm)	Tolerance (dB)
13	17	±3
14	15	±3
15	13	±3
16	11	±5
17	9	±5
18	7	±5
19	5	±5

Table 11 GSM 1800 and GSM 1900 power control levels

Power control level	Nominal output power (dBm)	Tolerance (dB)
0	30	±3
1	28	±3
2	26	±3
3	24	±3
4	22	±3
5	20	±3
6	18	±3
7	16	±3
8	14	±3
9	12	±4
10	10	±4
11	8	±4
12	6	±4
13	4	±4
14	2	±5
15	0	±5

Power Time Template

While the mobile has to ramp up or down its RF power level within some 30 microseconds, the RF power level should be constant during the burst. The PTT (= power/time template) defines the power level the mobile should transmit with for any time position during and some 50 microseconds before and after the burst.

Different templates exist for the various power control levels. The test system knows the applicable limits and compares the power vs. time curve against these limits.

If you want the result of the power/time template check to be included in the overall assessment of the mobile's performance, enter 0 in both the Min and Max parameter fields.
If you do not want to include the power/time template result in the performance assessment, enter 0 in the Min and 1 in the Max parameter field.

Timing Advance

This limit parameter refers to the timing error (in microseconds or µs) of the bursts transmitted by the mobile phone, taking the commanded timing advance into account. These limits are used in all the transmitter measurements except for the MES_TADV measurement (see also Timing Advance Bits below).

Timing Advance Bits

This parameter is the same as the above Timing Advance, but the limit can be stated in bit periods. They can be stated as a fraction of bits, e.g. 0.75.

The software uses the limits of Timing Advance Bits (in bit periods) in the "MES_TADV" command.

Changing the limits for GSM receiver tests

Use the GSM-RX tab menu to alter the upper and lower limits for the following GSM and GPRS parameters.

Frame Erasure Rate

The frame erasure rate is a measure of the receiver quality, and is defined as the ratio of the frames rejected by the mobile in relation to all frames transmitted to it.
A frame is marked as 'erased' and rejected by the mobile when its error detector finds an error. To do so, the mobile will use the checksum provided with the class Ia bits. The frame erasure rate is expressed as a percentage.

The frame erasure rate may be carried out at different receive levels, so Lector and Scriptor offer two limit parameters, one for low receive levels (Frame Erasure Rate) and one for higher levels (Frame Erasure Rate(>-80dBm)).

Bit Error Rate Class 1b

The bit error ratio is defined as the ratio of falsely decoded bits in relation to all bits transmitted for a speech frame. It is calculated for the three different bit classes separately: class Ia, class Ib, and class II.

This limit parameter determines the upper (and lower) limit for the bit error rate on class Ib bits.

The bit error rate may be carried out at different receive levels, so Lector and Scriptor offer two limit parameters, one for low receive levels (Bit Error Rate Class 1b) and one for higher levels (Bit Error Rate Class 1b(>-80dBm)).

Bit Error Rate Class 2

The bit error ratio is defined as the ratio of falsely decoded bits in relation to all bits transmitted for a speech frame. It is calculated for the three different bit classes separately: class Ia, class Ib, and class II.

This limit parameter determines the upper (and lower) limit for the bit error rate on class II bits.

The bit error rate may be carried out at different receive levels, so Lector and Scriptor offer two limit parameters, one for low receive levels (Bit Error Rate Class 2) and one for higher levels (Bit Error Rate Class 2(>-80dBm)).

Block Error Rate USF

The USF-based block error rate measurement is a receiver test in GPRS operation mode. Based on the Uplink State Flag (USF), it can be compared with a paging test. The measurement result is defined as a percentage.

RX Level

The mobile under test estimates the RF power level at which it receives the base station (i.e. the test instrument). The RX Level measurement in the phone depends on the level transmitted by the tester, so there are limit parameters for power levels from –110 to –40 dBm. The limits used depend on the power level actually transmitted by the tester.

RX Quality

Based on the number of bits corrected by its own channel decoder, the mobile estimates the BER. The mobile phone reports its RX (receive) quality back to the network (or the tester) in its MS report as a number from 0 to 7. The RX quality is coded as shown in Table 12.

Table 12 RX quality coding

RX Quality	BER in %
0	< 0.2
1	0.2...0.4
2	0.4...0.8
3	0.8...1.6
4	1.6...3.2
5	3.2...6.4
6	6.4...12.8
7	> 12.8

Changing the spectrum test limits for GPRS

The following measurement limits apply to measurements on GPRS channels only.

ACPM Modulation

ACPM Modulation is the measurement of the adjacent channel power due to modulation. The measurement is performed during the active part of the burst, through a 30 kHz filter at offsets of ±100 kHz, ±250 kHz and all multiples of ±200 kHz from the carrier up to (and including) ±1800 kHz. The results are expressed in dBc.

The limits can be defined for each of the specified carrier offsets. The worst-case result from both sides (offset below and above the carrier) is compared to the limits.

ACPM Transient

The spectrum due to switching transients is measured through a 30 kHz filter at the carrier frequency and at offsets of ±400 kHz, ±600 kHz, ±1200 kHz and ±1800 kHz from the carrier. Measurements are ungated, i.e. measurements include the edges and the midamble. The results are expressed in dBm. For each of these carrier offsets, upper and lower limits can be specified. As limits typically differ between the GSM 850 and 900 bands on the one hand side, and GSM 1800 and 1900 on the other, separate limit parameters by band group are available. The worst-case result from both sides (offset below and above the carrier) is compared to the limits.

Changing the audio measurement limits

Audio measurements can be performed on signals applied to the AFin connector of the instrument.

Audio Volume The audio volume at the AFin connector is RMS-valued and measured in mV.

Changing the test limits for EDGE

If the appropriate option is enabled, the tester can take EDGE measurements on EGPRS signals.

EDGE Error Vector Magnitude

The key measurement for EDGE modulation is the error vector magnitude or EVM for short, which is the distance in the I/Q diagram between the measured signal and the ideal one, relative to the ideal signal vector magnitude; the EVM is measured separately for each symbol. Standard measurement results to observe are the RMS-averaged EVM (for all the symbols of a burst) and the maximum (peak) EVM within the burst. The results are expressed as a percentage.

EDGE ACPM Transient

The spectrum due to switching transients is measured through a 30 kHz filter at the carrier frequency and at offsets of ±400 kHz, ±600 kHz, ±1200 kHz and ±1800 kHz from the carrier. Measurements are ungated, i.e. measurements include the edges and the midamble. The results are expressed in dBm. For each of these carrier offsets, upper and lower limits can be specified. As limits typically differ between the GSM 850 and 900 bands on the one hand side, and GSM 1800 and 1900 on the other, separate limit parameters by band group are available.

EDGE ACPM Modulation

ACPM Modulation is the measurement of the adjacent channel power due to modulation. The measurement is performed during the active part of the burst, through a 30 kHz filter at offsets of ±100 kHz, ±250 kHz and all multiples of ±200 kHz from the carrier up to (and including) ±1800 kHz. The results are expressed in dBc.

The limits can be defined for each of the specified carrier offsets.

Changing the test limits for WCDMA

Spectrum Emission Mask

In the spectrum emission mask (SEM) the signal spectrum outside the allocated channel is measured. The spectrum curve is compared to a limit template and the result is a pass (0) or fail (1).

If you want to consider the result of the spectrum emission mask in your overall assessment of the phone, set both the upper and lower limit to zero. Otherwise, if you do not care about the spectrum emission mask, set the upper limit to 1.

Peak Code Domain Error

The peak code domain error is a measure of the modulation error. It is the maximum relative power on a code channel that is not in use by the phone under test. The peak code domain error is measured in dB.

Open Loop Power Control (OLPC)

The open loop power control measurement tests the ability of the mobile phone to set its transmit power to a specific level, depending on the received signal strength (i.e. the output power level of the instrument). The power level error (compared to the expected power) is measured in dB.

Inner Loop (High Service Level) DOWN

The high-level test of the inner loop power control for power Down commands tests the ability of the phone to adjust its output power in 1 dB steps. Lector and Scriptor compare the worst-case results from ten measurements (ten times a 1 dB step down) with the limit for the lowest power step deviation and the highest power step deviation.

Inner Loop (High Service Level) UP

The high-level test of the inner loop power control for power Up commands tests the ability of the phone to adjust its output power in 1 dB steps. Lector and Scriptor compare the worst-case results from ten measurements (ten times a 1 dB step up) with the limit for the lowest power step deviation and the highest power step deviation.

Inner Loop (Go/NoGo) DOWN

The Go/NoGo-level test of the inner loop power control for power Down commands tests the ability of the phone to adjust its output power in steps by 10 dB. Lector and Scriptor compare the result from a measurement with the limit for the lowest power step deviation and the highest power step deviation.

Inner Loop (Go/NoGo) UP

The Go/NoGo-level test of the inner loop power control for power Up commands tests the ability of the phone to adjust its output power in steps by 10 dB. Lector and Scriptor compare the result from a measurement with the limit for the lowest power step deviation and the highest power step deviation.

Uplink Power MAX

The test instrument can make the mobile phone transmit at its maximum possible power level, according to its power class. There are limit parameters for the maximum power level (measured in dBm) for all four power classes.

Uplink Power MIN

Similar to the Uplink Power MAX, the test instrument can make the mobile phone transmit at its minimum possible power level. The power level is measured in dBm and there is one set of limits, independent of the power class.

Uplink Power MEAN

In this test, the power level between the minimum and maximum is measured and compared with the nominal value. The result is expressed in dB.

WCDMA Occupied Bandwidth

This measurement shows the bandwidth occupied by the UE's signal. The occupied bandwidth identifies the frequency range into which a given percentage of the signal power falls. 99% of the entire power should be spread within a range of no more than 5 MHz around the carrier frequency. The purpose of this measurement is to verify that the UE's occupied bandwidth is lower than 5 MHz based on a chip rate of 3.84 Mcps. An occupied bandwidth exceeding this value may increase interference with other channels or other systems.

WCDMA Error Vector Magnitude

The key measurement for WCDMA modulation is the error vector magnitude or EVM for short, which is the distance in the I/Q diagram between the measured signal and the ideal one, relative to the ideal signal vector magnitude; the EVM is measured separately for each symbol. Standard measurement results to observe are the RMS-averaged EVM (for all the symbols of a frame) and the maximum (peak) EVM within the frame. The results are expressed as a percentage.
Limit value for the RMS EVM according to WCDMA specifications: 17.5%.
Limit value for the peak EVM according to WCDMA specifications: 50%.

WCDMA Magnitude Error

The root mean squared magnitude error is a measurement of the error in the mobile's transmit signal size (magnitude) at the decision points. The result is measured as a percentage, relative to the nominal magnitude.
Limit value for the RMS magnitude error: 17.5%.
Limit value for the peak magnitude error: 50%.

WCDMA Phase Error

The phase error indicates the phase difference, i.e. the angle difference, between the signal vector measured and the ideal signal vector. The phase error is calculated for each bit; for the purposes of WCDMA tests, both the RMS-valued phase error (RMS-averaged over a frame) or the peak (maximum) phase error over a frame are evaluated.
Limit value range for the RMS phase error, according to WCDMA specifications: ±10°.
Limit value range for the peak phase error, according to WCDMA specifications: ±45°.

WCDMA Frequency Error

There are band-specific limits for the frequency error measurement which indicates the deviation of the actual carrier frequency from the nominal carrier frequency, in hertz.
The limits are separately definable for Bands I and II, Bands III, IV, IX and X, Bands V, VI and VIII, and Band VII.

WCDMA Rho

Rho is the waveform quality factor, a measure of modulation accuracy. A value of 1 indicates perfect waveform quality.
Limit value according to WCDMA specifications: 0.9440

WCDMA IQ Offset

The I/Q offset value is the determined ratio between the I/Q offset vector and the average signal vector corrected by offset. It is expressed in dB.
Limit value according to WCDMA specifications: –15 dB

WCDMA IQ Imbalance

The I/Q imbalance value indicates the ratio of the power in the desired sideband carrier produced and the undesired sideband carrier produced due to an amplitude difference between the input signals to the I/Q modulator, expressed in dB.
Limit value according to WCDMA specifications: –25 dB

WCDMA ACLR

The measurement of the adjacent channel leakage ratio (ACLR) determines the ratio of the spectral power in the neighboring channels to the power in the allocated channel. The purpose of this measurement is to verify that the ACLR value does not exceed the WCDMA limits and to ensure thereby that the mobile's modulator does not create sideband emissions that would then disturb transmission on adjacent traffic channels.

The ACLR measurements are performed at offsets of 5 MHz and 10 MHz, and the results are in dBc. Separate limits for 5 and 10 MHz exist.

RSCP (normal condition)

The Common Pilot Channel received signal code power is the average power of the signal received by the UE, after despreading and combining the signal. It is important how the UE received the CPICH transmitted by Node B. Based on this value the Preamble Initial Power is calculated. This value indicates the accuracy of the UE's CPICH RSCP measurement. The RSCP is determined in dBm.

RSCP (extreme condition)

The test is the same as in RSCP (normal conditions), but separate (usually wider) limits apply.

WCDMA Bit Error Rate

The bit error rate indicates the number of erroneous bits in relation to the total number of bits in a transmission. It is expressed as a percentage. A BER of 0 would be ideal.
According to WCDMA specifications the BER value shall not exceed 0.001 at an input level that depends on the WCDMA frequency band.

Changing the test limits for HSDPA

HSDPA ACLR

The measurement of the adjacent channel leakage ratio (ACLR) determines the ratio of the spectral power in the neighboring channels to the power in the allocated channel. The purpose of this measurement is to verify that the ACLR value does not exceed the HSDPA limits and to ensure thereby that the mobile's modulator does not create sideband emissions that would then disturb transmission on adjacent traffic channels.

The ACLR measurements are performed at offsets of 5 MHz and 10 MHz, and the results are in dBc. Separate limits for 5 and 10 MHz apply.

HSDPA Block Error Rate

The block error rate indicates the number of blocks received in error in relation to the total number of blocks in a transmission. It is expressed as a percentage. A BLER of 0 would be ideal.
According to HSDPA specifications the BLER value shall not exceed 10% at an input level that depends on the frequency band.

HSDPA Error Vector Magnitude

In important modulation measurement for WCDMA is the error vector magnitude or EVM for short, which is the distance in the I/Q diagram between the measured signal and the ideal one, relative to the ideal signal vector magnitude; the EVM is measured separately for each symbol. Standard measurement results to observe are the RMS-averaged EVM (for all the symbols of a frame) and the maximum (peak) EVM within the frame. The results are expressed as a percentage.
Limit value for the RMS EVM according to HSDPA specifications: 17.5%.
Limit value for the peak EVM according to HSDPA specifications: 50%.

HSDPA Frequency Error

There are band-specific limits for the frequency error measurement which indicates the deviation of the actual carrier frequency from the nominal carrier frequency, in hertz.
The limits are separately definable for Bands I and II, Bands III, IV, IX and X, Bands V, VI and VIII, and Band VII.

HSDPA IQ Offset

The I/Q offset value is the determined ratio between the I/Q offset vector and the average signal vector corrected by offset. It is expressed in dB.
Limit value according to WCDMA specifications: –15 dB.

HSDPA IQ Imbalance

The I/Q imbalance value indicates the ratio of the power in the desired sideband carrier produced and the undesired sideband carrier produced due to an amplitude difference between the input signals to the I/Q modulator, expressed in dB.
Limit value according to HSDPA specifications: –25 dB.

HSDPA Magnitude Error

The root mean squared magnitude error is a measurement of the error in the mobile's transmit signal size (magnitude) at the decision points. The result is measured as a percentage, relative to the nominal magnitude.
Limit value for the RMS magnitude error: 17.5%.
Limit value for the peak magnitude error: 50%.

HSDPA Occupied Bandwidth

This measurement shows the bandwidth occupied by the UE's signal. The occupied bandwidth identifies the frequency range into which a given percentage of the signal power falls. 99% of the entire power should be spread within a range of no more than 5 MHz around the carrier frequency. The purpose of this measurement is to verify that the UE's occupied bandwidth is lower than 5 MHz based on a chip rate of 3.84 Mcps. An occupied bandwidth exceeding this value may increase interference with other channels or other systems.

HSDPA Power MAX

The test instrument can make the mobile phone transmit at its maximum possible power level, according to its power class. There are limit parameters for the maximum power level (measured in dBm) for all four power classes.

HSDPA Phase Error RMS

The phase error indicates the phase difference, i.e. the angle difference, between the signal vector measured and the ideal signal vector. The phase error is calculated for each bit; for the purposes of HSDPA tests, both the RMS-valued phase error (RMS-averaged over a frame) or the peak (maximum) phase error over a frame are evaluated.
Limit value range for the RMS phase error, according to HSDPA specifications: ±10°.
Limit value range for the peak phase error, according to HSDPA specifications: ±45°.

HSDPA Rho

Rho is the waveform quality factor, a measure of modulation accuracy. A value of 1 indicates perfect waveform quality.
Limit value according to HSDPA specifications: 0.9440.

HSDPA Throughput Category

The HSDPA throughput category is equivalent to the UE Category. The maximum (peak) throughput of the mobile (UE) depends on the number of code channels, the minimum TTI interval and the modulation scheme as follows:

Table 13 Maximum throughput rate as a function of the UE category

UE category	HS-(P)DSCH code channels	Min. TTI interval	Modulation	Peak data rate (Mbit/s)
1	5	3	QPSK, 16QAM	1.2
2	5	3	QPSK, 16QAM	1.2

Table 13 Maximum throughput rate as a function of the UE category

UE category	HS-(P)DSCH code channels	Min. TTI interval	Modulation	Peak data rate (Mbit/s)
3	5	2	QPSK, 16QAM	1.8
4	5	2	QPSK, 16QAM	1.8
5	5	1	QPSK, 16QAM	3.6
6	5	1	QPSK, 16QAM	3.6
7	10	1	QPSK, 16QAM	7.2
8	10	1	QPSK, 16QAM	7.2
9	15	1	QPSK, 16QAM	10.8
10	15	1	QPSK, 16QAM	14.4
11	5	2	QPSK	0.9
12	5	1	QPSK	1.8

Changing the test limits for CDMA

CDMA US800 Power This measurement determines the maximum power level for the US 800 frequency band. Limits can be entered for each of the three power classes. The power level is measured in dBm.

CDMA USPCS Power This measurement determines the maximum power level for the US-PCS frequency band. Limits can be entered for each of the five power classes. The power level is measured in dBm.

CDMA KPCS Power This measurement determines the maximum power level for the Korean PCS frequency band. Limits can be entered for each of the five power classes. The power level is measured in dBm.

CDMA NMT450 Power This measurement determines the maximum power level for the NMT 450 frequency band. Limits can be entered for each of the four power classes. The power level is measured in dBm.

CDMA AWS Power This measurement determines the maximum power level for the AWS frequency band. Limits can be entered for each of the five power classes. The power level is measured in dBm.

CDMA Open Loop Estimate The open loop estimate tests the ability of the mobile phone to set its transmit power to a specific level, depending on the received signal strength (i.e. the output power level of the instrument). The power level error (compared to the expected power) is measured in dB.

CDMA Minimum Power The test instrument can make the mobile phone transmit at its minimum possible power level. The power level is measured in dBm.

CDMA Standby Power The standby power (in dBm) is the in-band power level measured while the mobile phone is inactive and observing the base station signals.

CDMA Access Power This is the measured power (in dBm) of the first burst of an access probe (first burst), i.e. while the mobile phone accesses the network, e.g. to set up a call.

CDMA Closed Loop Range This measurement can be used to verify the mobile phone's closed loop power control ability and to measure its maximum and minimum power level, respectively. First the initial power is measured (in dBm). The test instrument then directs the CDMA phone to increase its power level by means of sending power control bits, until the phone transmits at its maximum power level. This level is measured relative to the initial power,

in dB. Similarly, the power control bits are then set so that the phone transmits at its minimum power level, and the relative power level is measured.

The closed loop range limits refer to the upper and lower power measurement. The value in the Min column determines the upper limit for the lower power, relative to the initial power value. The value in the Max column gives the lower limit for the upper power with respect to the initial power.

The defaults are –24 and +24 dB, respectively as defined in the CDMA specifications.

CDMA Freq. Error

This is the limit for the frequency error measurement which indicates the deviation of the actual carrier frequency from the nominal carrier frequency, in hertz.

The frequency error limit depends on the frequency band. Separate limits can be defined for the US 800, US-PCS, Korean PCS, NMT 450 and AWS bands.

CDMA Waveform Quality

The waveform quality factor rho is a measure of the modulation quality. The ideal value is 1; measured values are in the range 0 to 1.

The waveform quality factor rho must be greater than 0.944 as specified in the CDMA specifications.

CDMA Time Error

The time error indicates the transmit time error (Tau) with respect to the forward channel timing and is measured in microseconds.

The time error must be within ±1 µs according to the CDMA specifications.

CDMA Carrier Feedthrough

The carrier feedthrough indicates the accuracy of the I/Q modulator's DC setup; it is usually an undesired leakage produced due to a DC offset in the phone's I/Q modulator. It is measured in dBc.

CDMA I/Q Imbalance

The I/Q imbalance measurement is an indication of the accuracy of the I/Q modulator's modulating signal amplitude balance. It is the ratio of the power in the desired sideband carrier produced and the undesired sideband carrier produced due to an amplitude difference between the input signals to the I/Q modulator.

The I/Q imbalance is measured in dBc.

CDMA Peak Phase Error

The phase error is a measurement of the phase component of the vector error of the mobile's transmit signal at the decision points. The peak measurement determines the maximum phase error over a measurement interval. The phase error is given in degrees.

CDMA RMS Phase Error The phase error is a measurement of the phase component of the vector error of the mobile's transmit signal at the decision points. The RMS measurement determines an average value over a measurement interval. The phase error is given in degrees.

CDMA Peak EVM The error vector magnitude (EVM) is a measure of the modulation accuracy at the decision points. It is the difference between the vector of the received signal and that of the ideal (expected) signal. The peak value is the maximum EVM of all the decision points (symbols) over a whole measurement interval. EVM is given as a percentage.

CDMA RMS EVM The error vector magnitude (EVM) is a measure of the modulation accuracy at the decision points. It is the difference between the vector of the received signal and that of the ideal (expected) signal. The RMS value is an average of all the decision points (symbols) over a whole measurement interval. EVM is given as a percentage.

CDMA Peak Mag. Error The magnitude error is a measurement of the error in the mobile's transmit signal size (magnitude) at the decision points. The peak value is the maximum error over a whole measurement interval. The magnitude error is given as a percentage.

CDMA RMS Mag. Error The magnitude error is a measurement of the error in the mobile's transmit signal size (magnitude) at the decision points. The root-mean square value is an average over a whole measurement interval. The magnitude error is given as a percentage.

CDMA FER Frame Erasure Rate The FER (frame error rate) indicates the number of bad frames (frame errors) the mobile has received relative to the overall number of frames received. The FER is measured in percent.

CDMA FER Confidence Level The confidence level is a statistical measure of the completeness of information obtained about a statistical process. A confidence level of less than 100% may result in the test being concluded before the specified number of frames has been reached, so that the test time can be shortened. The expected confidence level is in the range from 95 to 100%.

CDMA FER Max. Frames This is not a limit but the maximum number of frames to be used for a FER measurement.

Changing the test limits for EVDO

EVDO Open Loop Estimate

The open loop estimate tests the ability of the mobile phone to set its transmit power to a specific level, depending on the received signal strength (i.e. the output power level of the instrument). The power level error (compared to the expected power) is measured in dB.

EVDO Minimum Power

The minimum power measurement represents the minimum power level supported by the mobile. Setting the mobile to its lowest power level is achieved by a combination of open loop power control (where the 4400's output power is set to a high level) and closed loop power control (the mobile is repetitively told to decrease its power level). The power level is measured in dBm.

EVDO Standby Power

The standby power (in dBm) is the in-band power level measured while the mobile phone is inactive and observing the base station signals.

EVDO Access Power

This is the measured power (in dBm) of the first burst of an access probe (first burst), i.e. while the mobile phone accesses the network, e.g. to set up a call.

EVDO Closed Loop Range

This measurement can be used to verify the mobile phone's closed loop power control ability and to measure its maximum and minimum power level, respectively. First the initial power is measured (in dBm). The test instrument then directs the CDMA phone to increase its power level by means of sending power control bits, until the phone transmits at its maximum power level. This level is measured relative to the initial power, in dB. Similarly, the power control bits are then set so that the phone transmits at its minimum power level, and the relative power level is measured.

The closed loop range limits refer to the upper and lower power measurement. The value in the Min column determines the upper limit for the lower power, relative to the initial power value. The value in the Max column gives the lower limit for the upper power with respect to the initial power.

The defaults are –24 and +24 dB, respectively as defined in the CDMA specifications.

EVDO Freq. Error

The frequency error (measured in Hertz) is a measure of the synthesizer accuracy. The frequency error is frequently updated during a data connection. A value of 0 Hz indicates perfect synthesizer accuracy. The limits may differ between the supported frequency bands (US 800, US-PCS, Korean PCS, NMT-450, AWS).

EVDO Waveform Quality The waveform quality factor, rho is a measure of the modulation accuracy. A value of 1 indicates perfect waveform quality.

EVDO Time Error The time error indicates the transmit time error (Tau) with respect to the forward channel timing. The result is in microseconds. The ideal value for the time error is 0 µs.

EVDO Carrier Feedthrough The carrier feedthrough is an undesired leakage of the unmodulated carrier at the nominal R-TCH frequency. As it is caused by a DC offset in the mobile's I/Q modulator, this measurement can be used to trim this offset. The measurement results are in dBc.

EVDO I/Q Imbalance The I/Q imbalance indicates the accuracy of the I/Q modulator's output signal spectrum. It is the ratio of the power produced in the undesired sideband(s) and in the desired sideband(s) and is expressed in dB.
I/Q imbalance usually is caused by a physical difference (e.g. amplitude) between the input signals to the I/Q modulator.

EVDO Peak Phase Error Results of the phase error measurement are positive numbers in degrees; the ideal value is zero. A lower limit is therefore not configurable. Measurement results (with pass/fail verdict according to these limits) are available in the **Rho/Freq.** test menu.

EVDO RMS Phase Error This is the root mean squared phase component of the error vector at the constellation points.

The phase error is given in degrees; the ideal value for the RMS Phase Error is 0°.

EVDO Peak EVM The error vector magnitude (EVM) is a measure of the modulation accuracy at the constellation points (symbols). The error vector magnitude is the difference between the vector of the received signal and that of the ideal (expected) signal. The peak value is the maximum of the EVMs for all constellation points over a whole measurement interval.

The EVM is given as a percentage, relative to the ideal signal. Therefore, the ideal value is 0%.

EVDO RMS EVM The error vector magnitude (EVM) is a measure of the modulation accuracy at the constellation points (symbols). The error vector magnitude is the difference between the vector of the received signal and that of the ideal (expected) signal. The root mean squared (RMS) value is an average of all EVMs for all constellation points over a whole measurement interval.

The EVM is given as a percentage, relative to the ideal signal. Therefore, the ideal value is 0%.

EVDO Peak Mag. Error

The magnitude error is the magnitude component of the error vector at the constellation points. The peak value is the maximum over all the constellation points of a measurement interval.

The magnitude error is given as a percentage, related to the ideal signal. Therefore, the ideal value is 0%.

EVDO RMS Mag. Error

The magnitude error is the magnitude component of the error vector at the constellation points. The RMS value is the root mean square over all the constellation points of a measurement interval.

The magnitude error is given as a percentage, related to the ideal signal. Therefore, the ideal value is 0%.

EVDO FER Frame Error Rate

The FER (frame error rate) indicates the number of bad frames (frame errors) the mobile has received relative to the overall number of frames received. The FER is measured in percent.

EVDO FER Confidence Level

The confidence level is a statistical measure of the completeness of information obtained about a statistical process. A confidence level of less than 100% may result in the test being concluded before the specified number of frames has been reached, so that the test time can be shortened. The expected confidence level is in the range from 95 to 100%. [Und deshalb sind die Standardlimits 0 bis 95%.]

EVDO FER Max. Frames

This is not a limit but the maximum number of frames to be used for a FER measurement.

Changing the test limits for AMPS

AMPS Power Level

The AMPS transmit power is measured in dBm. The actual power level is affected by the power control performed by the base station (or the test instrument in the case of the measurements) by way of the MAC (see Table 14), therefore separate limits for each of the MACs apply. Note that nominal power levels exceeding the mobile's capabilities given by its power class, result in the highest possible power level.

Table 14 Mobile attenuation codes (MAC) and nominal power levels

MAC	Nominal power level
0	36 dBm
1	32 dBm
2	28 dBm
3	24 dBm
4	20 dBm
5	16 dBm
6	12 dBm
7	8 dBm

AMPS Freq. Error

The frequency error (measured in Hertz) is a measure of the synthesizer accuracy. The frequency error is frequently updated during a data connection. A value of 0 Hz indicates perfect synthesizer accuracy.

AMPS SAT Freq. Error

The SAT frequency error describes the difference between the measured and the nominal SAT carrier frequency. The ideal value is 0 hertz.

AMPS SAT Deviation

The deviation of the SAT (supervisory audio tone) is measured. The SAT carrier is modulated with a nominal deviation of 2 kHz and the allowable limit is ±0.2 kHz off the nominal value.

AMPS ST Freq. Error

The signaling tone (ST) is a 10 kHz tone used in AMPS for mobile ringing, call terminations, handoffs, and switch-hook operation. The ST test is designed to verify the baseband signaling performance and circuitry of a mobile.
The frequency error of the signaling tone, measured in hertz, should be close to zero.

AMPS ST Deviation

The signaling tone (ST) is a 10 kHz tone used in AMPS for mobile ringing, call terminations, handoffs, and switch-hook operation. The ST test is designed to verify the baseband signaling performance and circuitry of a mobile.
The deviation of the signaling tone is 8 kHz ±0.8 kHz typically.

AMPS RX SINAD

The SINAD (signal to noise and distortion), measured in dB, is a measure of the receive quality. The higher the value at low power levels, the better the quality or receiver sensitivity. The measurement is taken from the signal fed into the **AF IN** connector of the instrument.

AMPS Peak Audio Deviation

This measurement indicates the frequency deviation affected by the transmitted audio (or DTMF) signal. The deviation should rise with the audio level but not exceed 12 kHz.
The upper and lower limits of the audio deviation depend on the signal fed into the mobile phone. The upper limit should not exceed 12 kHz as this is the maximum allowable value for AMPS phones.

AMPS BS Level Sensitivity

The upper limit is used as the maximum power level at which sensivity measurements based on the AMPS SAT are performed.

Changing the test limits for TETRA

MAX TX Power

The nominal (maximum) transmit power depends on the power class of the TETRA radio (power classes 1 thru 4 and 1L thru 4L). The allowable range at the nominal power level, in dBm, differs from that at any other power level step.

TX Power (Power Steps 5 thru 7)

Limits for these three power steps can be entered in dBm.

Tetra Frequency Error

The frequency error expresses the mobile station carrier offset to the expected frequency, in Hz. The upper and lower limits depend on the actual frequency, the limit range is $\pm 10^{-7}$.

Tetra Frame Alignment

This limit parameter refers to the timing error (in symbol periods) of the bursts transmitted by the TETRA radio, taking the commanded timing advance into account.

Tetra Residual Carrier Power

The residual carrier power is a measure of the modulation quality. It is an absolute value measured in %.

Tetra Vector Error (RMS and Peak)

The vector error is another measure of the modulation quality. It is measured as an RMS and as a peak percentage value over the symbols of a burst.

Tetra Power/Time Template

While the TETRA radio has to ramp up or down its RF power level within microseconds, the RF power level should be constant during the burst. The PTT (= power/time template) defines the power level that the radio should transmit for any time position during the burst.

If you want the result of the power/time template check to be included in the overall assessment of the mobile's performance, enter 0 in both the Min and Max parameter fields.
If you do not want to include the power/time template result in the performance assessment, enter 0 in the Min and 1 in the Max parameter field.

Tetra Paging Sensitivity

The Paging Sensitivity test is a means of determining the receiver quality at low levels. The result is the lowest power level at which the TETRA radio still responds to paging. The upper limit, in dBm, should be set to the maximum allowable sensitivity threshold (e.g. –112 if the radio is expected to successfully receive down to –112 dBm or better).

TT BER (Class 0 thru 2) These limits apply to the bit error rate (BER) measurement for class 0, 1 and 2 bits in the TETRA Test mode loopback test which is performed in call mode. The limits are entered as percentage values.

TT MER These limits apply to the message erasure rate (MER) measurement in the TETRA Test mode loopback test which is performed in call mode. The limits are entered as percentage values.

X2TEST Editor

9

This chapter describes how the X2TEST feature can be set up. Topics discussed in this chapter are as follows:

What X2TEST does

Overview

GSM and WCDMA tests usually depend on the serial number of the phone, the IMEI (International Mobile Equipment Identity) because the IMEI contains a Type Approval Code (TAC) indicating the brand and type of mobile phone. The capabilities, necessary tests and vendor-specific limits can all be derived from this information. The IMEI can be requested by the test equipment over the air interface.
In CDMA2000, the type of phone and the subsequent tests are usually set with the group, subgroup and test script settings.

However, with X2TEST, the test script to be run depends on a code that is entered by the user, e.g. the phone's serial number (or an important part within the serial number, e.g. the type approval code TAC. The user enters the code using either the keyboard or – more failsafe – a barcode reader. The serial number is typically printed on the phone, inside the battery compartment.

GSM and WCDMA mobile phones have a serial number containing a code for the whole series, usually the first eight digits (TAC). Lector can use this code to determine which test shall be carried out. The operator only needs to enter the serial number or scan it using a barcode reader; Lector then uses a user-defined table to find out the right test script.

NOTE

In order for this to work, the IMEI Comparison parameter in Configuration > General must be set to "Always" or "Only TAC2TEST". Please refer to "IMEI Comparison" on page 36 for more information.

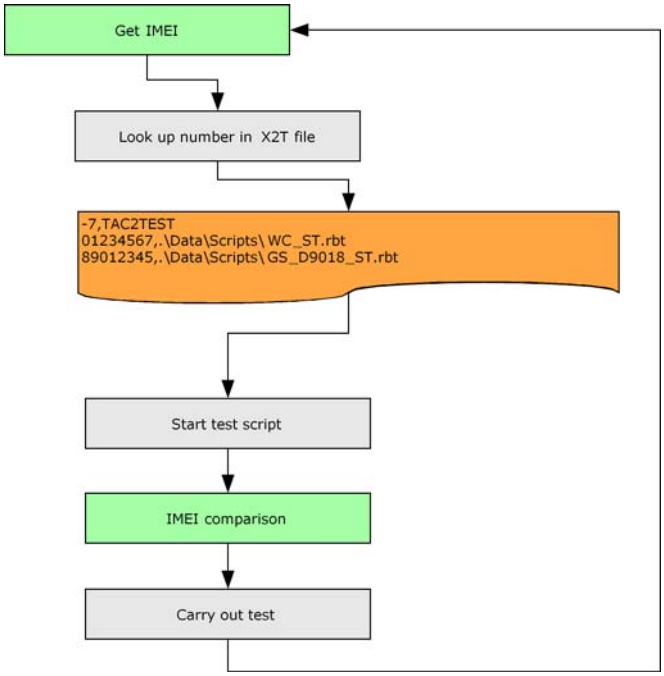
Limit values and coupling factors may also depend on a specific code because they can be loaded from the test script.

Lector and Scriptor support three different concepts: TAC2TEST, TECH2TEST and CODE2TEST.

TAC2TEST

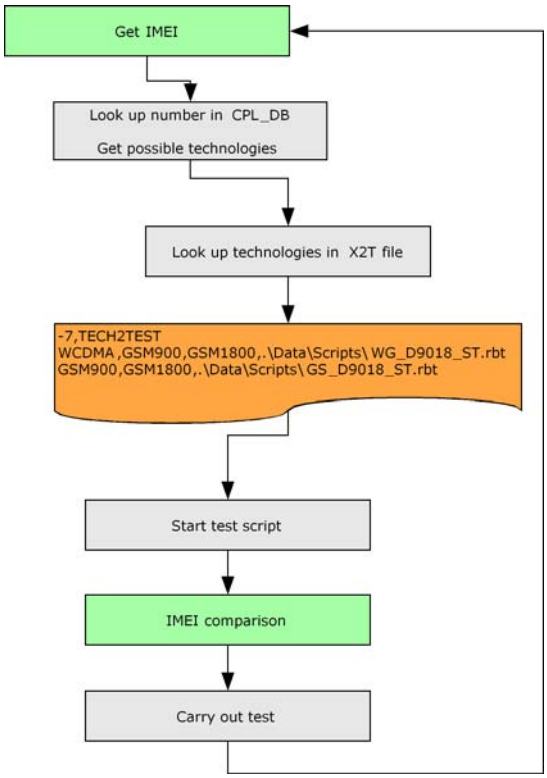
The code to be entered should be the serial number (IMEI in GSM and WCDMA). Lector or Scriptor performs a plausibility check on the code, then extracts the TAC (Type Approval Code) and searches for the TAC in a user-defined list (the X2T file) associating TACs with test scripts. If the TAC is present in the list, the related test script is started. Once the test is completed, the next mobile phone can be tested, i.e. TAC2TEST expects the next serial number.

An example TAC2TEST file can be found under the subgroup TAC2TEST in the GSM/WCDMA group of tests. You can modify this file or add your own TAC2TEST files to any test group and subgroup.



TECH2TEST

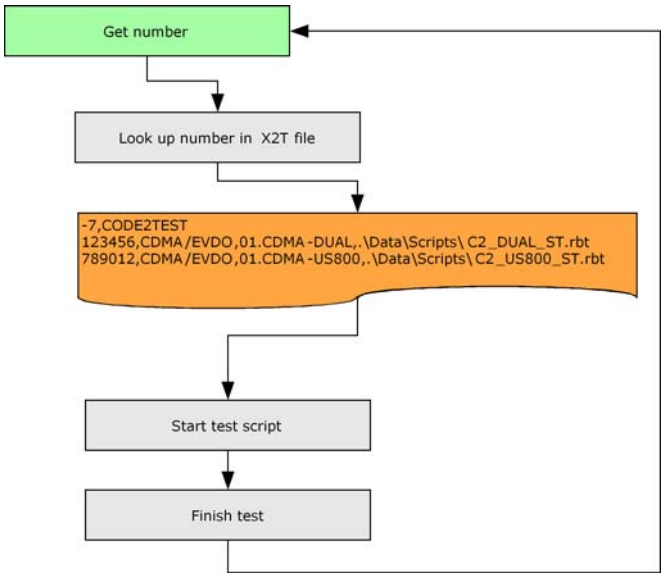
Similar to TAC2TEST, the code to be entered should be the serial number (IMEI). Lector or Scriptor performs a plausibility check on the code, then extracts the TAC and searches for the TAC in the coupling factor databases. If the TAC is present, Lector or Scriptor reads the technologies that the mobile phone supports from the coupling factor database. The user-defined X2T file contains a table of technologies and associated test scripts. The advantage over TAC2TEST is that the user does not need to maintain a list with all the different mobile phone types because this is extracted from the coupling factor databases (the 7360 Coupling Factor Update License can be very helpful in this case). You can also set up the X2T file so that certain technologies are ignored, e.g. if you do not want to perform GPRS or WCDMA tests.



CODE2TEST

The code to be entered can be a serial number, a code for a particular type of mobile phone or supported technology. Lector or Scriptor looks up the code in a user-defined list (the X2T file) associating the code with a test group, subgroup and script. The group and subgroup information is particularly important in CDMA because a lot of configuration information is linked to group and subgroup. The test script is started; once the test is completed, the next mobile phone can be tested, i.e. CODE2TEST expexts the next code.

An example CODE2TEST file can be found in the subgroup MEID2TEST of the CDMA/EVDO group of tests. You can modify this file or add your own CODE2TEST files to any test group and subgroup.



General

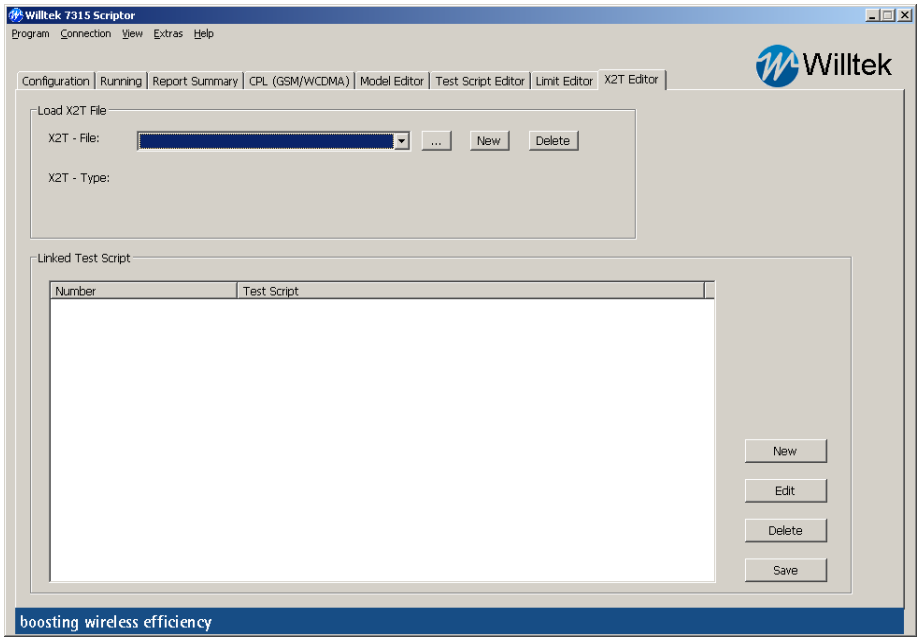
TAC2TEST, TECH2TEST and CODE2TEST files all have the filename extension X2T (instead of RBT for normal test scripts). You can have different X2T files for individual purposes, e.g. one for each service level with different test depths.

Before tests can be performed, test scripts must be assigned to codes. This can be done with 7315 Scriptor; the following section explains the necessary steps.

Creating and modifying TAC2TEST files

The X2T Editor in Scriptor allows you to assign codes, such as a serial number or parts of it, to test scripts.

1 In 7315 Scriptor, open the X2T Editor.



2 In the Load X2T File section, click on **...** to select the X2T file that you want to modify.
The section entitled Linked Test Script displays the serial numbers and associated test scripts that are already defined in the TAC2TEST file.
– Or, if you want to create a new file: –

   a Click **New** in the Load X2T File section.
   A popup menu entitled Create New X2T File appears.

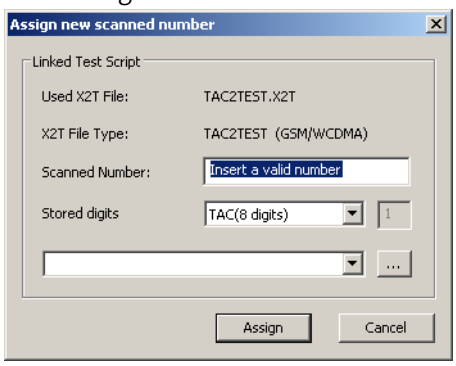
   b Select TAC2TEST as the X2T file type.

   c Click **...** to enter a file name and select a folder for the new file.

   d Click **OK** to confirm your selections.
   The popup menu disappears, and the section entitled Linked Test Script displays an empty table for serial numbers and associated test scripts.

3 In order to assign a new serial number (range) to a test script:

a Click on **New**.
The "Assign new scanned number" window pops up.



b In the Scanned Number field, enter the serial number of the phone to test, or the first relevant digits that characterize a phone series (e.g. the first eight digits in GSM and WCDMA).

c In the Stored digits field, select TAC(8 digits) if the Scanned Number field contains the TAC (Type Approval Code) for a GSM or WCDMA phone.
Or select ALL if the field contains a complete serial number.
Or select USER and enter the number of relevant digits.

d In the last input field, select the test script that shall be used when the mobile phone under test matches the Scanned Number.

e Click **Assign** to confirm your entries and to add them to the TAC2TEST list.

4 In order to modify an existing entry, select the entry with the mouse key and click Edit. Then follow the sub-steps starting under step 3.b.

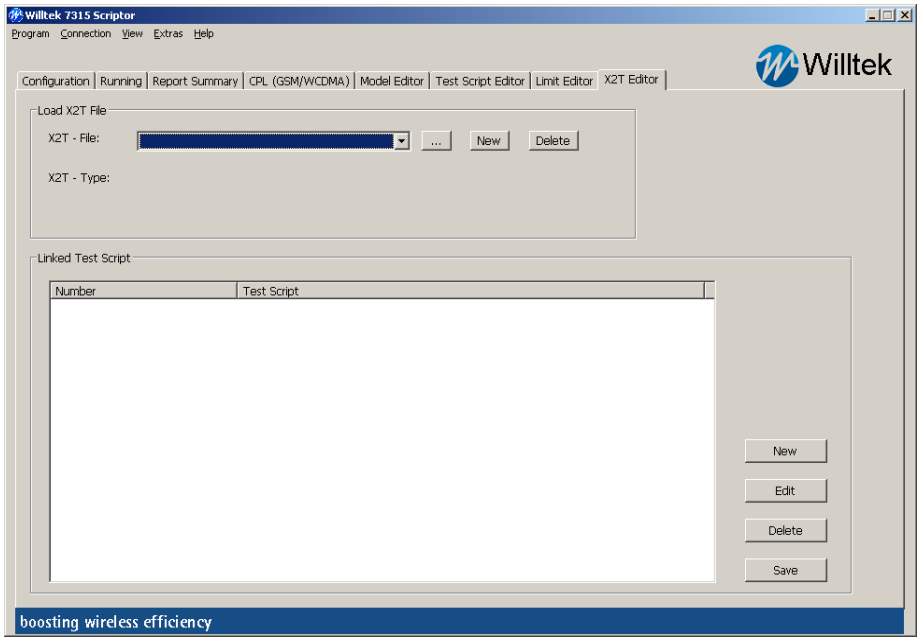
5 In order to delete an assignment, select the entry with the mouse key and click **Delete**.
The serial number and the test script are deleted from the list.

6 Click **Save** to confirm the changes and have Scriptor save the X2T file.

Creating and modifying TECH2TEST files

The X2T Editor in Scriptor allows you to assign wireless technologies to test scripts. The technologies supported by a phone under test are identified through its serial number and comparison with the coupling factor databases.

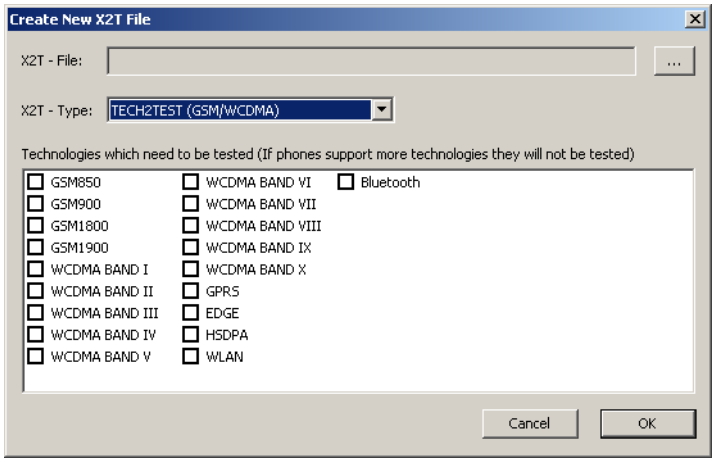
1 In 7315 Scriptor, open the X2T Editor.



2 In the Load X2T File section, click on **...** to select the X2T file that you want to modify.
The section entitled Linked Test Script displays the relevant wireless technologies and associated test scripts that are already defined in the TECH2TEST file.
– Or, if you want to create a new file: –

   a Click **New** in the Load X2T File section.
   A popup menu entitled Create New X2T File appears.

   b Select TECH2TEST as the X2T file type.
   The popup menu displays additional selection boxes for the different wireless technologies.



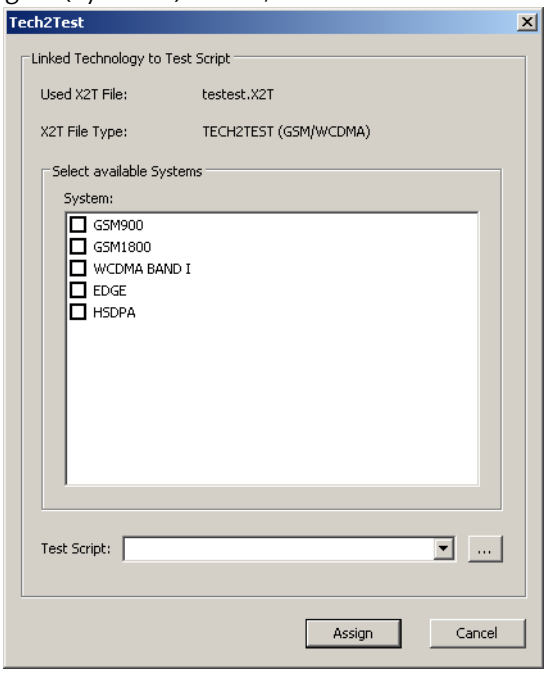
c Check all the technologies that are relevant for testing.

d Click **...** to enter a file name and select a folder for the new file.

e Click **OK** to confirm your selections.
The popup box disappears, and the section entitled Linked Test Script displays an empty table for the relevant technologies and associated test scripts.

3 In order to assign a new technology (combination) to a test script:

a Click on **New**.
The ''Tech2Test'' menu pops up, with the available wireless technologies (systems) listed.,



b Check the wireless technologies (systems) that are to be tested or available in the phone.

c In the Test Script input field, click on **...** to select the test script that shall be used when the mobile phone under test supports the selected technologies.

d Click **Assign** to confirm your entries and to add them to the TECH2TEST list.

4 In order to modify an existing entry, select the entry with the mouse key and click Edit. Then follow the sub-steps starting under step 3.b.

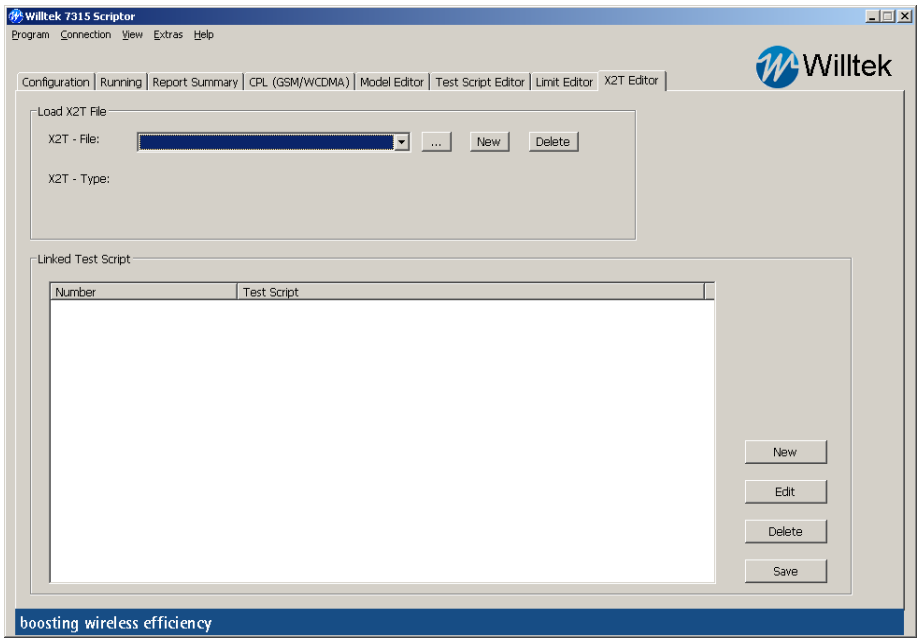
5 In order to delete an assignment, select the entry with the mouse key and click **Delete**.
The serial number and the test script are deleted from the list.

6 Click **Save** to confirm the changes and have Scriptor save the X2T file.

Creating and modifying CODE2TEST files

The X2T Editor in Scriptor allows you to assign codes to test groups, subgroups and scripts.

1 In 7315 Scriptor, open the X2T Editor.



2 In the Load X2T File section, click on **...** to select the X2T file that you want to modify.
The section entitled Linked Test Script displays the codes and associated test groups, subgroups and scripts that are already defined in the CODE2TEST file.
– Or, if you want to create a new file: –

a Click **New** in the Load X2T File section.
A popup menu entitled Create New X2T File appears.

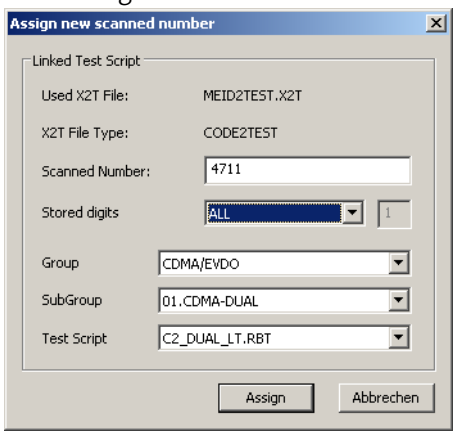
b Select CODE2TEST as the X2T file type.

c Click **...** to enter a file name and select a folder for the new file.

d Click **OK** to confirm your selections.
The popup menu disappears, and the section entitled Linked Test Script displays an empty table for codes and associated test groups, subgroups and scripts.

3 In order to assign a new code to a test script:

a Click on **New**.
The "Assign new scanned number" window pops up.



b In the Scanned Number field, enter the code associated with phones to test, or the first relevant digits that characterize a phone series.

c In the Stored digits field, select TAC(8 digits) if the Scanned Number field contains the TAC (Type Approval Code) for a GSM or WCDMA phone.
Or select ALL if the field contains a complete code.
Or select USER and enter the number of relevant digits.

d In the Group, Subgroup and Test Script input fields, select appropriate entries for the test script that shall be used when the mobile phone under test matches the Scanned Number.

e Click **Assign** to confirm your entries and to add them to the CODE2TEST list.

4 In order to modify an existing entry, select the entry with the mouse key and click Edit. Then follow the sub-steps starting under step 3.b.

5 In order to delete an assignment, select the entry with the mouse key and click **Delete**.
The serial number and the test script are deleted from the list.

6 Click **Save** to confirm the changes and have Scriptor save the X2T file.

Administrating Lector on multiple computers

10

This chapter shows how an administrator with 7315 Scriptor can install new and modified test scripts and mobile phone description files on computers running Lector. Topics discussed in this chapter are as follows:

Introduction

An administrator in a service factory takes care of the test environment on a number of work benches, in particular in incoming inspection and final test. Using Scriptor, the administrator may create description files for new mobile phones, including pictures of phones and coupling factors. Test scripts may also be altered or added. It is easily possible to make these changes and additions available to all test stations, even if they are only running the Lector software. This chapter provides the necessary steps to do this.

Using a particular configuration on multiple test stations

Configuration data such as folders for files to be read or created, print and save settings should be uniform over all the test stations to ease maintenance. Also, in order to protect configuration data from being altered by unauthorized users, they should be read-only.

This can be achieved by simply copying the **config.ini** file from Scriptor to the test stations, e.g. using the local area network or a USB memory stick. The config.ini file is located in Data\Init within the program installation folder (typically C:\Program files\Willtek\731X Lector-Scriptor).

Note

Drives and folders used in the Lector environment must have the same names and drive letters on all of the computers.

Copying test scripts and phone definition files for GSM and WCDMA to other test stations

In order to manually replicate information about new GSM or WCDMA phones on other test stations, the following files should be copied to the test stations, e.g. using the local area network or a USB memory stick. Note that the file locations are relative to the software installation folder (typically C:\Program files\Willtek\731X Lector-Scriptor) and apply for a default configuration.

Data\Init\phones.ini (for the groups and subgroups)
Data\CPL_DB\MPUSER.DAT (phone models and coupling factors)
Data\CPL_DB\TAC6USER.DAT (how TACs are assigned to phone models)
Data\CPL_DB\USERTAC.DAT (assignment of new TACs to existing phone models)
Data\CPL_DB\Pictures*.* (new phone pictures)
Data\Scripts*.rbt (files with new or modified scripts)
Data\Limits*.lim (limit values)

Note that if you want to return to the default settings of groups and subgroups, you can delete the existing ones by copying phones.def to phones.ini (effectively overwriting the old file).

Copying test scripts and phone definition files for CDMA2000 1xRTT and 1xEV-DO to other test stations

In order to manually replicate information about new CDMA-capable phones on other test stations, the following files should be copied to the test stations, e.g. using the local area network or a USB memory stick. Note that the file locations are relative to the software installation folder (typically C:\Program files\Willtek\731X Lector-Scriptor) and apply for a default configuration.

Data\Init\phones.ini (for the groups and subgroups)
Data\Init\mobilesettings.ini
Data\Init\carrier.ini
Data\CPL_DB\MPCUSER.DAT (phone models and coupling factors)
Data\CPL_DB\Pictures*.* (new phone pictures)
Data\Scripts*.rbt (files with new or modified scripts)
Data\Limits*.lim (limit values)

Note that if you want to return to the default settings of groups and subgroups, you can delete the existing ones by copying phones.def to phones.ini (effectively overwriting the old file).

Copying test scripts and mobile station definition files for TETRA to other test stations

In order to manually replicate information about new TETRA radios on other test stations, the following files should be copied to the test stations, e.g. using the local area network or a USB flash disk. Note that the file locations are relative to the software installation folder (typically C:\Program files\Willtek\731X Lector-Scriptor) and apply for a default configuration.

Data\Init\phones.ini (for the groups and subgroups)
Data\Init\mobilesettings.ini
Data\Init\channelsettings.ini
Data\CPL_DB\MPTUSER.DAT (TETRA radio models and coupling factors)
Data\CPL_DB\Pictures*.* (new pictures of mobile stations)
Data\Scripts*.rbt (files with new or modified scripts)
Data\Limits*.lim (limit values)

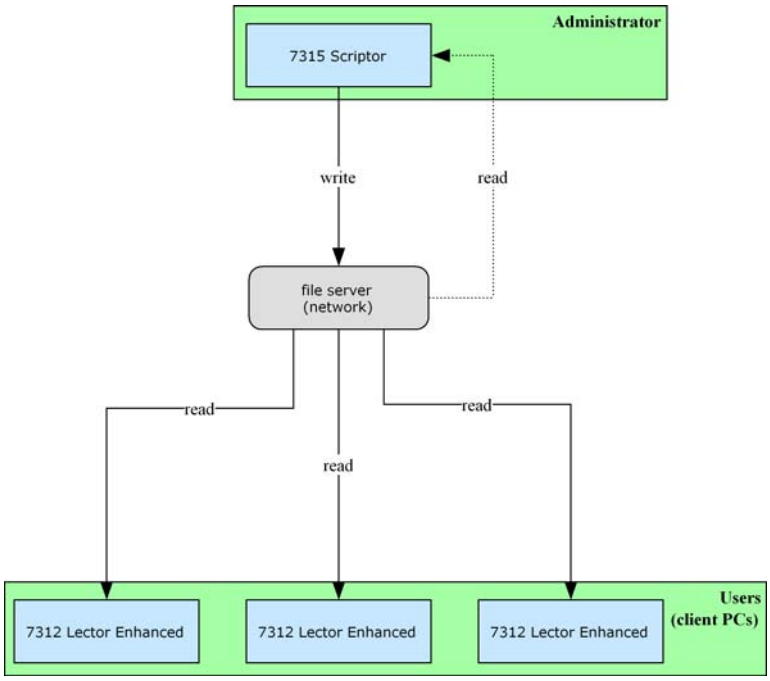
Note that if you want to return to the default settings of groups and subgroups, you can delete the existing ones by copying phones.def to phones.ini (effectively overwriting the old file).

Providing a reference configuration to multiple users

Principle

As an alternative to the above distribution method, configuration files can also be provided on a network and copied into the local installation folders. The update on the local PCs (clients) can be done either manually or automatically at regular intervals; this requires 7312 Lector Enhanced installations on the client PCs and is described in "Updating the configuration from a network drive" on page 51.

The administrator provides the reference configuration (mobile, carrier and coupling factor definitions, scripts and limits) in a folder on a network drive that the clients can access also. In this case, the administrator's 7315 Scriptor software copies the local user data to the network folder. The local user data are organized in files as outlined in "User-defined configuration data files" on page 212.



Updating the server data

In order to copy the current local user data, proceed as follows.

1 In 7315 Scriptor, select **Extras > Synchronize > Sync Settings...** to open the Synchronization Settings pop-up menu.

2 Check the **Write Files for Synchronization** radio button.

3 Click on the **...** button in the Synchronization Path section of the pop-up menu and select a network drive and folder where the user configuration data shall be stored. Confirm your choice by clicking **OK**.

4 Confirm your changes by clicking **OK**.

5 Select **Extras > Synchronize > Write Manually**.
The file creation date and time of the respective files from the test script folder (as set up in the Configuration section, see "Test Script Path" on page 28) and from the Data\CPL folder of the software installation directory are compared with the same files on the network server. If a file on the network server is older or does not yet exist, it will be copied from the local installation to the network. Newer files will not be overwritten.

6 If you want to copy additional files to the synchronization folder on the network, you can select them in **Extras > Synchronize > Single Sync...** Once the files to be copied have been added to the list, click on **Write to Sync Server** to copy them.
When a client is synchronized with the synchronization folder on the network, the additional files will be copied there as well.

User-defined configuration data files

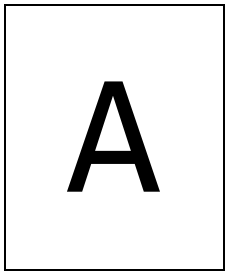
The following files contain user-defined configuration data for mobile phones, mobile carriers and coupling factors as follows; in order to maintain the same data on multiple Lector or Scriptor installations, it is advisable to copy them from a reference configuration to all the local installations as explained above.

The reference folder is the installation path, typically C:\Program files\Willtek\731X Lector-Scriptor.

Table 15 Files containing user-defined configuration data

subfolder and file name	Data contained
Data\Init\phones.ini Data\Init\PhonesAll.INI	Groups and subgroups
Data\Init\mobilesettings.ini	Mobile phone definitions for CDMA and 1xEV-DO, and for TETRA radios
Data\Init\carrier.ini	Carrier definitions for CDMA and 1xEV-DO
Data\Init\channelsettings.ini	Network and channel definitions for TETRA
Data\CPL_DB\MPUSER.DAT	Phone models and coupling factors for GSM and WCDMA
Data\CPL_DB\MPCUSER.DAT	Phone models and coupling factors for CDMA and 1xEV-DO
Data\CPL_DB\MPTUSER.DAT	Mobile station models and coupling factors for TETRA
Data\CPL_DB\TAC6USER.DAT	Assignment of TACs to phone models
Data\CPL_DB\USERTAC.DAT	Assignment of additional TACs to existing phone models
Data\CPL_DB\Pictures*.*	Pictures from the mobile phones
Data\Scripts*.rbt	Test scripts
Data\Limits*.lim	Limit values
Data\Channels*.*	Test channels that are defined in the Configuration section under the Test Channels tab.

Testing Bluetooth devices



This appendix summarizes the measures to be taken to test Bluetooth-enabled mobile phones. The topics discussed in this appendix are as follows:

Performing Bluetooth tests with Lector

This section explains how to carry out connectivity tests on the Bluetooth device integrated in wireless devices. See section "Bluetooth Test" on page 36 on how to enable and disable this feature.

The Bluetooth test can be an integral part of the mobile phone test procedure.

- If you are using the 3100 Mobile Fault Finder or a 4400 Series Mobile Phone Tester, this requires the BLUETOOTH command (see "BLUETOOTH" on page 99) as part of the test script.
- If you are using the 2201 ProLock, a 4100 or a 4200 series instruments, the test script needs to include the BLUETOOTH_DIRECT command (see "BLUETOOTH_DIRECT" on page 99).

In addition, users of 7315 Scriptor can check the script and add the command.

Typically after a connection (a call) between the phone and the tester has been established, Lector will ask if you want to perform a Bluetooth.

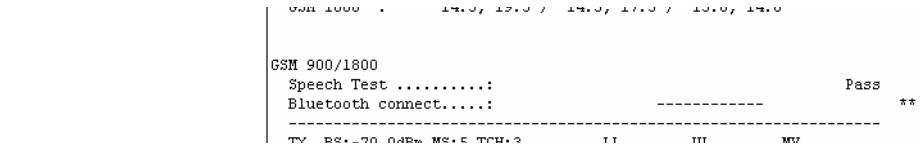
Follow the onscreen instructions. In particular, make sure that

- the Willtek Bluetooth dongle is switched on
- the Bluetooth function in the mobile phone is enabled
- the Bluetooth visibility in the phone is enabled

After completing the mobile phone tests, Lector shows or prints a test protocol that includes the RF measurements as well as the results of the Bluetooth connectivity test.
If successful, the Bluetooth test result consists of the MAC address of the Bluetooth device and the device name. The device name should be identical to the one that is set up in the phone.

Troubleshooting Bluetooth tests with Lector

If a Bluetooth test fails, this is indicated by asterisks on the right-hand side of the results printout.



Test failure may occur for different reasons. It may be either because the test setup is not suitable or because the Bluetooth device in the mobile phone is defective. Here are a few possibilities:

- The Bluetooth testing device is switched off.
  Switch on the device in the 4921 RF Shield.

– The phone under test does not have a Bluetooth device.
  Repeat the test, but do not request a Bluetooth connectivity test.
– The Bluetooth function in the phone is disabled.
  Turn on the Bluetooth feature in the phone.
– The Bluetooth function is enabled, but the visibility is disabled.
  Enable the Bluetooth visibility in the phone.
– There are other Bluetooth devices around that make communication difficult.
  Close the RF Shield before starting the Bluetooth test.

If none of these conditions are met, the Bluetooth device in the phone may indeed by defective!

Warranty and Repair

B

This chapter describes the customer services available through Willtek. Topics discussed in this chapter include the following:

Warranty information

Willtek warrants that all of its products conform to Willtek's published specifications and are free from defects in materials and workmanship for a period of one year from the date of delivery to the original buyer, when used under normal operating conditions and within the service conditions for which they were designed. This warranty is not transferable and does not apply to used or demonstration products.

In case of a warranty claim, Willtek's obligation shall be limited to repairing, or at its option, replacing without charge, any assembly or component (except batteries) which in Willtek's sole opinion proves to be defective within the scope of the warranty. In the event Willtek is not able to modify, repair or replace nonconforming defective parts or components to a condition as warranted within a reasonable time after receipt thereof, the buyer shall receive credit in the amount of the original invoiced price of the product.

It is the buyer's responsibility to notify Willtek in writing of the defect or nonconformity within the warranty period and to return the affected product to Willtek's factory, designated service provider, or authorized service center within thirty (30) days after discovery of such defect or nonconformity. The buyer shall prepay shipping charges and insurance for products returned to Willtek or its designated service provider for warranty service. Willtek or its designated service provider shall pay costs for return of products to the buyer.

Willtek's obligation and the customer's sole remedy under this hardware warranty is limited to the repair or replacement, at Willtek's option, of the defective product. Willtek shall have no obligation to remedy any such defect if it can be shown: (a) that the product was altered, repaired, or reworked by any party other than Willtek without Willtek's written consent; (b) that such defects were the result of customer's improper storage, mishandling, abuse, or misuse of the product; (c) that such defects were the result of customer's use of the product in conjunction with equipment electronically or mechanically incompatible or of an inferior quality; or (d) that the defect was the result of damage by fire, explosion, power failure, or any act of nature.

The warranty described above is the buyer's sole and exclusive remedy and no other warranty, whether written or oral, expressed or implied by statute or course of dealing shall apply. Willtek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding, oral or written, made by an agent, distributor, or employee of Willtek, which is not contained in the foregoing warranty will be binding upon Willtek, unless made in writing and executed by an authorized representative of Willtek. Under no circumstances shall Willtek be liable for any direct, indirect, special, incidental, or consequential damages, expenses, or losses, including loss of profits, based on contract, tort, or any other legal theory.

Equipment return instructions

Please contact your local service center for Willtek products via telephone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number.
- Serial number, product type, and model.
- Warranty status. (If you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note.)
- Detailed description of the problem or service requested.
- Name and telephone number of the person to contact regarding questions about the repair.
- Return authorization (RA) number or reference number.

If possible, return the equipment using the original shipping container and material. Additional Willtek shipping containers are available from Willtek on request. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit. Willtek is not liable for any damage that may occur during shipping. The customer should clearly mark the Willtek-issued RA or reference number on the outside of the package and ship it prepaid and insured to Willtek.

End-User License Agreement

C

This appendix describes the conditions for using the software.

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(ii) copy the software, except for archive purposes consistent with your standard archive procedures;

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(iv) modify, decompile, disassemble, reverse engineer or otherwise attempt to derive the source code of the software;

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Publication History

Revision	Comment
0704-220-A	First revision.
0706-231-A	New sections on: software license updating, comments in the results summary, separate and new result file naming for GSM/WCDMA and CDMA/EVDO, multiple installations, software and configuration updating, modified coupling data determination, new test script commands, improved TAC2TEST capabilities and more from software version 2.30.
0712-300-A	New features for version 3.00 added, including new TAC2TEST editor.
0804-400-A	Updated to reflect version 4.00 changes with support of 4300 Mobile Service Tester Series and HSDPA technology.
0809-420-A	Reflects changes made to versions 4.10 and 4.20.
0901-500-A	Integration of Willtek's 2201 ProLock. Additional HSDPA and EVDO commands (e.g. EVDO hybrid mode). Support of the 1490 Bluetooth Connectivity Test Package.
0909-610-A	Reflects changes introduced with versions 6.00 and 6.10, including TETRA support.

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