User's Guide

will'tek

7311 Lector Basic, 7312 Lector Enhanced, 7315 Scriptor

User's guide
Version 2.31

boosting wireless efficiency

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Ordering information This guide is issued as part of **Lector and Scriptor**. The ordering number for a published guide is 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.

Table of Contents

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:

3100 Mobile Fault Finder getting started manual, ordering number M 295 111

3100 Mobile Fault Finder user's guide, ordering number M 290 111

4400 Mobile Phone Tester getting started manual, ordering number M 295 011

4400 Mobile Phone Tester Series user's guides

Bluetooth Connectivity Test Products user's guide, ordering number M 292 018

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 1 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 2 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 3 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 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

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, WCDMA/UMTS, CDMA2000 and EDGE mobile phones 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 4400 Mobile Phone Tester Series – just download the software from the Internet!

Features and capabilities

- GSM, GPRS, EDGE, WCDMA and Bluetooth tests
- CDMA2000, EV-DO, AMPS test
- MEID support
- Remote controls for 4400 Mobile Phone Tester and 3100 Mobile Fault Finder

- Easy to use software for different user groups
  - 7311 Lector Basic → Operator level
  - 7312 Lector Enhanced → Operator level
  - 7315 Scriptor → Administrator level
- Free version for player purposes available: 7311 Lector Basic
- Graphical user interface for automatic coupling factor calculation.
- Functions for protected administration and configuration.
- Different starts 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)
- Free version for player purposes available
- Coupling factor (CPL) database for popular phones included
- Test result summary
- Easy-to-use script editor, mobile list editor and limits editor (Scriptor)
- Single installation file for all types of products (available functionality depends on USB license 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 inserted 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 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 or Windows XP. You will need to log in with administrator rights to install the software.

To control a 4400 Series Mobile Phone Tester, the instrument will need software version 6.20 or higher.

To control a 3100 Mobile Fault Finder, the instrument will need software version 11.20 or higher.

To make use of the Bluetooth and the Intersystem Handover capabilities, software version 12.00 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 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.

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 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.

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). Please note the following particularities:

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 7200 Update Utility for more information.

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".

Configuring the software

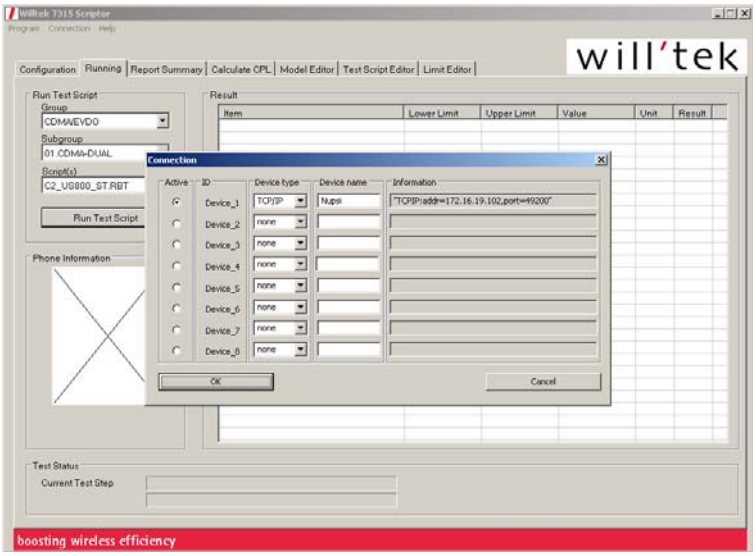
Lector and Scriptor can be set up to communicate with several different instruments over different connections. Only one instrument, however, can be used at any time while Lector is running.

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. The Device name field can be used to note any instrument or connection information.

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 Device type:

Table 1 Device type input fields in the Connection menu

Device type	Parameters	Remarks
RS-232	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/Xoff, RTS, None)	Use the physical COM port number. **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 11. The port number indicates the logical port for the software. **Default** port is 49200.
USB	COM port (range 1 – 99) Baud rate (in kbps) Handshake protocol (Xon/Xoff, RTS, None)	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** baud rate is 115200, None.

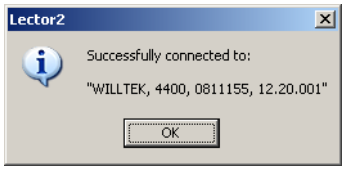
Table 1 Device type input fields in the Connection menu

Device 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 instrument found, including its serial number and software version number (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 11. 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 7200 Update Utility to check the IP address. See separate manual for the utility.

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

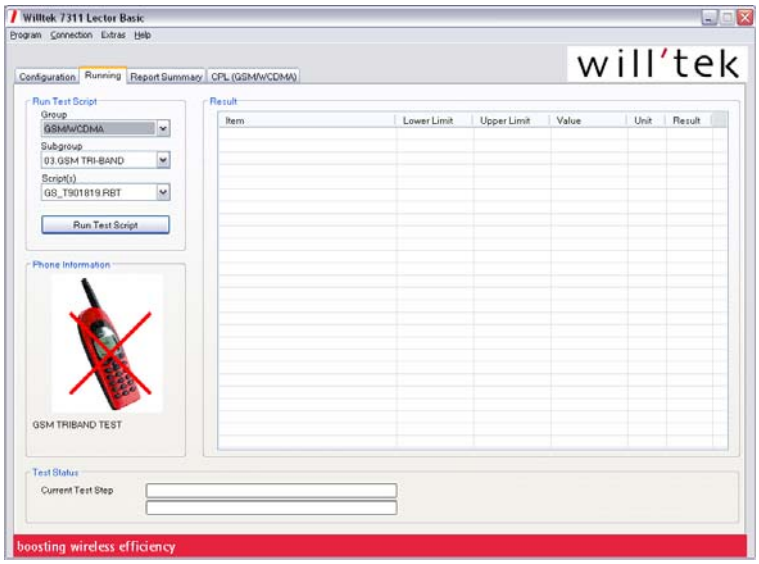
3

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, in conjunction with a pop-up box (see below) indicating the current interface settings. You can immediately test the connection to the instrument by klicking on the **Connect** button, check and change the interface settings with a klick on the **Settings** button, or skip the interface part by klicking on the **Skip** button.



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. These are (subject to change and amendment):

Table 2 Default test scripts delivered with Lector and Scriptor

Group	Subgroup	Test Script
CDMA/EVDO	01.CDMA-Dual	C2_US800_ST.RBT
		C2_US800_LT.RBT
		C2_USPCS_ST.RBT
		C2_USPCS_LT.RBT
		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

Table 2 Default test scripts delivered with Lector and Scriptor

Group	Subgroup	Test Script
		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
	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
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
	06.WCDMA;GSM	WG_D9018_ST.RBT
		WG_D9018_LT.RBT
		WG_T901819_ST.RBT
	07.WCDMA;GSM;EDGE	WGE_D9018_ST.RBT
		WGE_D9018_LT.RBT
	08.GSM;EDGE	GE_D9018.RBT
		GE_D8519.RBT

Table 2 Default test scripts delivered with Lector and Scriptor

Group	Subgroup	Test Script
		GE_T901819.RBT
	09.GPRS	GP_S90.RBT
		GP_S18.RBT
		GP_S85.RBT
		GP_S19.RBT
		GP_D9018.RBT
		GP_D8519.RBT
	10.TAC2TEST	TAC2TEST

Abbreviations used:

- C2: CDMA2000 standard
- EV: 1xEV-DO standard
- GS: GSM standard
- GP: GSM standard including GPRS
- GE: GSM standard including EGPRS
- WC: WCDMA standard (UMTS FDD)
- WG: WCDMA standard and GSM standard
- WGE: WCDMA standard and GSM standard including EGPRS
- 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 Appendix A.

Starting and stopping a test

Carrying out a test

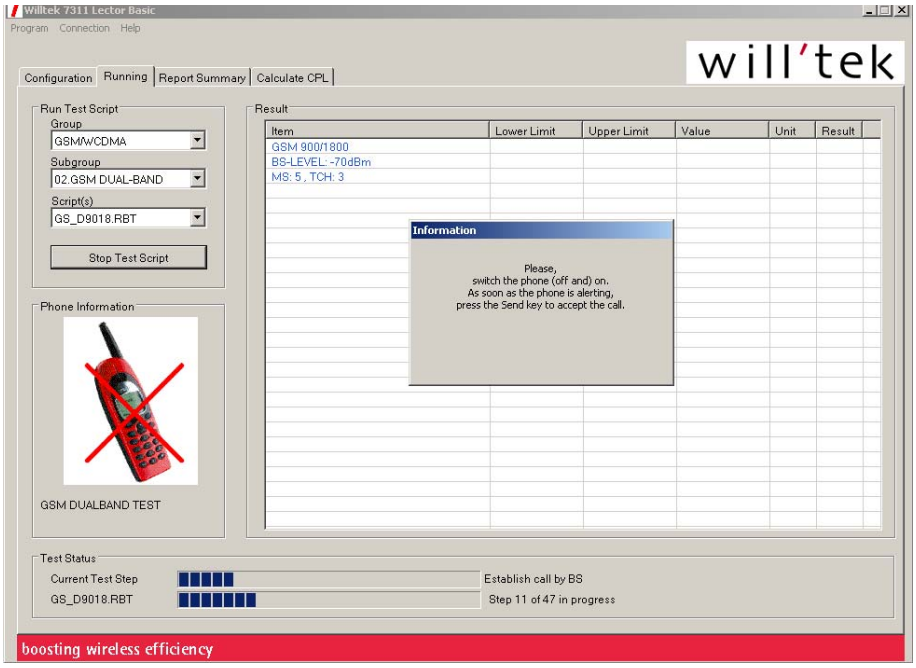
To start a test, click on **Start Test** in the Mobile and Carrier Tests main menu.

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" on page 26 and "Print" on page 27), the results can be printed and/or stored on a media device.

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 15.

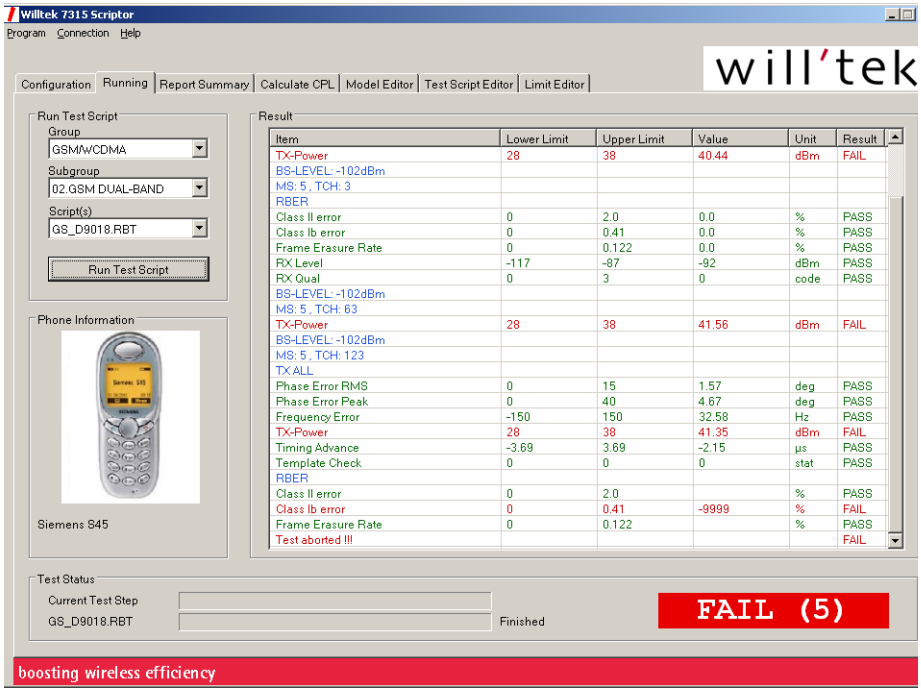
2 In the Running input/output section, click on **Run Test Script**.
The test will start, the instrument will set up a connection with the mobile phone and take various measurements. Lector and Scriptor will keep you informed about the progress (see example below). During the test, you may be asked to switch on the phone or to speak into the microphone and check the audio receiver.



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

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 is 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.

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.

Troubleshooting

If you experience problems with Lector, please refer to one of the Technical Assistance Centers (TAC) (see page xiv). Keep the following information at hand:

- Problem description
- Log file log.txt from the program installation folder (e.g. C:\Program files\Willtek\731X Lector-Scriptor), including the type and serial number of instrument and the version number of Lector or Scriptor
- Installed options on the tester
- Script file
- Result file

Lector logs the SCPI commands executed during the last application run into file log.txt.

Configuring The Test Environment

4

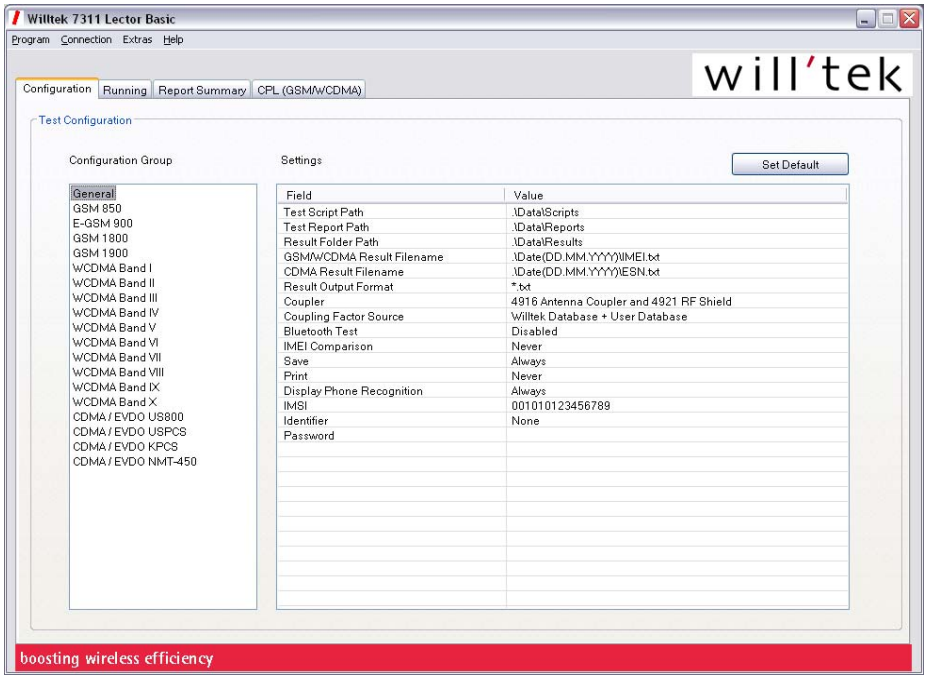
This chapter describes how Lector and Scriptor can be configured to optimally fit the test needs. Topics discussed in this chapter are as follows:

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.



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).

Test Report 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.

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.

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.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; 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 565068446.txt. The results for the second run with the same phone are stored in 565068446A.txt.

.\Date(YYYY-MM-DD)\ESN.txt This selection has the same effect as in .\Date(DD.MM.YYYY)\ESN.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).

.\ESN.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; 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 565068446.txt. The results for the second run with the same phone are stored in 565068446A.txt.

Result Output Format

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

Select "*.txt" if you do not need the XML format. Only the text file will be written. Otherwise, select "*.txt+*.xml". Both a text file and an XML file will be written into the results folder.

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

This option is useful because Willtek already delivers the coupling factors for many phone models for testing with the 4916 Antenna Coupler. 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

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.

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. More on Bluetooth connectivity tests can be found in Appendix B.
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.

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

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" if you want Lector or Scriptor to always save the test results.
Select "IfFail" if you want the results from only those tests to be saved that were not passed.
Select "IfPass" if you want the results from only those tests to be saved that

failed.
Select "Never" if you do not want any results to be saved.
Select "OnRequest" 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

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.

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.

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 35 for more information.

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.

Settings specific to system and frequency band

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.

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

GSM settings

Note that 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 3).

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 3 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 4. There are different frequency bands in use with their respective channel numbers; Lector currently supports Band I.

Table 4 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
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)

Table 4 WCDMA frequency bands

Frequency band	Uplink channels	Downlink channels	Region or designation
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
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

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 5, while more details regarding the frequency numbering is available in Table 6.

Table 5 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

Table 5 CDMA2000 frequency bands

Frequency band	Channel numbers	Uplink frequencies	Downlink frequencies
NMT 450	1—300, 539—871, 1039—1473, 1792—2016	411—484 MHz	421—494 MHz

Table 6 Channel arrangements

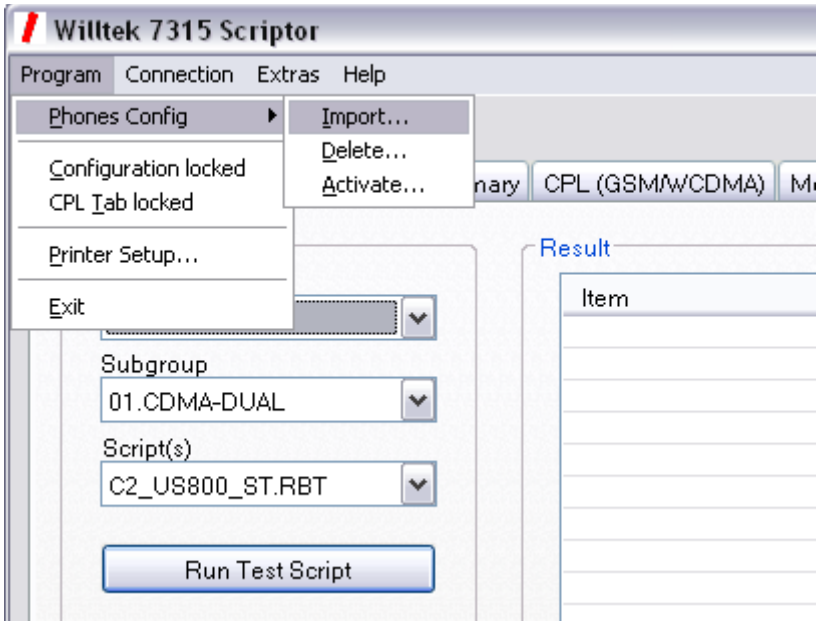
Band	Channel number	Center frequency, reverse link (in MHz)	Center frequency, forward link (in MHz)
US-800	1 to 799 991 to 1023	0.03·n + 825 0.03·(n-1023) + 825	0.03·n + 870 0.03·(n-1023) + 870
US-PCS	0 to 1199	0.05·n + 1850	0.05·n + 1930
Korean PCS	0 to 599	0.05·n + 1750	0.05·n + 1840
NMT 450	1 to 300 539 to 871 1039 to 1473 1792 to 2016	0.025·(n-1) + 450 0.025·(n-512) + 411 0.025·(n-1024) + 451 0.025·(n-1792) + 479	0.025·(n-1) + 460 0.025·(n-512) + 421 0.025·(n-1024) + 461 0.025·(n-1792) + 489

Configuring a coupling offset

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

Using predefined phone configurations

Willtek's Lector and Scirptor provide the possibility to load a file with predefined test scripts and phone descriptions. 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 sum 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 and phone descriptions, 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 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".

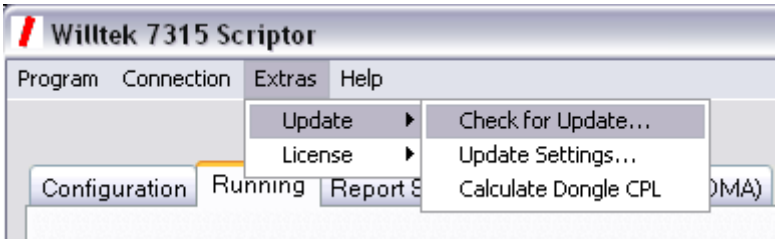
1 Select **Program > Phones Config > Delete**.
The Delete Phone Configuration box appears.

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.

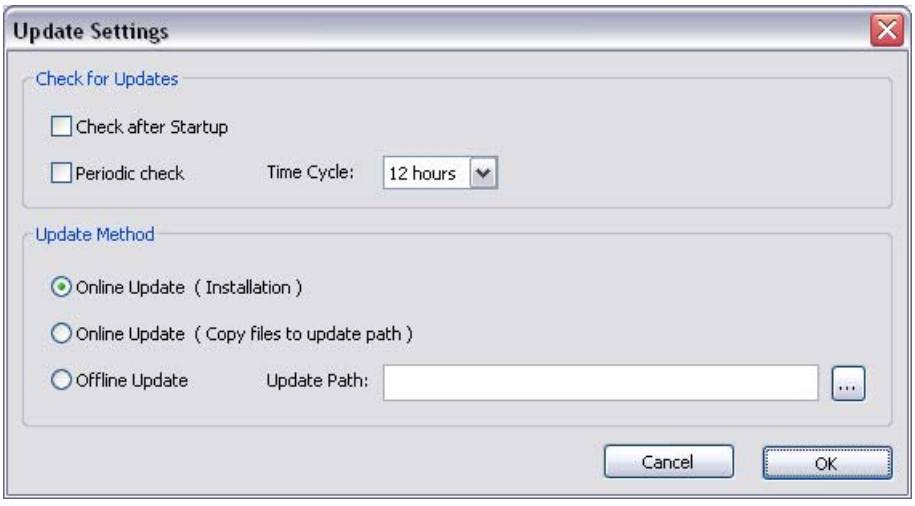
Updating the phone and test script configuration

From time to time, Willtek may provide an updated software version, an updated help file, or updated and additional test scripts and phone descriptions including the associated coupling factor tables 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.

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 automatically.
- 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.

Distributing local versions of configuration files

The above steps show how to update PCs with the latest Willtek database of mobile phones and coupling factors. Administrators in service centers can also distribute a user database with new phone definitions.
Chapter 9 "Administrating Lector on multiple computers" explains which files and folders are affected when the user database shall be copied from one PC to another. The update process can be automated by including these configuration files in the general software and conifguration update process.

As an administrator, in order to add the user database and associated files to the update, proceed as follows:

1 In the network folder for the software and configuration update, create a new folder named Users.

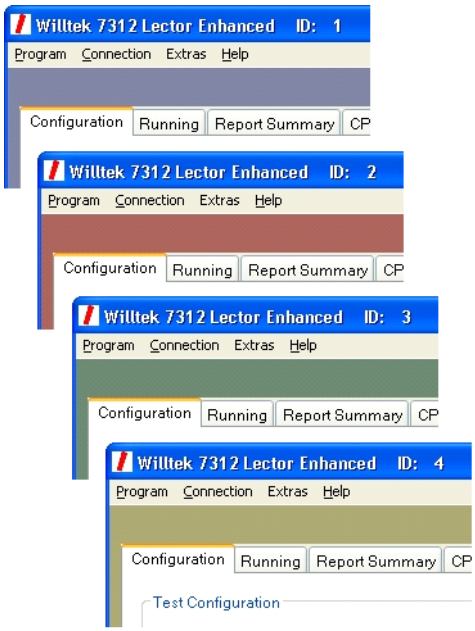
2 Copy all the relevant *.DAT files to the Users folder.
Example: Let's assume that the local user database is located in C:\Program files\Willtek\731X Lector-Scriptor\Data\CPL_DB. Let's also assume that the network folder for software and configuration update distribution is N:\7310Update. The relevant files (e.g. MPUSER.DAT) should be copied to N:\7310Update\User.

Running multiple instances of Lector or Scriptor

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 27). 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.



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:

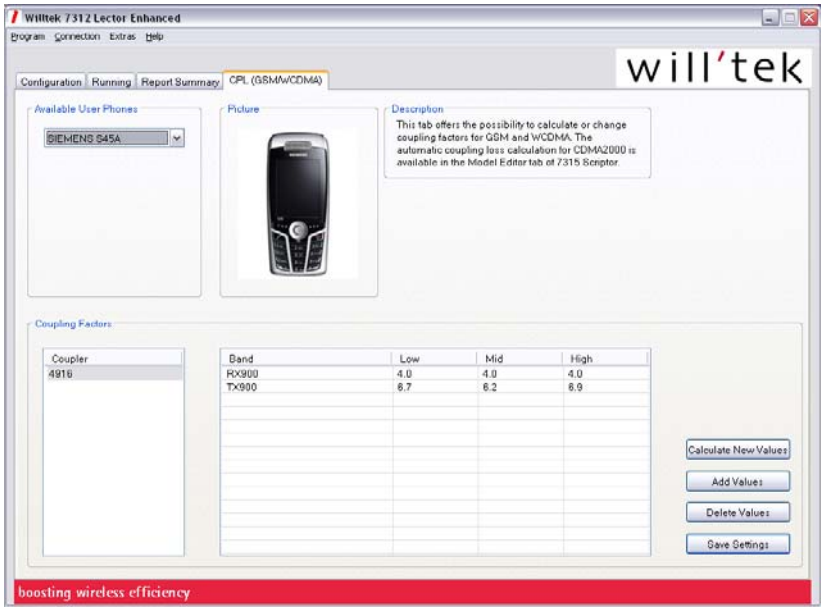
- Database of mobile phones delivered with Lector and Scriptor (Willtek database, see section "Coupling Factor Source" on page 25)
- Enhanced Willtek database of mobile phones based on the 7360 Coupling Factor Update License that can be purchased separately; contains most recent phone models and requires 7312 Lector Enhanced or 7315 Scriptor (Willtek database, see section "Coupling Factor Source" on page 25)
- 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 39)
- Coupling Factor Wizard for CDMA and 1xEV-DO; only available with 7315 Scriptor (user database, see section "Running the Coupling Factor Wizard for CDMA and 1xEV-DO" on page 42)

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:

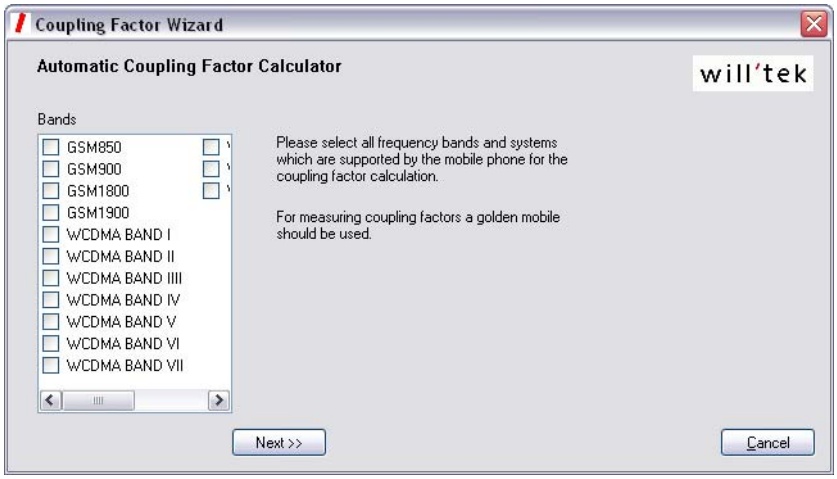
1 Select the CPL (GSM/WCDMA) tab.
The CPL (GSM/WCDMA) input/output section appears (see picture below).



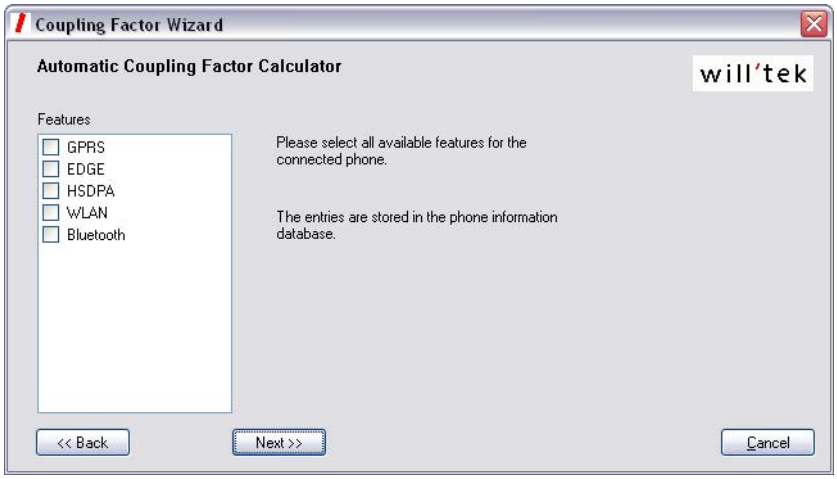
2 To start the Coupling Factor Wizard, click on **Calculate New Values**.
A new window with the Coupling Factor Wizard will pop up, see screenshot below.

Note

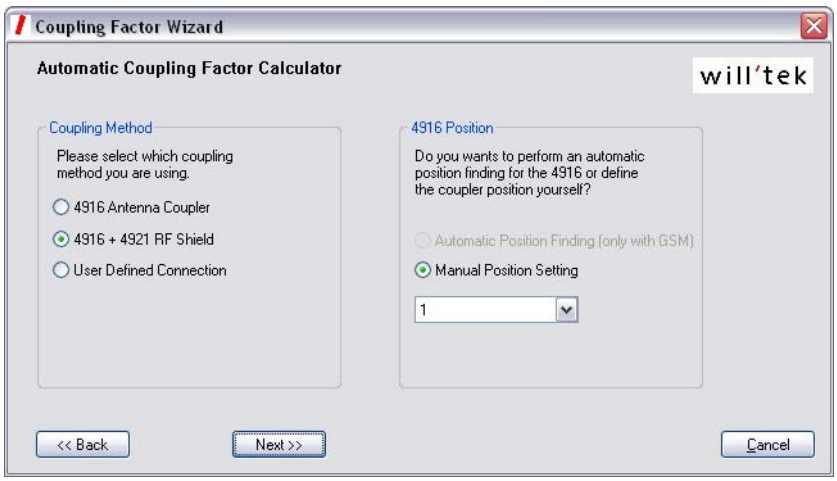
All coupling factor values previously measured and stored in the user database for that mobile phone type will be overwritten.



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, or you may select the position from the scroll field (select "No positioning used" if the position does not matter). If you do not use a 4916, ignore these fields.

Note

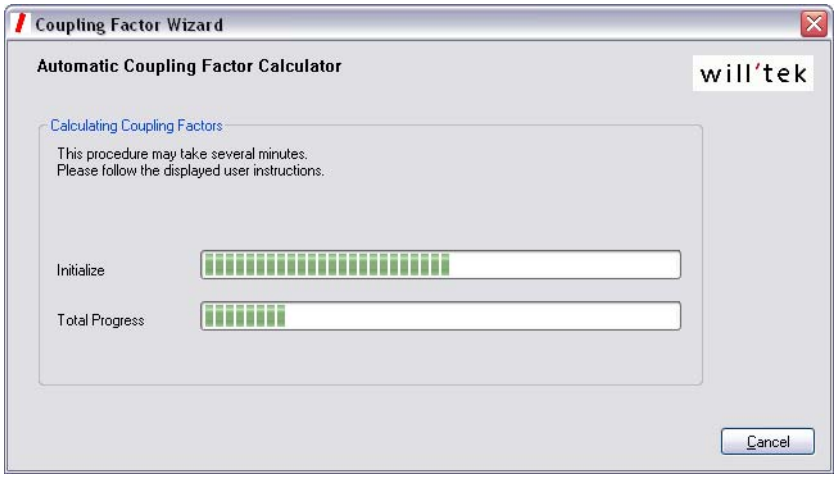
Automatic position finding is only available in 7312 Lector Enhanced and 7315 Scriptor.

7 Click **Next**.

8 In the next menu appearing, click on **...** to select a file name for the picture of the phone. Prior to that, you can store a picture 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.

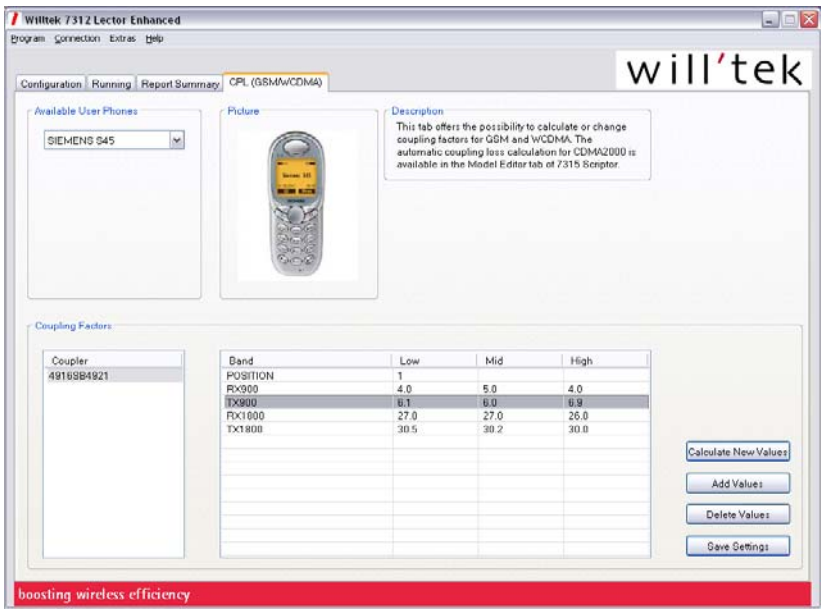
9 In the Name field, assign a name to the phone – this name will appear on the screen during a test and also in the test log.

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 Factor Wizard displays the coupling factors.

11 Klick on the **Save** 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

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 and 1xEV-DO

The Coupling Factor Wizard for CDMA is part of the Model Editor menus. The Model Editor is available in 7315 Scriptor. Please refer to "Changing the coupling factors" on page 55.

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.

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

CDMA and EVDO

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.

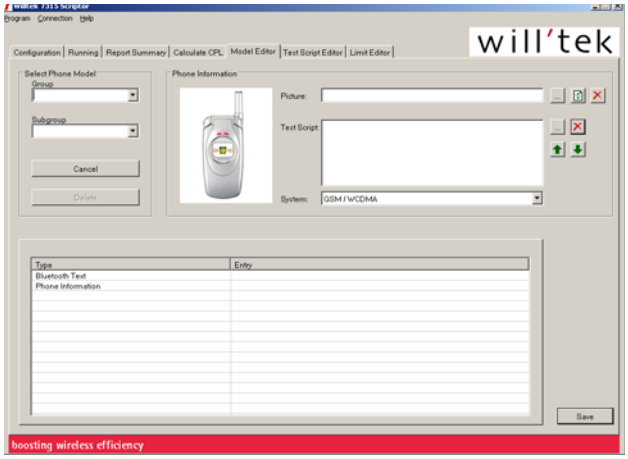
3 In the Subgroup field, enter the name of the new phone model.

4 Next to the Picture input field, click on **...** to select a file name for the picture of the phone. Prior to that, you can store a picture 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.

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 22), 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 15.
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.

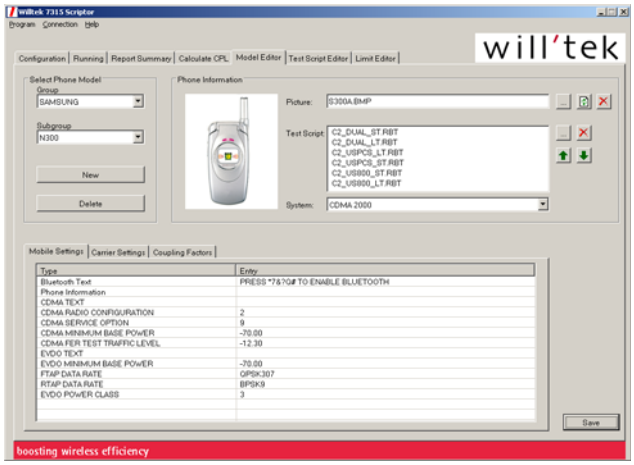
6 In the System scroll field, select the applicable system(s), GSM and/or WCDMA, or CDMA2000 (including 1xRTT and 1xEV-DO).
Depending on the chosen system, the tabs below display parameter groups for either GSM and WCDMA phones or for CDMA2000 phones.

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.

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.

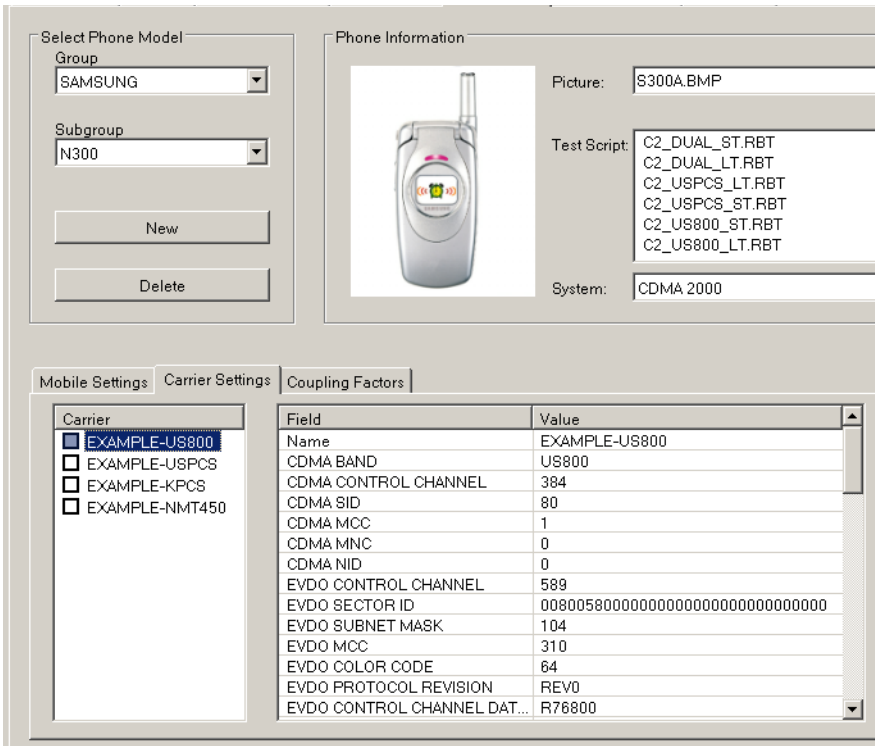
FTAP DATA RATE Forward data rate for the FTAP-based (Forward Test Application Protocol) test.

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.

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 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 30.

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

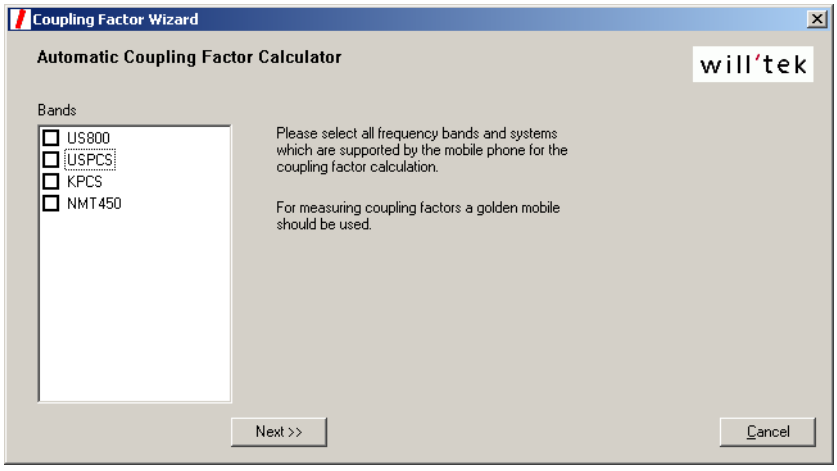
The coupling values can be determined by the Coupling Factor Wizard for CDMA and EVDO.

Note

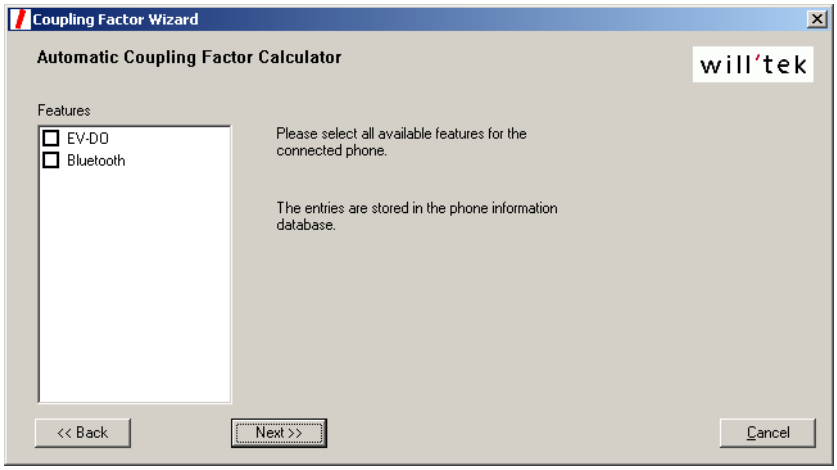
The Coupling Factor Wizard for CDMA and EVDO may take a long time to determine the coupling factors. Use an external power supply for the phone, or a fully loaded battery to avoid that the Wizard is aborted due to an empty battery.

1 Select the phone for which to determine the coupling (see "Selecting a phone model" on page 46 on how to do it).

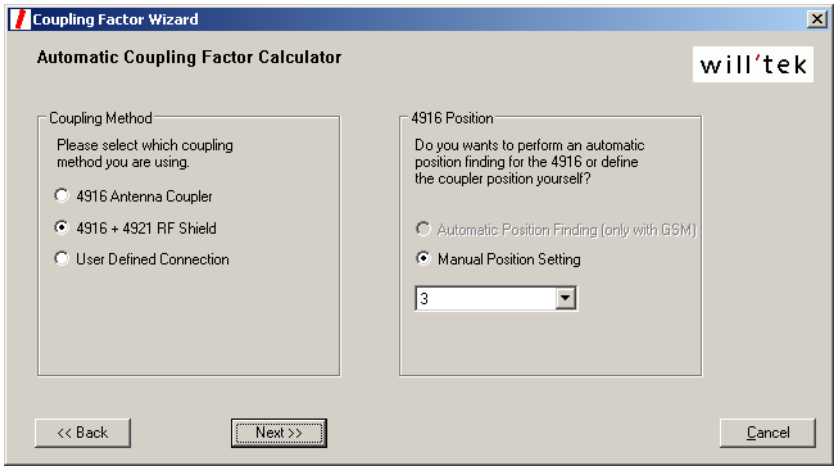
2 On the Coupling Factors tab within the Model Editor menu, click **Coupling Meas.**
The Coupling Factor Wizard appears.



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.



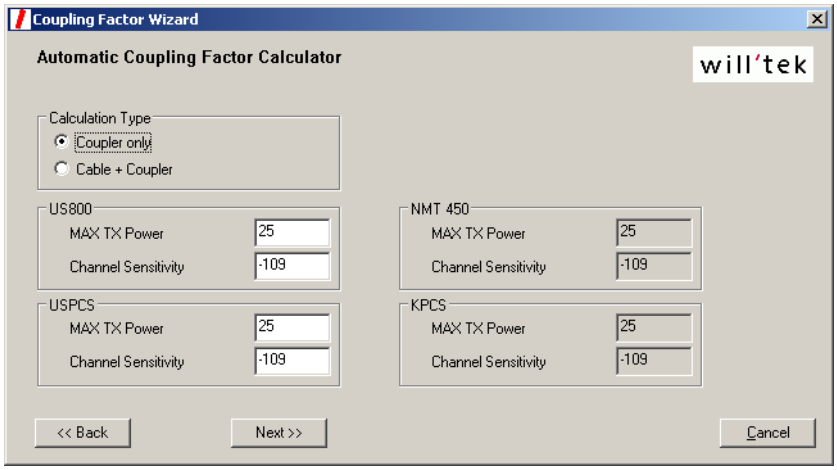
4 Select additional technologies that the phone supports and that might be tested, then click on **Next**.
The Coupling page of the Coupling Factor Wizard appears.



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, select the best position for the antenna coupler shuttle from the scroll field (select "No positioning used" if the position does not matter). If you do not use a 4916, ignore this field.

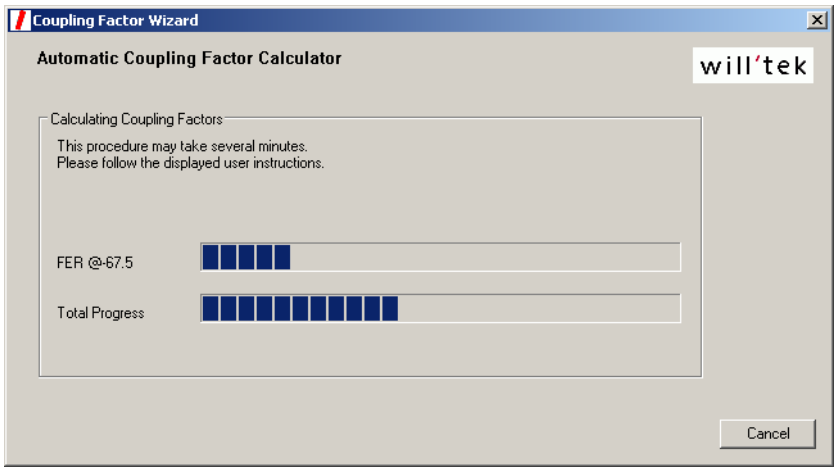
7 Click **Next**.
The Calculation Type page of the Coupling Factor Wizard appears.



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**.

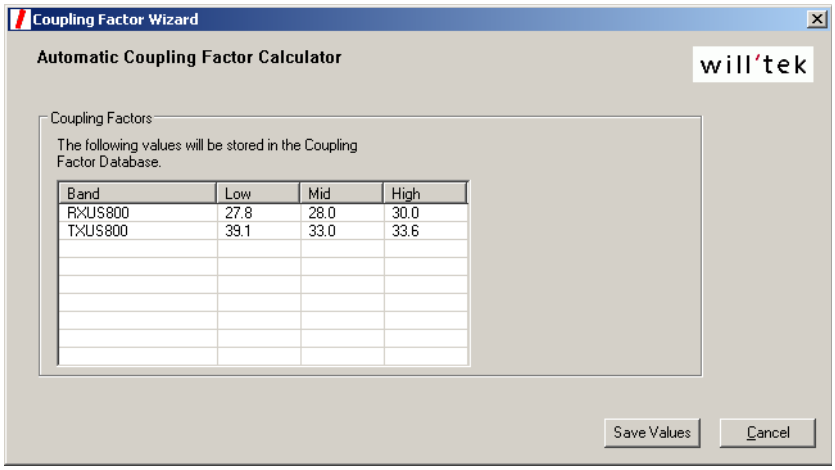
9 For the different frequency bands to be supported, carefully enter the respective maximum power (according to the power class for that band, in dBm) and the expected receiver sensitivity (usually –109 dBm).

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.



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.

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

13 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 46 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.

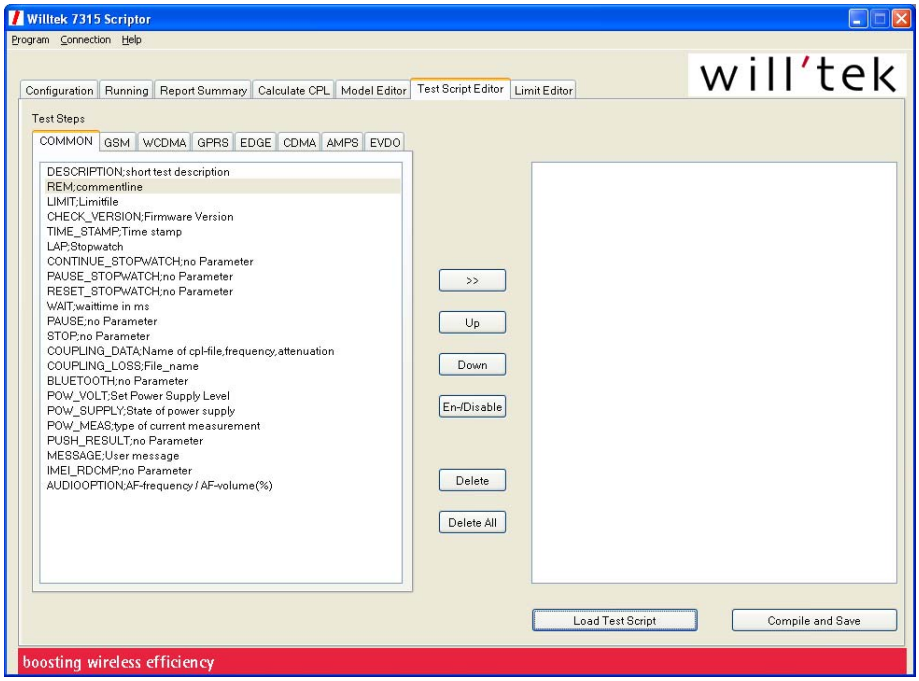
Modifying and Creating Test Scripts

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, WCDMA, GPRS, EDGE, CDMA, AMPS and 1xEV-DO.



The left-hand side shows a list of commands under the tabs for the different command groups. 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 22).

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 59). Do not forget to save the changes before closing Scriptor (see "Saving a test script" on page 59)!

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**.
A box appears, displaying a test script folder and its files (see "Test Script Path" on page 22). 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).

Editing the test script

Adding a new command

The test commands (test steps) are explained in "Test command reference – Common commands" on page 62. 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.

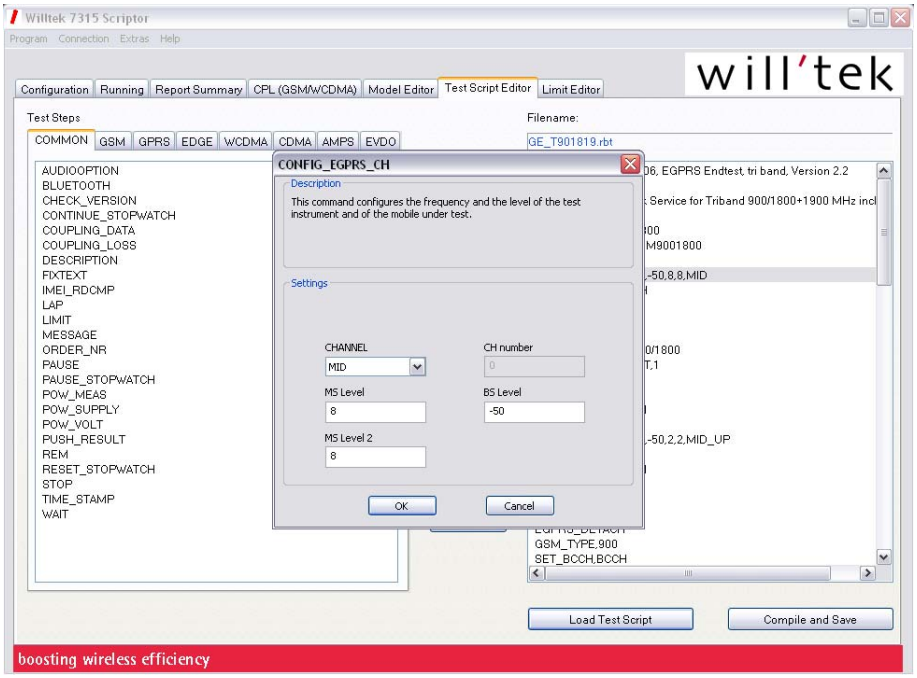
Editing test parameters

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 62. 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 connectivity test.
	Parameters	None.
	Notes	Requires the Bluetooth Connectivity Test Option to be installed in the tester.
	Example	BLUETOOTH
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
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 called up from the TAC2TEST 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.
	Parameters	None.
	Example	IMEI_RDCMP
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.
	Example	MESSAGE,Test starts now
ORDER_NR	Description	Calls up an input box appearing onscreen. Text can be entered, usually an order number. The text (order number) is copied to the result file.
	Parameters	Text1,Text2 Text1 – Text appearing onscreen, prompting for the order number input. Text2 – Text appearing in the result file with the order number.
	Example	ORDER_NR,Please enter order number,Order number is:

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
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
STOP	Description	Terminates execution of the test script.
	Parameters	None.
	Example	STOP
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 accumulated-measurement 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
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

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.
	Example	COUPLING_AUTO,900/1800
FASTPOWER	Description	Compared to the TX_POWER measurement, FASTPOWER is a faster measurement of the mobile's transmit power, matching almost every burst on a voice channel. The measurement is performed without filtering, i.e. it is a broadbast measurement. A number of measurements is taken and each measurement result is printed or displayed.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also TX_POWER, TX_POWER_AVG, FASTPOWER_ARRAY commands.
	Example	FASTPOWER,1
FASTPOWER_ARRAY	Description	This is the same measurement as FASTPOWER, but a number of measurements is taken and the minimum, average and maximum are calculated.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also FASTPOWER command.
	Example	FASTPOWER_ARRAY,10
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_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	None.
	Notes	See also MS_INFO command.
	Example	MS_INFO_ALL
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 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%).
	Notes	See also MS_INFO command.
	Example	MS_REPORT,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	None.
	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 Evaluation Test Configuration 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	Count Count – Number of measurements to be carried out.
	Notes	See also TX_ALL_AVG, TX_POWER_AVG, PHASE_MAX commands.
	Example	TX_ALL,1

TX_ALL_AVG	Description	TX measurements are taken and the average is calculated. TX measurements are: RMS and peak phase error, frequency error, TX power, template check, corner points and flatness.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also TX_POWER_AVG, TX_ALL commands.
	Example	TX_ALL_AVG,10
TX_POWER	Description	The TX Power of a mobile is measured only. No averaging or any other statistical evaluation is performed.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also TX_POWER_AVG, FASTPOWER, TX_ALL, TX_ALL_AVG commands.
	Example	TX_POWER,1
TX_POWER_AVG	Description	The TX Power of a mobile is measured only. MAX, MIN and AVG is calculated for the number of measurements carried out.
	Parameters	Count Count – Number of measurements to be carried out.
	Notes	See also TX_POWER, TX_ALL, TX_ALL_AVG commands.
	Example	TX_POWER_AVG,10
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 Mode – AVG or MAX, where AVG performs modulation spectrum measurements and MAX performs switching transients measurements. Count – Number of measurements to be carried out.
	Notes	See also START_BLER_USF and STOP_BLER_USF commands.
	Example	START_BLER_USF,100 BLER_USF ACPM,MAX,5 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.
	Example	COUPLING_AUTO,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 Evaluation Test Configuration 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	Count, Timeslot Count – Number of measurements to be carried out. Timeslot – Number of time slot to be measured.
	Notes	See also START_GPRS_TEST and STOP_GPRS_TEST
	Example	START_GPRS_TEST,2 TX_ALL_GPRS,10,1 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 Count – Number of measurements to be carried out. Timeslot – Number of time slot to be measured.
	Notes	See also START_BLER_USF and STOP_BLER_USF commands.
	Example	START_BLER_USF,100,2 BLER_USF TX_ALL_USF,10,1 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 Mode – AVG or MAX, where AVG performs modulation spectrum measurements and MAX performs switching transients measurements. Count – Number of measurements to be carried out.
	Notes	See also START_EGPRS_TEST and STOP_EGPRS_TEST commands.
	Example	START_EGPRS_TEST ACPM,AVG,3 STOP_EGPRS_TEST
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.
	Example	COUPLING_AUTO,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_MS_INFO_ALL	Description	This command delivers information provided by the mobile phone on request.
	Parameters	None.
	Example	EGPRS_MS_INFO_ALL
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 Evaluation Test Configuration 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_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_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	Count,Timeslot Count – Number of measurements to be carried out. Timeslot – Uplink time slot to be measured.
	Notes	See also START_EGPRS_TEST and STOP_EGPRS_TEST commands.

Example

```
START_EGPRS_TEST
TX_ALL_EGPRS,10,1
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
MODULATION_ALL	Description	Initiates a number of measurements of the modulation quality parameters. The results are averaged.
	Parameters	Count Count – Number of measurements to be carried out.
	Example	MODULATION_ALL,10

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,YES
MS_INFO
```

OBW

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

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

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

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
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	Count,BSLevel Count – Number of measurements to be carried out. 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_HANDOVER_TO_GSM	Description	Performs an inter-RAT handover from WCDMA to GSM.
	Parameters	Band,BSLevel,MSLevel,TCH 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.
	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
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 – CDMA commands

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`: (2047 (all) if not supplied) the tests that are to be printed in the printout. This number is the sum of the following numbers. Only add up the number of the tests desired in the printout:
1 = waveform quality (rho)
2 = frequency error
4 = time error
8 = carrier feedthrough
16 = IQ imbalance
32 = peak phase error
64 = rms phase error
128 = rms vector error
256 = peak magnitude error
512 = rms magnitude error
1024 = 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.
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. If Printout is not supplied it is set to 2047 (all tests). 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 = number: (2047 (all) if not supplied) The tests that are to be printed in the printout. This number is the sum of the following numbers. Only add up the number of the tests desired in the printout:

1 = waveform quality (rho)
2 = frequency error
4 = time error
8 = carrier feedthrough
16 = IQ imbalance
32 = peak phase error
64 = rms phase error
128 = rms vector error
256 = peak magnitude error
512 = rms magnitude error
1024 = RF power

Example
CDMA_TX_WQU,
Since Count and Printout are not supplied, one TX waveform quality measurement is performed, and all tests are reported as single values.

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.
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.
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

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 49.

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. This number is the sum of the following numbers. Only add up the number of the tests desired in the print out: 1 = RF Frequency Error 2 = RF Power 4 = SAT Frequency Error 8 = SAT Deviation Printout = NULL: 15 (all)
	Example	AMPS_STD_TX,5,15

Test command reference – EVDO commands

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. **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. **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 specified, 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: The tests to be printed in the print out. This number is the sum of the following numbers. Only add up the numbers of the tests desired in the printout: 1 = waveform quality (rho) 2 = frequency error 4 = time error 8 = carrier feedthrough 16 = IQ imbalance 32 = peak phase error 64 = rms phase error 128 = rms vector error

256 = peak magnitude error
512 = rms magnitude error
1024 = 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_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. **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 speci-

fied, 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: sets the Print Out value to 1031.
PrintOut = `number`: The tests to be printed in the print out. This number is the sum of the following numbers. Only add up the numbers of the tests desired in the print out:
1 = waveform quality (rho)
2 = frequency error
4 = time error
8 = carrier feedthrough
16 = IQ imbalance
32 = peak phase error
64 = rms phase error
128 = rms vector error
256 = peak magnitude error
512 = rms magnitude error
1024 = 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

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 49.

Parameters	Carrier Carrier – The name of a carrier network from the existing set of carriers on the instrument.
Example	SET_CARR,EXAMPLE_US800

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. The various test parameters are basically grouped by the different access technologies. The test limits can be stored in a file and loaded by 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.

2 Click **Load** to load a limits file if you want to change the limits in a previously stored file. Or proceed to the next step if you do not have stored limits as yet.

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 7. In the GSM 1800 and GSM 1900 bands, the power control levels 0 to 15 apply according to Table 8. 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 7 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
13	17	±3
14	15	±3
15	13	±3
16	11	±5
17	9	±5
18	7	±5
19	5	±5

Table 8 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 9.

Table 9 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 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 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 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 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

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.
Limit value range according to WCDMA specifications: ±200 Hz

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 neighbouring 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 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 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 and NMT 450 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 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).

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 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 10), 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 10 Mobile attenuation codes (MAC) and nominal power levels

MAC	Nominal power level
0	36 dBm
1	32 dBm

Table 10 Mobile attenuation codes (MAC) and nominal power levels

MAC	Nominal power level
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.

Administrating Lector on multiple computers

9

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 script may also be altered or added. It is easily possible to make these changes and additions available to all test stations, even if they 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

Manually copying files

To 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).

Automatically distributing configuration files

Much of the work described above can be automated with the update capabilities where you can store individual files in the User folder of the update directory on a network drive. See section "Distributing local versions of configuration files" on page 34 for more details.

Copying test scripts and phone definition files for CDMA2000 1xRTT and 1xEV-DO to other test stations

Manually copying files

To 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.

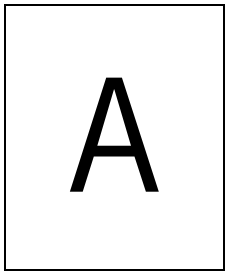
Data\Init\phones.ini (for the groups and subgroups)
Data\Init\mobilesettings.ini
Data\Init\carrier.ini
Data\CPL_DB\MPCUSER.DAT (phone models and coupling factors)
Data\CPL_DB\Pictures*.* (new phone pictures)
Data\Scripts*.rbt (files with new or modified scripts)
Data\Limits*.lim (limit values)

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).

Automatically distributing configuration files

Much of the work described above can be automated with the update capabilities where you can store individual files in the User folder of the update directory on a network drive. See section "Distributing local versions of configuration files" on page 34 for more details.

Working with TAC2TEST



This appendix details how TAC2TEST works. The topics discussed in this appendix are as follows:

What TAC2TEST does

With TAC2TEST, the test script to be run depends on the phone's serial number (or an important part within the serial number, e.g. the type approval code TAC or the mobile equipment identity MEID). At the start of the test, the user enters the serial number, using either the keyboard or a barcode reader. The serial number is typically printed on the phone, inside the battery compartment.

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 26 for more information.

Limit values and coupling factors may also depend on the TAC because they can be loaded from the test script.

Most of the mobile phones have a serial number containing a code for the whole series, usually the first six or eight digits. 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.

The test starts with the serial number query. Once the test is completed, a new test will automatically be started by requesting the next serial number entry.

After Lector and Scriptor is installed, TAC2TEST can be found as one of the subgroups in the GSM/WCDMA group of tests, or as MEID2TEST in CDMA/EVDO. However, TAC2TEST or MEID2TEST files can be added to any test group and subgroup because the principle of TAC2TEST is rather technology independent.

TAC2TEST files have the filename extension X2T (instead of RBT for normal test scripts). You can have different TAC2TEST 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 type approval codes. This is explained in the following section.

Assigning a test script to a type approval code

The following file contains a list of type approval codes (the first 1 to 8 digits of the serial number), each with the associated test script. Lector and Scriptor are delivered with an X2T file with a few examples; you should modify and extend it so that it meets your requirements. By default, the files, relative to the installation directory (typically C:\Program files\Willtek\731X Lector-Scriptor) are located in Data\Scripts.

To (create and) modify the list:

1 (Copy an existing file with filename extension X2T and) open the file with a text editor (e.g. Notepad).

2 Modify a line to change the type approval code or the test script name, or add a new line for an additional phone type.

3 When the changes are completed, save the file using the same file name and folder.

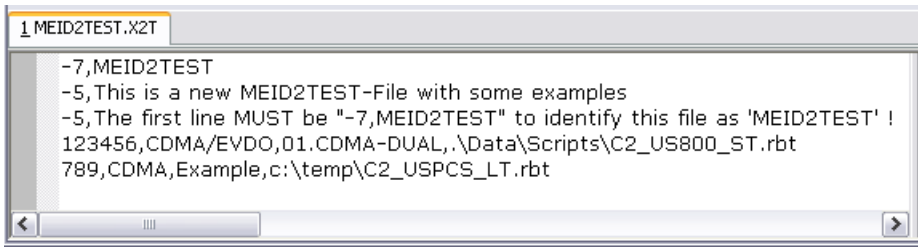
File contents structure for X2T files

In each line, the file should contain several parameters separated by commas: the relevant digits from the serial number that denote the whole series, the group and subgroup (as they should appear in the Running menu) and the file (including location) of the respective test script. The file location should be given relative to the installation directory of Lector and Scriptor.

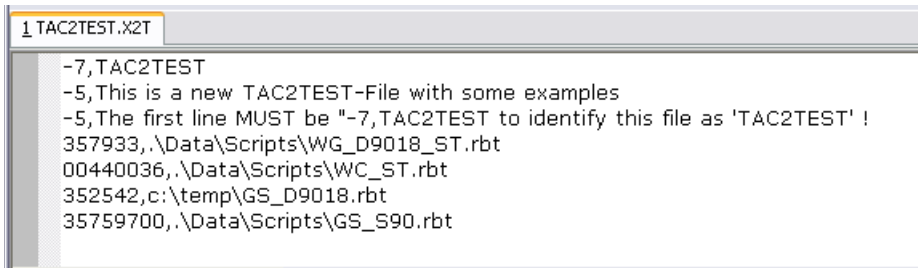
This way, Lector can decide which test is suitable for a particular phone (e.g. a dual-band GSM test or a dual-mode GSM and WCDMA test, etc).

In addition, the first line must start with "-7," and contain either the keyword MEID2TEST for CDMA or EVDO tests, or TAC2TEST for GSM and WCDMA tests. Comment lines can be added and should start with "-5,".

Example of an X2T file for CDMA and EVDO:



Example of an X2T file for GSM and WCDMA:



Testing Bluetooth devices

B

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 26 on how to enable and disable this feature.

The Bluetooth test can be an integral part of the mobile phone test procedure. This requires the BLUETOOTH command (see "BLUETOOTH" on page 62) as part of the test script; 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.

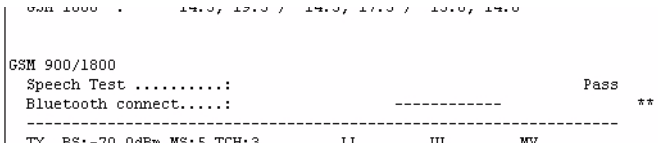
Follow the onscreen instructions. In particular, make sure that

- 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

C

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

D

This appendix describes the conditions for using the software.

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This end-user license agreement grants you the right to use the software contained in this product subject to the following restrictions. You may not:

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(ii) copy the software, except for archive purposes consistent with your standard archive procedures;

(iii) transfer the software to a third party apart from the entire product;

(iv) modify, decompile, disassemble, reverse engineer or otherwise attempt to derive the source code of the software;

(v) export the software in contravention of applicable export laws and regulations of the country of purchase;

(vi) use the software other than in connection with operation of the product.

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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.

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English

Willtek Communications GmbH
85737 Ismaning
Germany
Tel: +49 (0) 89 996 41-0
Fax: +49 (0) 89 996 41-440
info@willtek.com

Willtek Communications UK
Cheadle Hulme
United Kingdom
Tel: +44 (0) 161 486 3353
Fax: +44 (0) 161 486 3354
willtek.uk@willtek.com

Willtek Communications SARL
Roissy
France
Tel: +33 (0) 1 72 02 30 30
Fax: +33 (0) 1 49 38 01 06
willtek.fr@willtek.com

Willtek Communications Inc.
Parsippany
USA
Tel: +1 973 386 9696
Fax: +1 973 386 9191
willtek.cala@willtek.com
sales.us@willtek.com

Willtek Communications
Singapore
Asia Pacific
Tel: +65 6827 9670
Fax +65 6827 9601
willtek.ap@willtek.com

Willtek Communications Ltd.
Shanghai
China
Tel: +86 21 5835 8039
Fax: +86 21 5835 5238
willtek.cn@willtek.com

will'tek