

Adding a CDMA2000 phone model to Lector or Scriptor



boosting wireless efficiency

Each type of mobile has dedicated coupling values and sometimes dedicated settings which are required for completing a test. While in GSM and WCDMA each phone model has a unique identifier in the serial number which can be queried in the signaling protocol, the CDMA2000 technology does not allow identification of a phone model over the air interface. This limitation complicates the linking of coupling factors, script files and limits with a certain type of CDMA phone.

The 7315 Scriptor software allows the test systems administrator to easily add CDMA2000 mobile phone coupling information and specific test settings to a data base. This data base is then automatically utilized by the 7311 Lector Basic and 7312 Lector Enhanced software, thus eliminating the need for the operator to learn and understand all settings for each phone model.

Figure 1 shows how all the required information is linked to the dedicated subgroup entries.

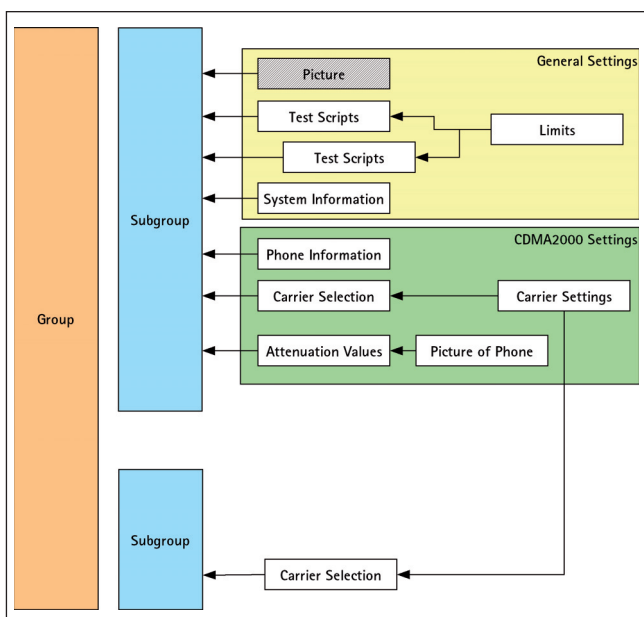


Figure 1: Settings and how they affect the subgroups

When starting 7315 Scriptor, a tab labeled "Model Editor" will appear with the other tabs. The Model Editor can be used to manage all links which are required for starting a test, and also offers the possibility to change the entries of the Group, Subgroup and Test Script drop down fields in the Running menu (see Figure 2).

When adding new mobile phone models, the testing manager must consider the work flow of the service organization prior to entering Groups and Subgroups. This prior consideration will lead to a more optimized test flow, thus increasing throughput and simplifying choices for operators of the test stations. The following is an example of creating a new mobile phone entry by utilizing the manufacturer or carrier name for the Group. Both cases will be described on the following pages.

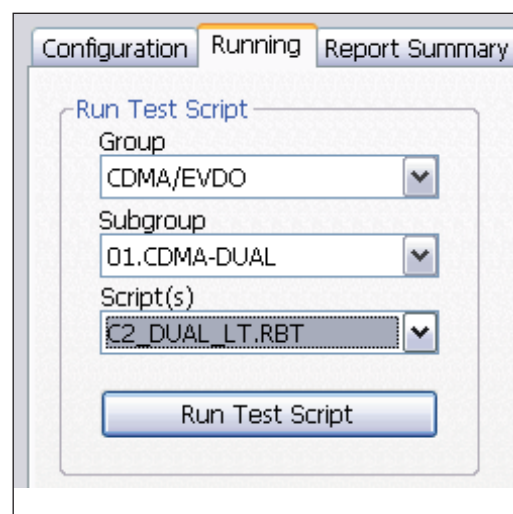


Figure 2: Run Test Script section in the Running menu

Adding new phones to the Run Test Script selection boxes

1. Select the New button on the Model Editor tab. All fields appear empty now.
 2. For creating a new group please edit the Group field and type in a name for your new group. For using an existing group, please select a dedicated group item from the drop down list.
 3. Creating the subgroup entries you have three possibilities:
 - For creating a new subgroup, click New, enter a new name in the Subgroup field and hit Enter.
 - For using an existing subgroup, select a dedicated Subgroup item from the dropdown list.
 - For copying an existing subgroup, click New, select the group and subgroup that you want to copy from the dropdown list and change the name of the selected subgroup.
 4. You can now define a picture which is displayed when selecting a subgroup item.
 5. In the System field, select CDMA2000. Then additional tabs appear in the lower part of the tab.
- Note: After storing the new subgroup entry the system selection cannot be changed anymore.
6. In the Test Script section, click on ... and select one or more test scripts. After pressing the Save button the absolute path disappears when any subfolder of the script folder (e.g.: C:\Program Files\Willtek\731X Lector-Scriptor\Data\Scripts) is used. Only the relative path of the test script is shown then.
 7. Click the Save button (see Fig. 3).
The new group and subgroup can now be selected in the Running menu.

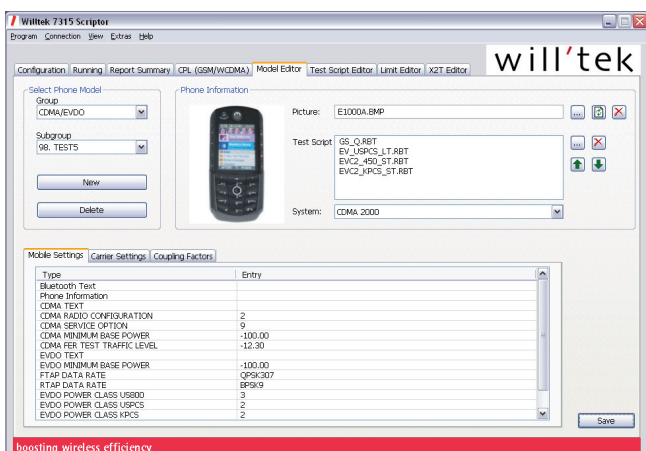


Figure 3: Mobile Editor with Group and Subgroup selection fields

8. For dedicated settings, use the Mobile Settings tab (see Fig. 4).
 - Bluetooth Text
The text entered here will be displayed when a Bluetooth test is started.
 - Phone Information
This text is displayed below the picture of the dedicated subgroup.
 - CDMA text
This text will be displayed in the result file and while the test is running.
 - CDMA Radio Configuration
The radio configuration defines the type of physical layer channel to utilize when a call is established. The physical layer consists of parameters like data rates, modulation characteristics and spreading rates. 7315 Scriptor provides five radio configuration selections for IS-2000 systems. The radio configuration specifies the base data rate and service options supported. – This setting is used when the CDMA_TRAF command is used and the Radio Configuration parameter Rcon is set to CONFIG.
 - Service Option
Service options specify the service capabilities of the IS-95 or IS-2000 system. Each service is identified by a unique service option number, e.g. standard voice or data services, or proprietary services. 7315 Scriptor supports the following service options for the selected radio configuration. The service option needs to be set to the same value which is set in the mobile device – this is mandatory for a successful call establishment. This setting is used when the CDMA_TRAF command is used and the Service Option parameter Sopt is set to CONFIG.

Type	Entry
Bluetooth Text	
Phone Information	
CDMA TEXT	
CDMA RADIO CONFIGURATION	2
CDMA SERVICE OPTION	9
CDMA MINIMUM BASE POWER	-100.00
CDMA FER TEST TRAFFIC LEVEL	-12.30
EVDO TEXT	
EVDO MINIMUM BASE POWER	-100.00
FTAP DATA RATE	QPSK307
RTAP DATA RATE	BPSK153
EVDO POWER CLASS US800	3
EVDO POWER CLASS USPCS	2
EVDO POWER CLASS KPCS	2

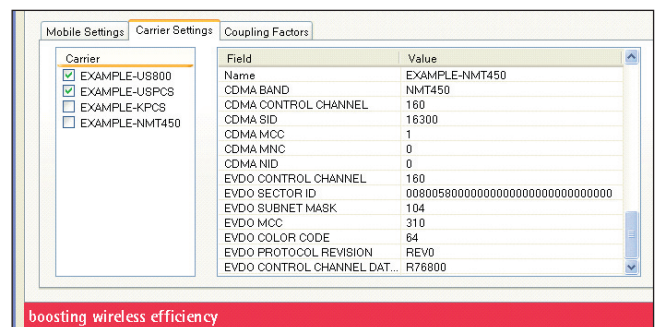
Figure 4: Mobile Settings tab in the Mobile Editor

Service Option	Description	Radio Configuration				
		1	2	3	4	5
1	Basic Variable Rate Voice Service (8 kbps)	✓		✓	✓	
2	Mobile Station Loopback (8 kbps)	✓		✓	✓	
3	Enhanced Variable Rate Codec (EVRC) Voice Service (8 kbps)	✓		✓	✓	
9	Mobile Station Loopback (13 kbps)		✓			✓
17	High Rate Voice Service (13 kbps)		✓			✓
32	Test Data Service Option (TDSO)			✓	✓	
55	Loopback Service Option (LSO)	✓	✓	✓	✓	✓
32768	Proprietary Service Option (Qualcomm Inc.)		✓			✓

- CDMA Minimum Base Power**
 The value constitutes the signal power at the mobile's input when a receiver sensitivity test is performed. This value is in dBm.
 This setting is used when the CDMA_FER_VERR command is applied and the BSLevel parameter is set to MIN.
- CDMA FER Test Traffic Level**
 This setting is used when the CDMA_FER_VERR command is used and the traffic channel parameter TCHLevel is set to CONFIG.
- EVDO Text**
 This text will be displayed in the result file and while the test is running.
- EVDO Minimum Base Power**
 The value constitutes the signal power (in dBm) at the mobile's input when a receiver sensitivity test is performed. This setting is used when the EVDO_PER command is used and the BSLevel parameter is set to MIN.
- FTAP Data Rate**
 This setting is used when the EVDO_TRAF command is applied and the Ftap_Data_Rate parameter is set to CONFIG.
 It is also used with the EVDO_FTAP_PARAMS command when the DRate parameter is set to CONFIG.

- RTAP Data Rate**
 This setting is used when the EVDO_TRAF command is applied and the Rtap_Data_Rate parameter is set to CONFIG.
- EVDO Power Class US800**
 This item specifies the power class of the mobile phone for the US800 band. The parameter is applied when the EVDO_TRAF command sets the band parameter to US800.
- EVDO Power Class USPCS**
 This item specifies the power class of the mobile phone for the USPCS band. The parameter is applied when the EVDO_TRAF command sets the band parameter to USPCS.
- EVDO Power Class KPCS**
 This item specifies the power class of the mobile phone for the KPCS band. The is applied when the EVDO_TRAF command sets the band parameter to KPCS.
- EVDO Power Class NMT450**
 This item specifies the power class of the mobile phone for the NMT450 band. The is applied when the EVDO_TRAF command sets the band parameter to NMT450.

- Before proceeding to the carrier settings, press the Save button.
- On the Carrier Settings tab all available carrier settings are available on the right-hand side. On the left-hand side the carrier for the particular subgroup can be defined by ticking the boxes.



Create a new carrier or delete the selected one if needed.

- When a new carrier is created the name needs to be entered. This parameter cannot be changed later on.
- Tick the carrier which is supported by the phone for the selected subgroup. When more than one carrier is selected a selection box is displayed when a test script is started.

13. The carrier settings can be defined in the box on the right-hand side. Double-click on a parameter to edit it.

- **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, USPCS.
The selected carrier band needs to fit to the dedicated band supported by the mobile phone and the performed test.

Note: For dual-band tests, always select the carrier for the band on which the registration is performed.

- **CDMA Control Channel**
Channel number for the CDMA control channel. This is the carrier frequency at which the instrument transmits the logical channels that the mobile requires to synchronize with the simulated network and to set up a call.
This parameter is mandatory for establishing a registration between the test set and the mobile phone.
- **CDMA SID**
The system identity (SID) identifies the subscriber's CDMA home system. This parameter is mandatory for performing a registration to the test set. SIDs are assigned by IFAST (International Forum on ANSI-41 Standards Technology) to every carrier and they are programmed into the phone when the customer is purchasing it.
This parameter is mandatory for establishing a registration between the test set and the mobile phone and is used for the CHANGE_CCCH command.
- **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.
The default value for Lector and Scriptor is one which is a reserved value defined by the ITU. This value is not used for any public network.
- **CDMA MNC**
The mobile network code identifies a network within a country. Valid MNCs are in the range from 0 to 99. The default value is zero which is a value reserved by the ITU. This value is not used for any public network.
- **CDMA NID**
The network identification (NID) number identifies the network. Valid NIDs are in the range from 0 to 65535. The NID is an optional subdivision of a SID.

NIDs can identify, for example, different rating areas, toll areas, private networks, MSC boundaries, or any other subdivision the operator may want to distinguish within a SID.
The default value in Lector and Scriptor is zero.

- **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**
An EVDO network 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 REVO 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 38,400 and 76,800 kbps.

14. Save the settings by clicking the Save button.

15. For calculating the attenuation values, select the Coupling Factors tab (see Fig. 5). Here you can add values by measuring the coupling loss between a correctly functioning mobile device and the test instrument, or add the values manually. The latter is useful for those who already obtained the values either through RAPID! or through another method.

The steps to measure the coupling factor automatically are as follows:

- 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.
- 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.
- 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".
- 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.
- Click Next. The Calculation Type page of the Coupling Factor Wizard appears.
- 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.

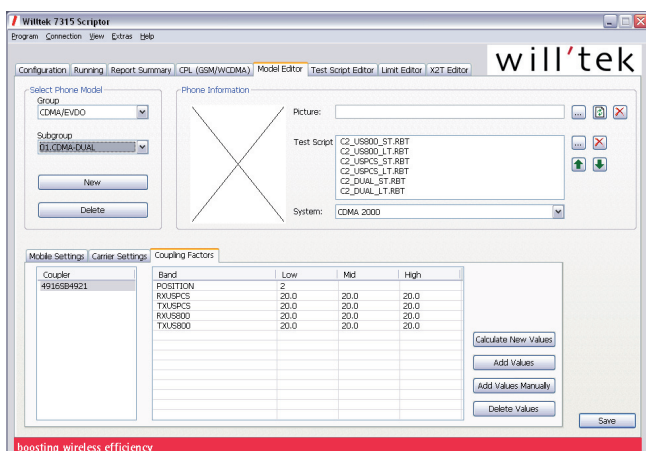


Figure 5: Coupling Factor tab in the Mobile Editor

- 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).
- 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.
- You can click on the values in the Low, Mid and High columns to 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.

- Click Save to store the coupling values.

The graph in Figure 6 shows the dependencies between a CDMA2000 test script and the required entries which have to be done with the Model Editor.

You can now test the phone model with the correct settings and coupling values. In order to start the test, select the "Running" tab and select the appropriate group, phone model and script.

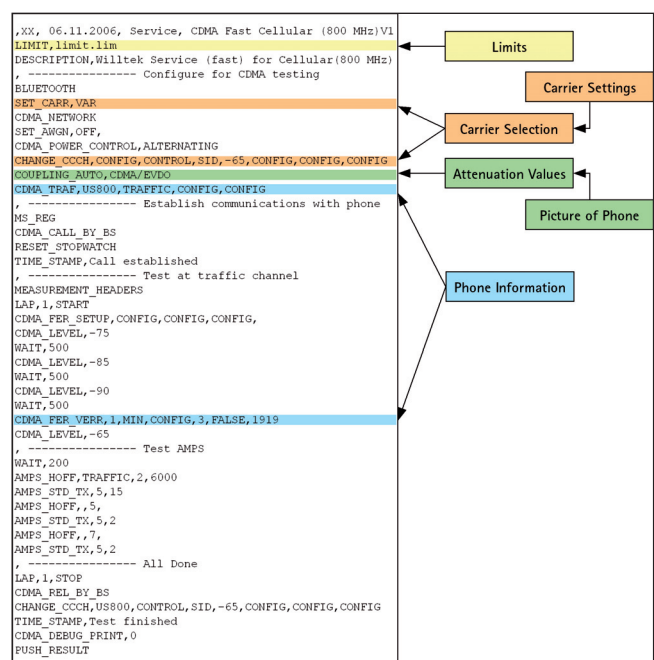
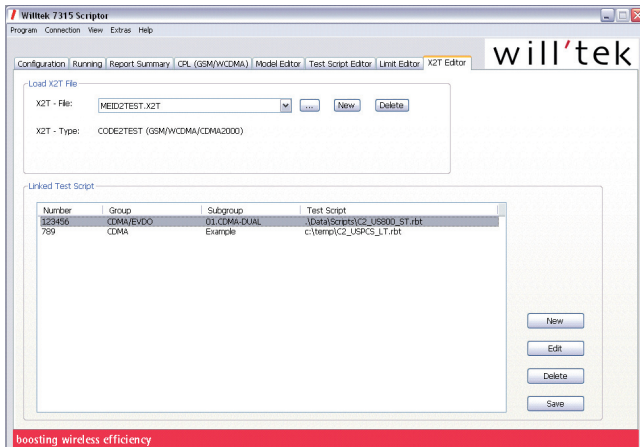


Figure 6: The test script uses entries from the Model Editor

Preparing a CDMA2000 test to be started through a barcode reader

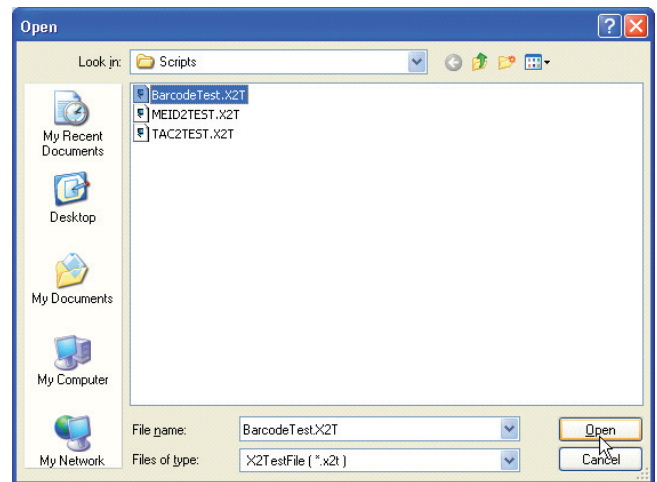
Once the entries for the groups and subgroups have been done the tests can also be started automatically via a barcode reader.

1. In 7315 Scriptor, select the X2T Editor menu by clicking the appropriate tab.

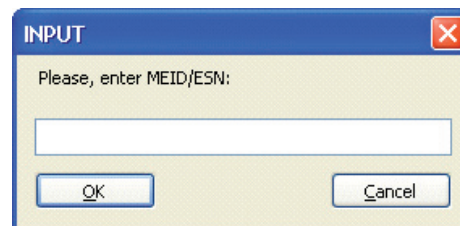


2. In the Load X2T File section, either select an existing X2T file of the required type (CODE2TEST for CDMA phones) in the file selector, or create a new X2T file by clicking NEW.
3. In the Linked Test Script section, add, edit or delete numbers and associated test scripts as appropriate.
4. Save the file.
5. Open the Model Editor and select the subgroup where the X2T file needs to be added, or create a new subgroup.

6. Browse the list of script files by clicking ..., change the file type to X2TestFile and select the appropriate file.



7. Once you run the BarcodeTest.X2T file in the Running menu, an input box for the barcode scanner string opens. Lector will wait for input from the barcode scanner. After a test has been performed, Lector will return the input box again for another mobile phone test.



Distributing mobile-specific data to multiple test stations

Once the coupling factors and other mobile-specific data have been gathered, they should be made available to other test stations within the service center. This can be done either by copying the relevant Lector and Scriptor files to other computers, or by providing a reference configuration on a file server on the computer network so that it can easily be used from the server location. For detailed information, see chapter "Administrating Lector on multiple computers" in the user's guide for Lector and Scriptor.

For more information about the 7310 Lector and Scriptor family of test automation products, please refer to Willtek's website at

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