

HCITester Tool

This user's guide describes how to use the HCITester software tool with TI's wireless *Bluetooth*® devices (BL6450, CC256x, WL127x, WL128x, and WL18xx), including how to send and receive HCI scripts using HCI commands and events.

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1 Requirements

1.1 System Requirements

The HCITester tool requires the following components:

- Minimum requirements: PC running Pentium II
- Operating systems: Windows® 2000, Windows XP, Windows 7
- Access to *Bluetooth* HCI pins
- Access to *Bluetooth* HCI UART lines
- For *Bluetooth* TX validation, standard RF equipment (such as a power meter, spectrum analyzer, vector signal analyzer, or a combined tester such as Litepoint™ IQxel™) for TX output power, *Bluetooth* mask, and DEVM measurements.
- For *Bluetooth* RX validation, a vector signal generator to generate *Bluetooth* packets for the IC to analyze.

Debug and calibration tools for WLAN and *Bluetooth*® require four UART ports. The most efficient way to drive these ports to the PC is to use a UART-to-USB converter (not included in the wireless tools package). TI recommends using the [WL18XXCOM82SDMMC](#) adapter with the TI [WL1837MODCOM8I](#) module or the [WL1835MODCOM8B](#) module on the COM8 board.

NOTE: Multiple UART-to-USB adapters are available on the market, such as the [FTDI Chip™ development modules](#).

1.2 Configuration Requirements

The HCITester tool for the [WiLink™ 8 TI Bluetooth release](#) requires the latest versions of the following configuration files:

- [XML file](#)
- [Bluetooth script](#)

NOTE: The XML file and the *Bluetooth* script support all of the WiLink family and are based on the BTS naming format; for information on the WL128x and prior releases, follow the [README file](#).

The installation files are in the directory named *Wireless Tools* at the installation path configured during installation. By default, the files are at the following path:

C:\Program Files (x86)\Texas Instruments\Wireless Tools

NOTE: Throughout this document, the directory in which the installation files reside is referred to as *Installation directory*.

2 Installation

The HCITester application is part of the TI wireless tools package release. When the wireless tools package is installed, the HCITester icon is created in the Texas Instrument\Wireless Tools folder at Start→Programs and on the desktop (see [Figure 1](#)).



Figure 1. HCITester Icon

To start the HCITester, double-click the HCITester icon. The software initializes and displays the HCITester working window (see [Figure 2](#)).

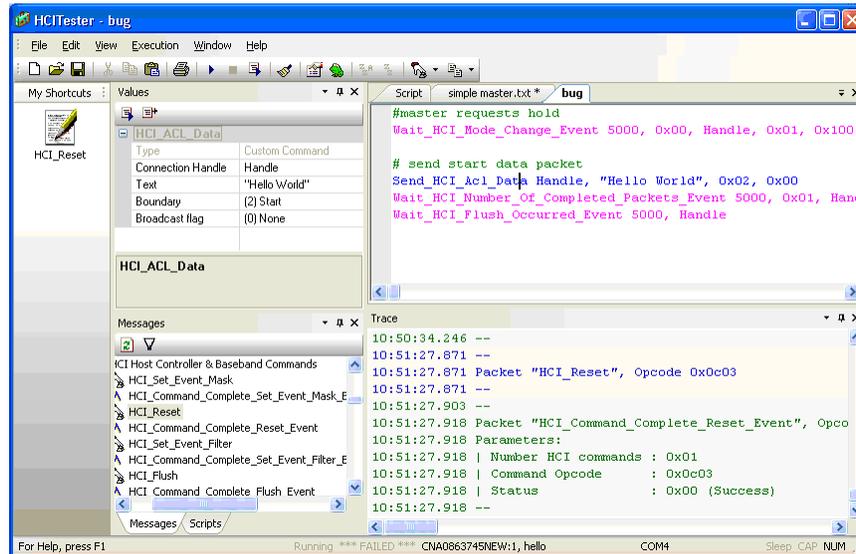


Figure 2. HCITester Working Window

3 Post Installation Requirements

3.1 Changing the XML File

TI *Bluetooth* devices require specific XML files. To change the XML file to match your specific TI *Bluetooth* device, perform the following steps:

1. From the toolbar, open the View menu and select Command Library. The Command Library pane appears (see [Figure 3](#)).

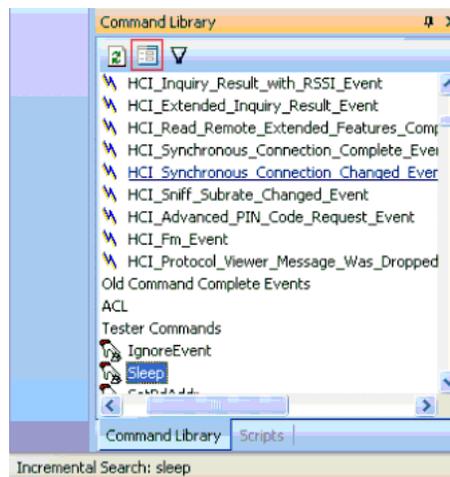


Figure 3. Command Library Pane

- To open the Change Library Files dialog box, click the Change Library button (for more information on the Change Library button, see [Table 11](#)). The Change Library Files dialog box displays (see [Figure 4](#)).

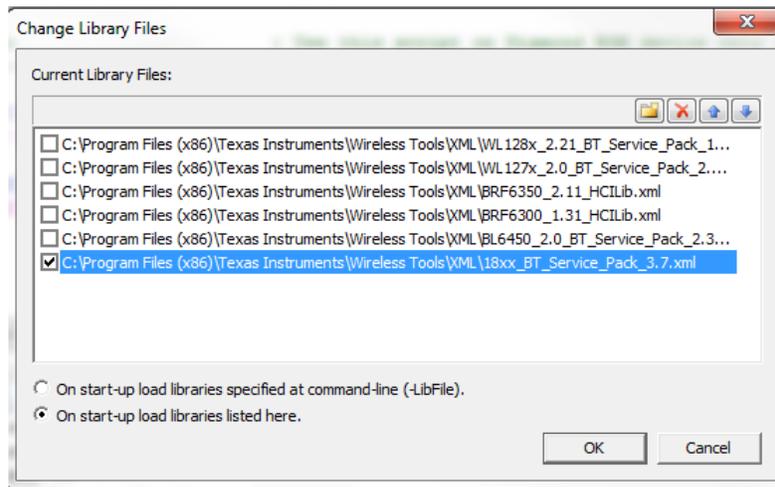


Figure 4. Changing the XML File

- Select the appropriate XML file for your device. and click OK.

NOTE: Select only one XML file at a time.

[Table 4](#) describes the XML file changing functions.

Table 1. XML File Changing Icon Functions

Icon	Function
	Create a new file
	Browse to the location of a saved file
	Delete a file from the list
	Move a file up in the list
	Move a file down in the list

3.2 Firmware Initialization Script (.BTS file)

The BTS file or initialization script must be modified to work with HCITester. Perform the following steps to modify the BTS file for HCITester:

1. Open HCITester tool.
2. Open the BTS file (File→ Open).
3. Create a new script (File→ New).
4. Copy the contents of the BTS file into the new tab.
5. Click Edit→ Replace→ Replace All and replace 0x00 in the Number of HCI Commands parameter with any (see [Figure 5](#)).

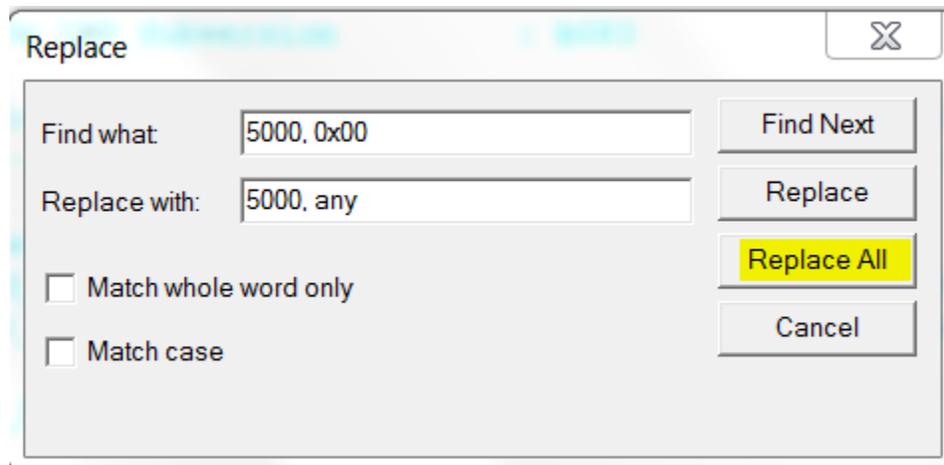


Figure 5. Editing the BTS File for Use in the HCITester Tool

6. Save that script as the new initialization file in TXT format.

NOTE: Run this initialization file before running any scripts on the module.

7. Click Execution→ Execute to run the initialization file.

3.3 Updating the Scripts Pane

The Scripts pane contains all the script files from the chosen root file. [Figure 6](#) shows the Scripts pane.

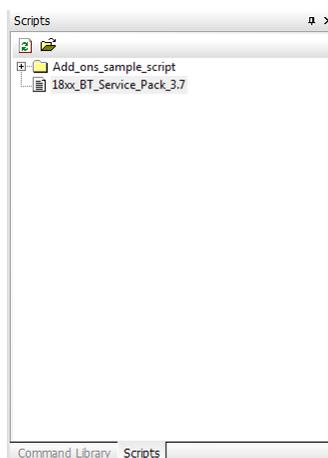


Figure 6. Scripts Pane

To search the Scripts pane, use the incremental search function in the following ways:

- To locate the desired script, type a partial text string.
- To search forward, press the F3 function key.
- To search backward from the present location, press Shift+F3.

Table 2 describes the Scripts pane functions.

Table 2. Scripts Pane Icon Functions

Icon	Function
	Refresh the contents of the Script pane

The Scripts pane lists all available scripts. You can choose any script to be loaded, executed, and edited. By default, the list of HCITester scripts is empty after software installation.

To update the pane, perform the following steps:

1. Press Open on the scripts pane.
2. Select the scripts folder.

4 HCITester Features

This section summarizes the features of the HCITester software.

4.1 Port Connection Options

The port connection Options dialog box enables configuration of the specific type of communication between the HCITester and the device. Figure 7 shows the port connection Options dialog box.

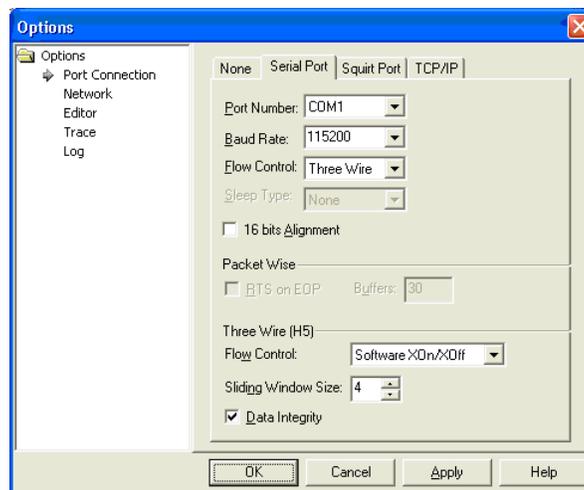


Figure 7. Configuration of the Port Connection

The port connection Options dialog box includes the following tabs:

- None: No connection is established between the HCITester software and the device.
- Serial: Connects a serial port connection with the device. This connection supports various types of flow control and power mode (sleep) controls.
- Squirt: Connects to the device using a squirt serial connection in parallel with other applications using a squirt port (such as Logger)

- TCP/IP: Connects to the device over all types of TCP/IP protocol (synchronized or not, servers, or clients)

NOTE: When selecting serial or squirt port connections, remember to select the port number, desired baud rate, flow control, and sleep type.

The default device baud rate is 115200 but can be configured up to 3MB using the HCI switch baud rate vendor-specific (VS) command. For more information, see the *Bluetooth (WL18xx and WL18xxQ) Vendor-Specific HCI Commands User's Guide* ([SWRU303](#)).

4.1.1 Flow Control Options

Table 3 summarizes the flow control options.

Table 3. Flow Control Options

Option	Result
None	Flow control is not used.
Hardware	CTS/RTS flow control
Packet Wise	Reserved
Negotiate	Reserved
Segmentation	Reserved
Three Wire	Software flow control (Xon/Xoff)

4.1.2 Sleep Type Options

HCITester supports three sleep protocols:

- HCILL
- Palau
- ThreeWire (set automatically if ThreeWire flow control is selected)

Table 4 describes the sleep type functions.

Table 4. Sleep Type Functions

Icon	Function
 Auto Control	HCITester automatically controls the power mode of the device. The software is set to sleep on a timeout and awake if required. The <i>SetAutoSuspend</i> script command controls this feature. The <i>SetSuspendTimeout</i> command sets the idle timeout value. The default value is 2000 ms.
 Manual Control	The user sets the power mode manually. Click to set the device in sleep mode or to awake from sleep mode. The <i>SetAutoState</i> command is a script command that controls this feature.
 Status	Status bar indicator showing when the host (that is, the HCITester) is in sleep mode.

4.2 Main Interface Screen Overview

Figure 8 shows the names of the areas and functions that make up the HCITester main interface window

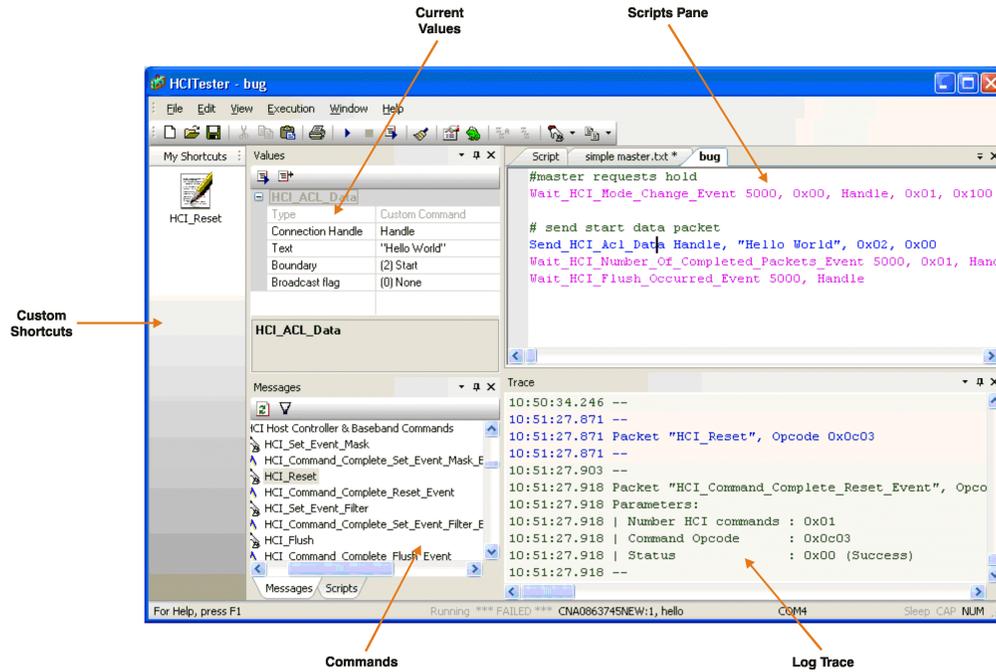


Figure 8. HCITester Main Interface Window

4.3 Executing Scripts or Commands

4.3.1 Executing Scripts

Executing a script involves three steps:

- Loading the script
- Editing the script (as required)
- Running the script

4.3.1.1 Loading the Script

A script can be loaded in the following ways:

- Select *Open Script...* from the File menu.
- To select a previously used script, click the Load icon () on the toolbar button.
- Double-click the requested script in the scripts pane.

4.3.1.2 Editing a Script

To edit a script, select a line of the script in the Edit script View window and change the values. Alternatively, edit scripts in the values in the Values pane. This option automatically updates the text in the script.

The Script Editor functions similarly to any other text editor. To copy, cut, and paste lines in the script or from one script to the other, right-click and select the desired option from the pop-up menu. The basic Control (Ctrl) commands to copy (Ctrl+C), cut (Ctrl+X), and paste (Ctrl+V) selected text are also available.

4.3.1.3 Executing a Script

After loading to the script editor pane, a script can be executed by clicking the Start icon () on the toolbar or pressing the F5 button on the keyboard.

To stop a running script, click the Stop button () on the toolbar or press F5 again.

The Trace Port view displays the output of the running script.

4.3.2 Executing Commands

4.3.2.1 Searching for a Specific Command in the Command Library

To search for a specific command in the Command Library, follow these steps [Figure 9](#):

1. Place the cursor on any command in the Command Library.
2. Type a key phrase from the command in the Incremental Search field.
3. Press F3 to scroll between all the commands that contain the phrase within them (SHIFT+F3 searches backwards).

Alternatively, use the toolbar button  to select one of the previously used commands for execution.

Figure 9 shows a search for the word *sleep*.

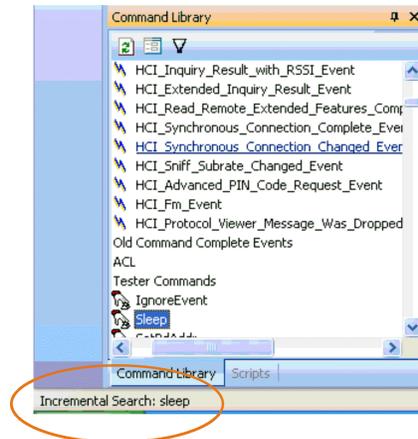


Figure 9. Searching For a Command in the Command Library

4.3.2.2 Executing a Single Command

Select the desired command in the Command Library pane. Right-click the desired command and select the desired option from the pop-up menu: Execute; Add the command to a currently active script; or Add the command to your list of shortcuts.

Figure 10 shows an example of this selection.

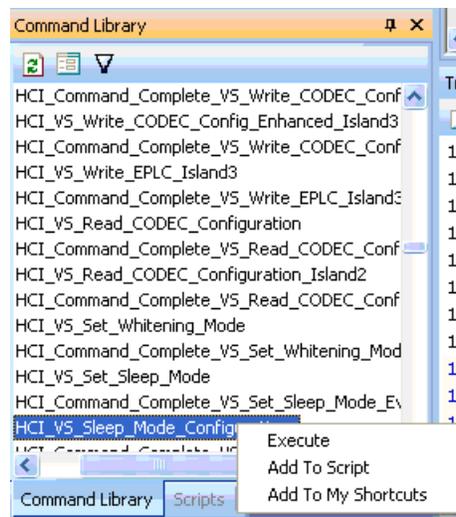


Figure 10. Executing a Single Command from the Command Library

Double-clicking a command line in the Command Library Pane also executes the command. A third way to execute a command is to press the  icon (as explained in Section 4.6, Values Pane).

4.3.3 Execution Shortcut-Keys and Status Indicators

There are three shortcut keys when working with scripts.

-  (F5): Execute current script
-  (F5): Stop running current script
-  (Ctrl+F5): Execute only current selection:
 - Selected script text
 - Current line (if no text selected)
 - Current command in Values pane

A complete list of shortcuts is provided in [Appendix A, List of Shortcuts](#).

As [Figure 11](#) shows, there are also four possible execution status indicators displayed in the status bar.

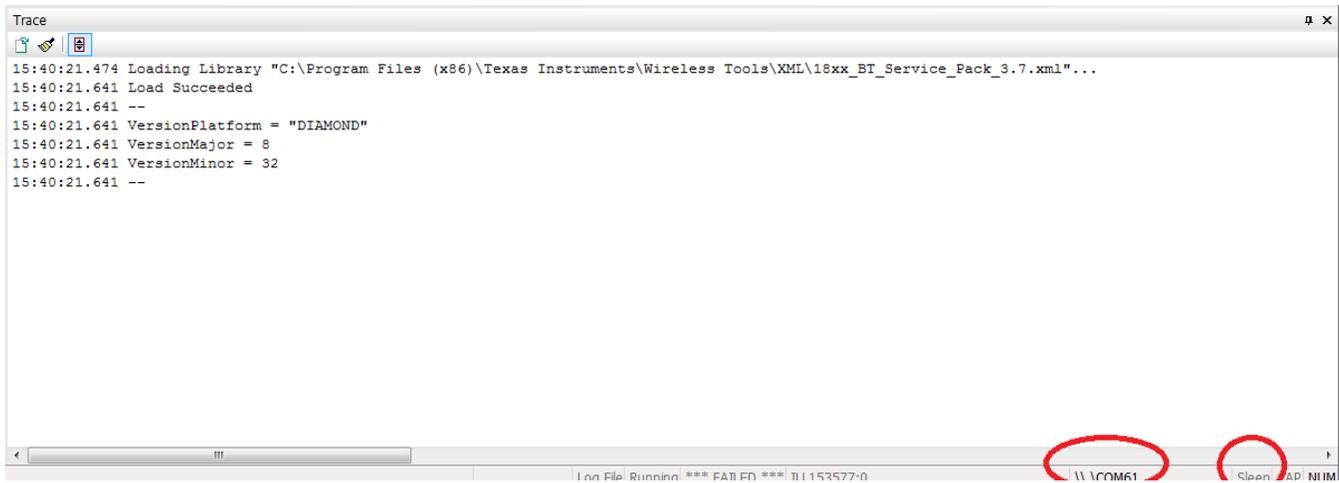
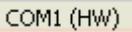


Figure 11. Execution Status Indicators

Table 5 summarizes the execution status indicators.

Table 5. Execution Status Indicators

Icon		Description
	Running	Normal indicator; the script or command is running
	Failed	Shows that the previous script or command failed
	Port	Indicates the COM port that is in use
	Sleep	Sleep indicator

4.4 ToolBar and Main Menus

4.4.1 Menu Bar and Toolbar

Figure 12 shows the menu bar and toolbar. Table 6 summarizes the program commands and functions available using the toolbar icons.



Figure 12. HCITester Menu Bar and Toolbar

Table 6. HCITester Menu Functions

Icon	Function
	Open a new script in the Scripts pane
	Open a new screen to browse through files on the PC.
	Save the active script
	Cut selected text to the clipboard
	Copy selected text to the clipboard
	Paste selected text from the clipboard to the present cursor location
	Print the active script or selection
	Execute the active script
	Stop executing the active script
	Execute a selected part of the active script
	Clear the Trace pane display
	Configure various display and command options
	Configure the HCITester software to automatically wake up the device from sleep mode
	Put the device into sleep mode
	Execute the most recent command
	Load and execute the most recent script

4.4.2 Drop-Down Menus

4.4.2.1 File Commands

Figure 13 shows the File drop-down menu.

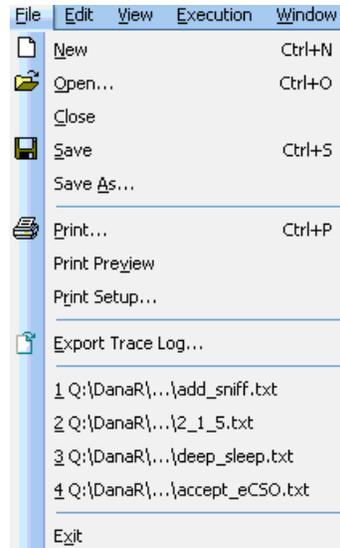


Figure 13. File Command Drop-Down Menu

Table 7 summarizes the File menu command functions.

Table 7. File Command Drop-Down Menu Functions

Command	Shortcut	Function
New	Ctrl+N	Open a new file (script)
Open script	Ctrl+O	Open an existing (saved) script. This option opens a new screen to browse through files on the PC
Close		Close a currently open script
Save	Ctrl+S	Save the currently active script
Save As		Save the currently active script under a different name. This option opens a new screen from which to enter a new file name and select a location to save the file.
Print	Ctrl+P	Print the currently active script
Print Preview		Preview the file to be printed
Print Setup		Open a new screen to configure printing options on the PC
Export Trace Log		Export the Trace log as an HTML file. This option opens a new screen from which to enter a new file name and select a location to export the file.
Exit		Exit the HCITester application

4.4.2.2 Edit Commands

The Edit menu contains actions that relate to editing scripts. [Figure 14](#) shows the Edit drop-down menu.

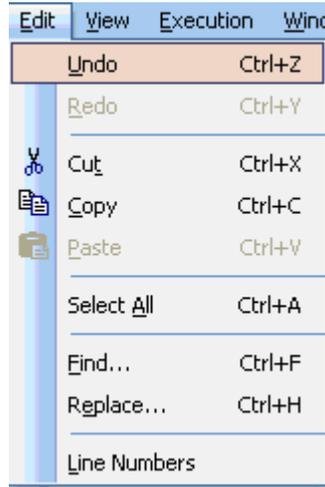


Figure 14. Edit Command Drop-Down Menu

[Table 8](#) summarizes the Edit command functions.

Table 8. Edit Command Drop-Down Menu Functions

Command	Shortcut	Function
Undo	Ctrl + Z	Undo last action
Redo		Repeat last action
Cut	Ctrl + X	Cut selected text
Copy	Ctrl + C	Copy selected text to clipboard
Paste	Ctrl + V	Paste selected text from clipboard
Select All	Ctrl + A	Select all text in currently active script
Find	Ctrl + F	Find selected text or item
Replace	Ctrl + H	Replace selected text with new text
Line Numbers		Add line numbers to the currently active script

4.4.2.3 View Commands

The View menu contains commands related to how the HCITester software displays the currently active script file. [Figure 15](#) shows the View menu.

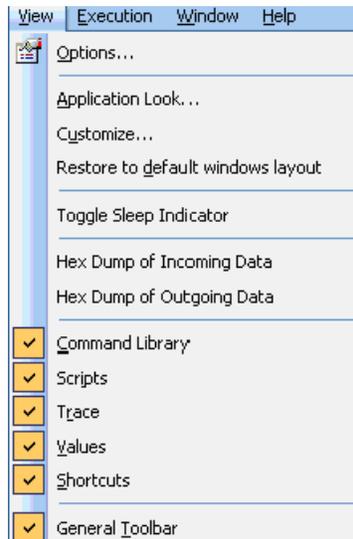


Figure 15. View Command Drop-Down Menu

[Table 9](#) summarizes the View menu command functions.

Table 9. View Command Drop-Down Menu Functions

Command	Function
Options	Trigger the Options screen (see Section 5, Setup and Configuration)
Application Look	Enable the selection of different looks for the HCITester based on the selection in the screen that is triggered
Customize	Enable customization of the HCITester menus and buttons based on user-defined parameters
Restore to default windows layout	Restore the program to default view options (requires exiting and restarting the HCITester software)
Toggle Sleep Indicator	Toggle the SLEEP state of the connected <i>Bluetooth</i> device (This function is identical to the function of the Device Sleep icon located on the toolbar.)
Hex Dump of Incoming Data	Enable a hex view of the incoming data from the <i>Bluetooth</i> device to the host
Hex Dump of Outgoing Data	Enable a hex view of the outgoing data from the host to the <i>Bluetooth</i> device
Command Library Scripts Trace Values Shortcuts General Toolbar	Display or hide specific panes in the active window

4.4.2.4 Window Commands

Figure 16 shows the Window drop-down menu.

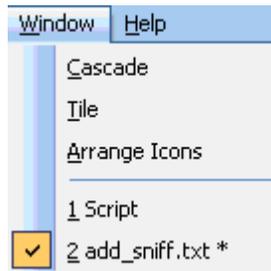


Figure 16. Window Menu Drop-Down Menu

Table 10 summarizes the Window menu command functions.

Table 10. Window Command Drop-Down Menu Functions

Command	Function
Cascade	These commands are not enabled in the current release of the HCITester software.
Tile	
Arrange Icons	
1, 2, etc.	These markers indicate the active panes of the currently active HCITester session.

4.4.2.5 Help Commands

The Help menu contains an option for the user to read about the HCITester software (as shown in Figure 17).

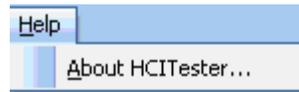


Figure 17. Help Command Drop-Down Menu

4.5 Command Library Pane

The Command Library pane, shown in [Figure 18](#), contains a list of all the supported commands and events.

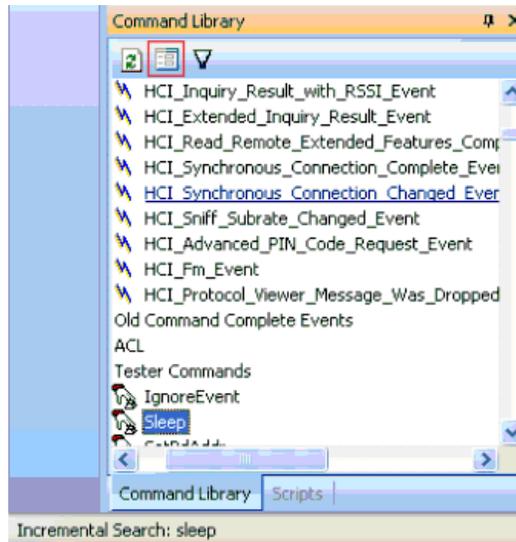


Figure 18. Command Library Pane

To search the Command Library, use the incremental search function as follows: Type a string of partial text to locate the desired command. Press F3 to search forward and Shift+F3 to search backward from the present location (for more information about the incremental search feature, see [Section 4.3.2.1, Searching for a Specific Command in the Command Library](#)).

To add the command (along with any related commands) to the active script, hold down the Ctrl key and double-click the left mouse button, or use the right mouse button pop-up menu (for more information, see [Section 4.3.2.2, Executing a Single Command](#)).

[Table 11](#) summarizes the three Command Library functions.

Table 11. Command Library Icon Functions

Icon		Function
	Refresh	Refresh the contents of the Command Library pane
	Change	Change the HCI Library. Use this button to change between different XML files (for more information, see Section 3.1, Changing the XML File).
	Filter	Filters the contents of the Scripts pane. Pressing this icon displays the Visible Categories dialog box (see Figure 19).

Figure 19 shows the Visible Categories dialog box.

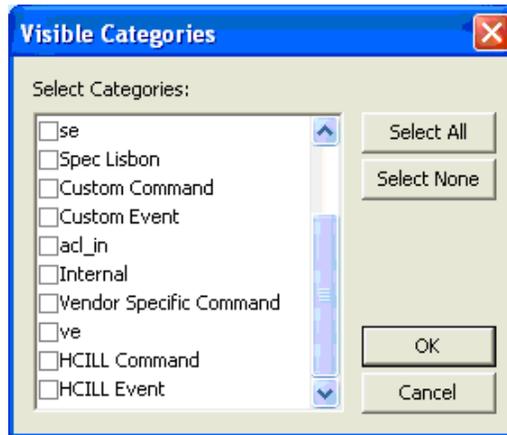


Figure 19. Visible Categories Dialog Box

4.6 Values Pane

The Values pane displays the values of the currently selected command (see Figure 20).

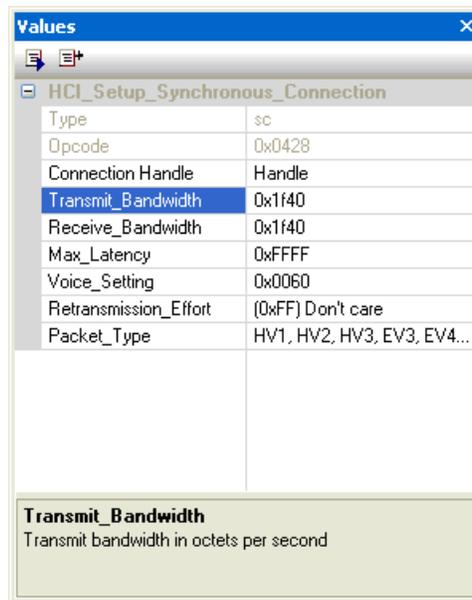


Figure 20. Values Pane

The Values pane reflects the command selected in the Command Library pane or a selected line in the script Editor pane. When the Values pane shows a script line in the Editor, changing a value in the script also changes the script text.

Table 12 describes the Values pane command functions.

Table 12. Values Pane Command Functions

Icon	Shortcut	Function
	Ctrl + F5	Execute the listed command
		Add the listed command to the active script

4.7 My Shortcuts Pane

The My Shortcuts pane allows quick access to predefined script files and code fragments (see [Figure 21](#)).

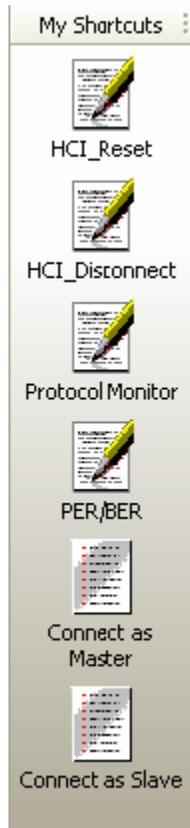


Figure 21. My Shortcuts Pane

To create a shortcut, follow these steps:

- To create a shortcut to a script file, Drag the desired script from the Scripts pane or from the Explorer window to the Shortcuts pane.
- To create a shortcut to a code fragment, Drag the selected code in the Editor to the Shortcuts pane.

The following commands are available from the Shortcut pane:

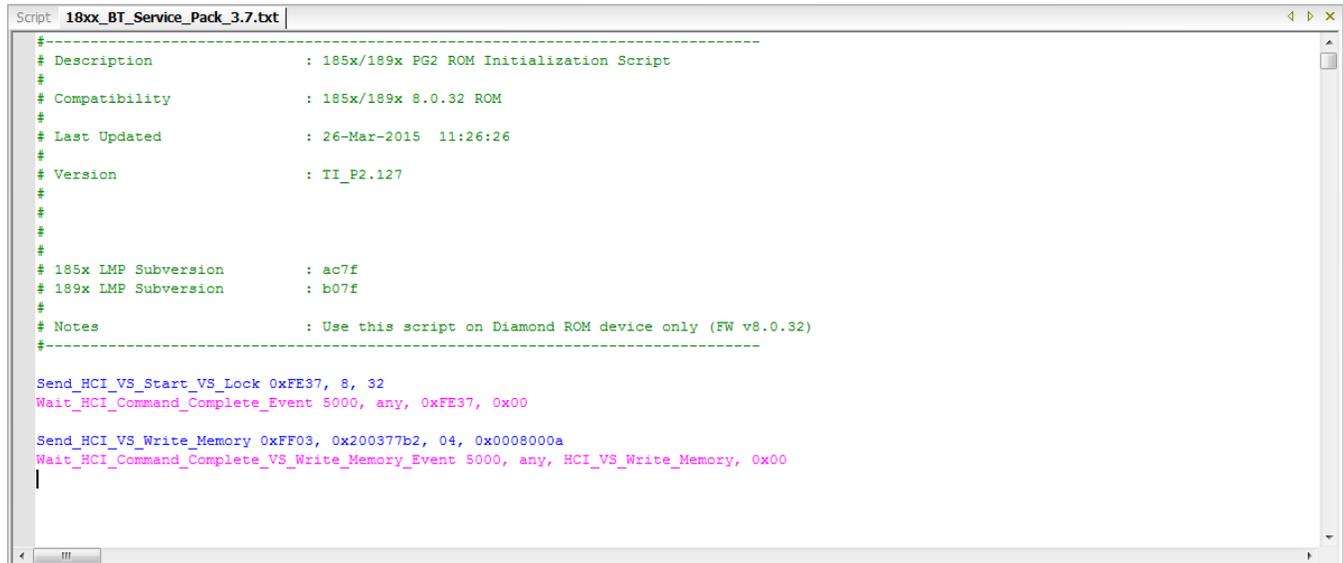
- Run and/or Load: Right-click and select *Edit...* to specify the desired behavior while clicking on this shortcut.
- Display name: Right-click and select *Edit...* to specify a customized label.
- Right-Click menu: Explicitly Run, Load, Delete, or Edit the shortcut properties.
- Shift + Click: Run the selected shortcut.
- Ctrl+ Click: Load the selected shortcut.

4.8 Script Editor Pane

The Script editor pane displays the currently loaded script to execute. While a script is executed, the executed line is highlighted at the bottom of the pane.

More than one script can be loaded into the Script Editor pane. To toggle between the scripts, select the tab of the desired script. For more information regarding loading, editing, and executing scripts, see [Section 4.3.1, Executing Scripts](#).

Figure 22 shows the Script Editor pane.



```

Script: 18xx_BT_Service_Pack_3.7.txt
-----
# Description           : 185x/189x PG2 ROM Initialization Script
#
# Compatibility         : 185x/189x 8.0.32 ROM
#
# Last Updated         : 26-Mar-2015  11:26:26
#
# Version              : TI_P2.127
#
#
#
# 185x LMP Subversion   : ac7f
# 189x LMP Subversion   : b07f
#
# Notes                : Use this script on Diamond ROM device only (FW v8.0.32)
#-----

Send_HCI_VS_Start_VS_Lock 0xFE37, 8, 32
Wait_HCI_Command_Complete_Event 5000, any, 0xFE37, 0x00

Send_HCI_VS_Write_Memory 0xFF03, 0x200377b2, 04, 0x0008000a
Wait_HCI_Command_Complete_VS_Write_Memory_Event 5000, any, HCI_VS_Write_Memory, 0x00
  
```

Figure 22. Script Editor

4.9 Trace Pane

The Trace pane displays the commands, events, and raw data communication of the HCITransport program. [Figure 23](#) shows the Trace pane.

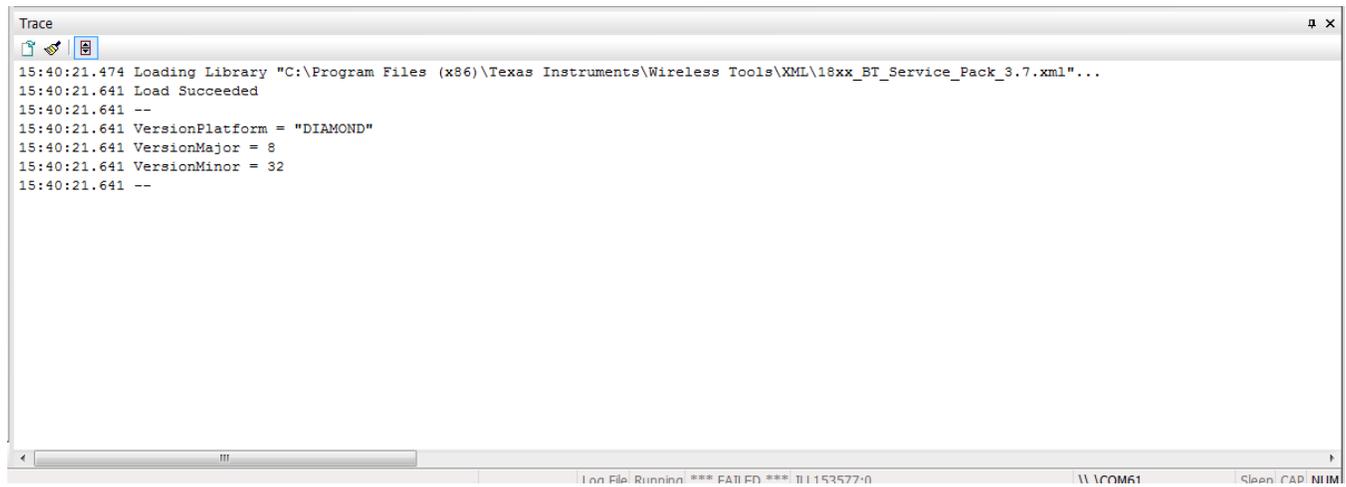


Figure 23. Trace Pane

The following display options are available in the Trace pane:

- **Customize Colors:** Select the Trace option in the Options dialog box (for information on customizing the font and display colors of the trace elements, see [Section 5.3, Trace](#)).
- **Automatic Save to File:** Select the Log option in the Options dialog box (for information on log file configuration options, see [Figure 29](#)).

[Table 13](#) describes the Trace pane icon functions.

Table 13. Trace Pane Icon Functions

Icon	Function
 Export Trace Log	Export the Trace log file to a different location. This option opens a new screen for selecting a new name for and location to save the file.
 Clear Trace Pane	Clear the Trace pane display.
 Automatic Scroll	Automatically scrolls through the active script.

To trace the raw data of a running command or script, select Hex Dump of Incoming Data or Hex Dump of Outgoing Data from the View menu for the selected COM port. [Figure 24](#) shows the View menu.

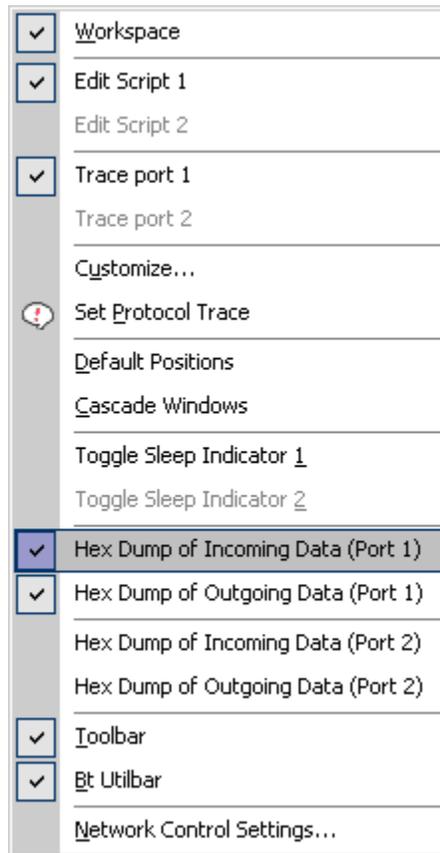


Figure 24. Selecting Raw HCI Data to Trace on the View Menu

After the menu option is selected, all data transferred through the UART interface are visible in the Port Trace View window.

5 Setup and Configuration Using the Options Window

The Options window controls software setup and configuration and is available from the View menu (see [Section 4.4.2.3, View Commands](#)).

5.1 Network Configuration Option

The Network configuration option enables multiple HCITester applications running on different machines to be linked on the same network domain.

To bind multiple HCITester applications, specify a group name and check the Network Control Active box, as shown in [Figure 25](#).

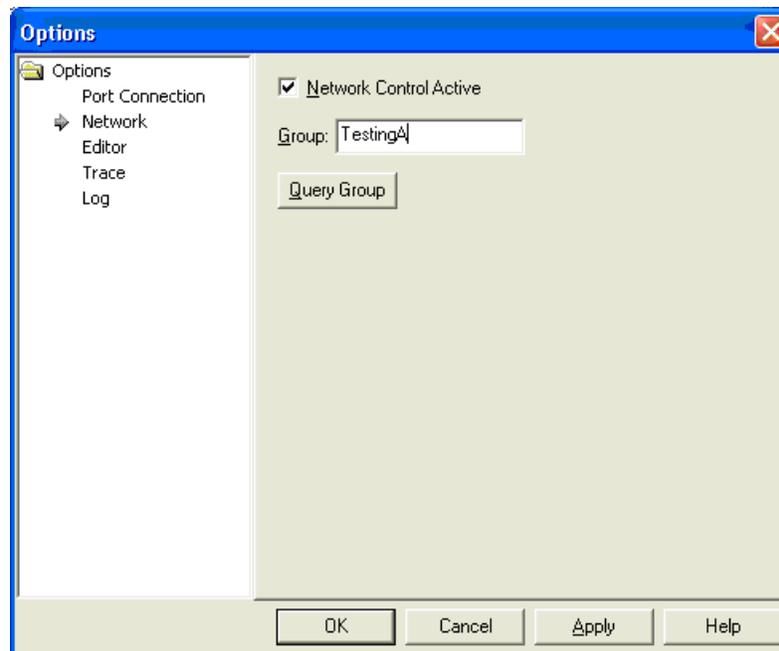


Figure 25. Network Configuration Option

When multiple HCITester applications are in the same network group, the programs start operating together. When Stop is clicked on one program, all running programs stop.

The status bar indication shown in [Figure 26](#) displays a unique name given to the running process and the group name.

CNA0123456:1, TestingA

Figure 26. Status Bar Indicator for Network Configuration

5.2 Editor Option

The Editor option allows the font and display colors of the Editor elements to be customized (see [Figure 27](#)).

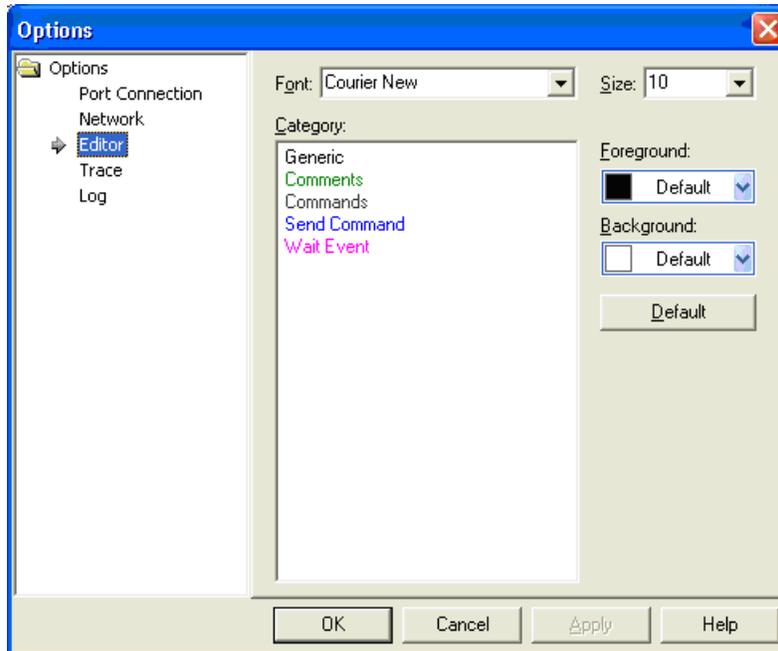


Figure 27. Editor Configuration

5.3 Trace Option

The Trace configuration option allows the font and display colors of the trace elements to be customized (see [Figure 28](#)).

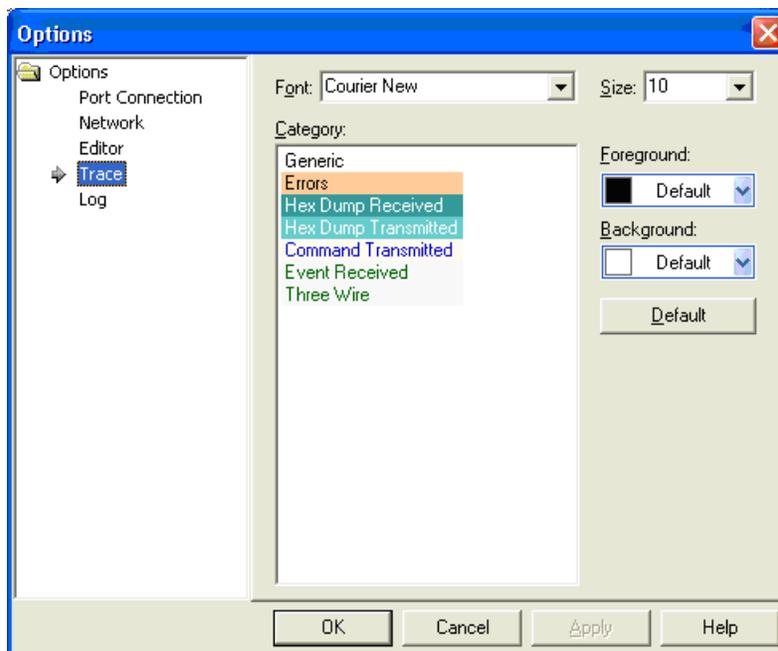


Figure 28. Trace Configuration Option

5.4 Log File Configuration Options

The log file option automatically saves the trace window contents while a script is running. [Figure 29](#) shows the log file configuration options.

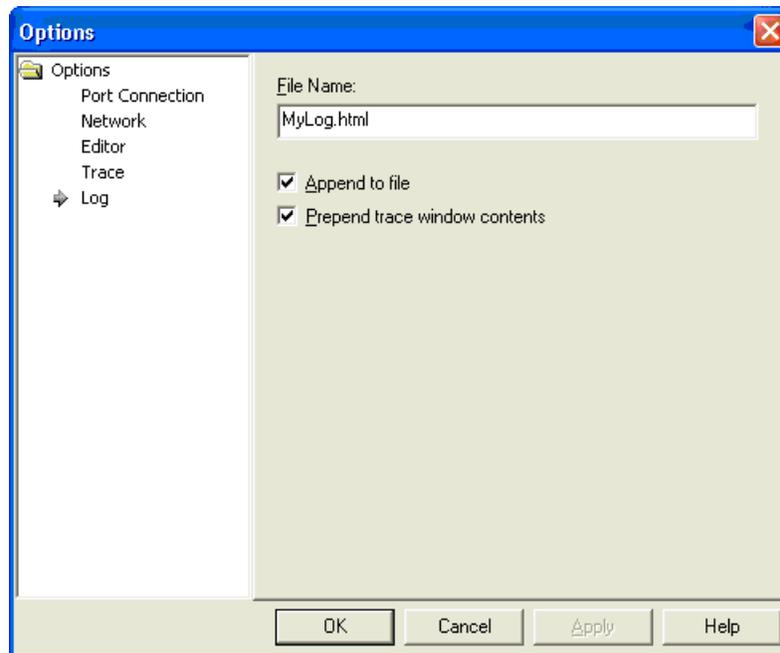


Figure 29. Log File Configuration Options

[Table 14](#) summarizes the log configuration options.

Table 14. Log Configuration Options

Option	Result
File Name	Three types of file extensions are allowed: .txt (plain text file) .htm (HTML formatted file) .xml (XML data file information)
Append	If this box is checked, then new log traces are appended to the existing file. Otherwise, a file is created each time a new script is executed.
Prepend	Adds currently displayed events to the active log file.

List of Shortcuts

Table 15. Available HCITester Shortcuts

Command	Action
F5	Execute or Stop script execution
Ctrl+F5	Execute current selection
F11	Execute last command
F12	Switch to last executed script
Ctrl+F11	Pop-up a list of recently-used commands
Ctrl+F12	Pop-up a list of recently executed scripts
F8	Clear Trace
Editor Commands	
Ctrl+C	Copy selection to clipboard
Ctrl+V	Paste from clipboard
Ctrl+X	Cut selection to clipboard
Ctrl+F	Pop-up <i>Find</i> dialog box
Ctrl+H	Pop-up <i>Replace</i> dialog box
F3	Repeat last search
Shift+F3	Repeat last search backwards
Ctrl+F3	Search for current word
Ctrl+A	Select all text
Ctrl+Z	Undo last action
Ctrl+Y	Redo the previously undone action
File Commands	
Ctrl+N	Create a new script
Ctrl+O	Open an existing script file
Ctrl+P	Print the current script
Ctrl+S	Save the current script
Ctrl+F6	Switch to the next script
Ctrl+Shift+F6	Switch to the previous script
Undocumented Commands	
Ctrl + 	Resets the COM port in cases when an error on the H4 protocol causes the port to get stuck
Ctrl+Shift+ Numpad-	Switch RTS on the serial port
Ctrl+Shift+ Numpad+	Switch DTR on the serial port
Ctrl+0..9	Run pre assigned scripts 0 to 9
	Add Shift for 10 to 19
Ctrl+Alt+0..9	Assign a script 0 to 9.
	Add Shift for 10 to 19

Terms and Abbreviations

Table 16 lists terms and abbreviations.

Table 16. Terms and Abbreviations

Term	Description
BD_ADDR	Bluetooth device address
BER	Bit error rate
BT	Bluetooth
HCI	Host controller interface
Host/host PC	A PC connected to the device through the serial port
LMP	Link manager protocol
LQM	Link quality monitor
PER	Packet error rate
RF	Radio frequency
RSSI	Received signal strength indication
SW	Software
VS	Vendor-specific

Revision History

Changes from A Revision (June 2015) to B Revision	Page
• Changed organization of user's guide	1
• Added Added Section.....	1
• Added Section 1, Requirements	3
• Added Section 2, Installation	3
• Added Section 3, Post Installation Requirements	4
• Added highlighted Change Library button in Figure 3	4
• Added Added Section.....	6
• Added <i>Bluetooth (WL18xx and WL18xxQ) Vendor-Specific HCI Commands User's Guide (SWRU303)</i> in Section 4.1, Port Connection	8
• Added Appendix B, Terms and Abbreviations	28

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