



HCI Commander, Release 3.2

User Manual

July 4, 2005
BT-UM-0043, Revision 0.1

Abstract

The Bluetooth HCI Commander is an application designed to allow users to operate Texas Instruments Bluetooth devices. This application can transmit HCI commands and receive HCI events from TI Bluetooth chips. The HCI Commander runs on a PC and controls the device through an RS-232 interface connection.

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Revision Control

Release 3.2, Revision 0.1 – Creation.

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1. Introduction

The Bluetooth HCI Commander is an application designed to allow users to operate Texas Instruments Bluetooth devices. This application can transmit HCI commands and receive HCI events from TI Bluetooth chips. The HCI Commander runs on a PC and controls the device through a serial interface connection.

1.1 Main Features

- User friendly interface
- Easily discovers and connects Bluetooth devices
- Display Bluetooth connection state
- Create voice links
- Chat tool
- Send HCI commands and receive HCI events from the Bluetooth device
- Full Bluetooth 1.1 and 1.2 specification support
- Drag and drop file transfer feature
- Script mode support

2. Documents Reference

Reference	Description / Comments
BT-DS-0023	BRF6300 Product Preview (rev 0.2)
BT-SW-0027	BRF6300 Vendor specific command
BT-UM-0038	BRF6300 SDK User Manual
---	Bluetooth Specification versions 1.1 and 1.2

3. Terms and Abbreviations

Abbreviation /Term	Meaning / Explanation
BT	Bluetooth
BD_ADDR	Bluetooth Device Address
HCI	Host Controller Interface
Host/Host PC	A PC connected to the device via the serial port
RF	Radio Frequency
SW	Software
BRF6100	The TI Bluetooth single chip.
BRF6150	Second generation TI Bluetooth single chip
BRF6300	Third generation TI Bluetooth single chip (includes EDR support)

4. System Requirements

- PC running Pentium II (minimum requirement)
- Operating Systems: Windows 2000, Windows XP.
- Serial communications port (RS232).

5. Installation

1. From the installation CD ROM, run the setup application and follow the on-screen prompts.
2. When installation is completed, the Texas Instrument\Bluetooth Tools program group displays the HCI Commander program icon.
3. Using a serial cable, connect the PC to the HCI serial port on the Bluetooth device.



6. Invoking the HCI Commander and Port Configuration

This section describes how to invoke the HCI Commander and how to select and configure the port connecting the HCI Commander and the Bluetooth device.

6.1 Invoking the HCI Commander

To invoke the HCI Commander, click on the HCI Commander program icon, or click the Start button and choose HCI Commander program from the menu as shown below.

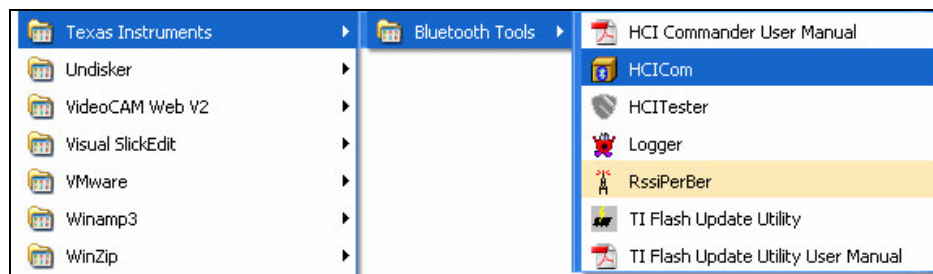


Figure 1: Invoking the HCI Commander

The HCI Commander Main Window opens showing the:

- Tasks Pane
- Bluetooth Network Pane
- Properties Pane
- Log Pane

If the Starter Kit modules are connected on two different computers the program must run on both computers.

6.2 HCI Commander Main Window

This is an example of a working window.

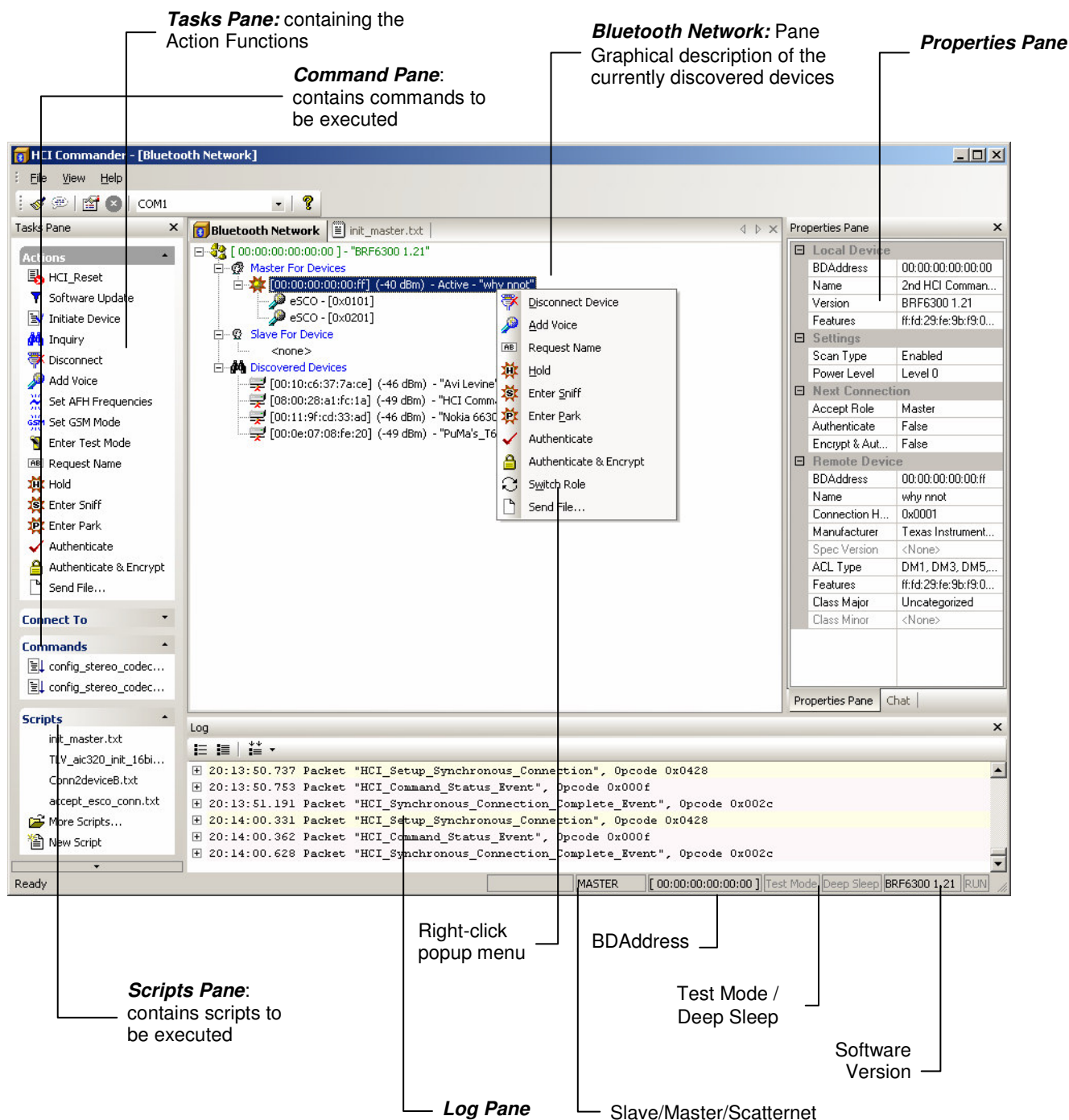


Figure 2: HCI Commander Main Window

6.3 Port Selection

1. From the Toolbar, click the **Port Connection** box; a drop down menu displays the available ports. The program is self-configurable.
2. Choose the desired port.

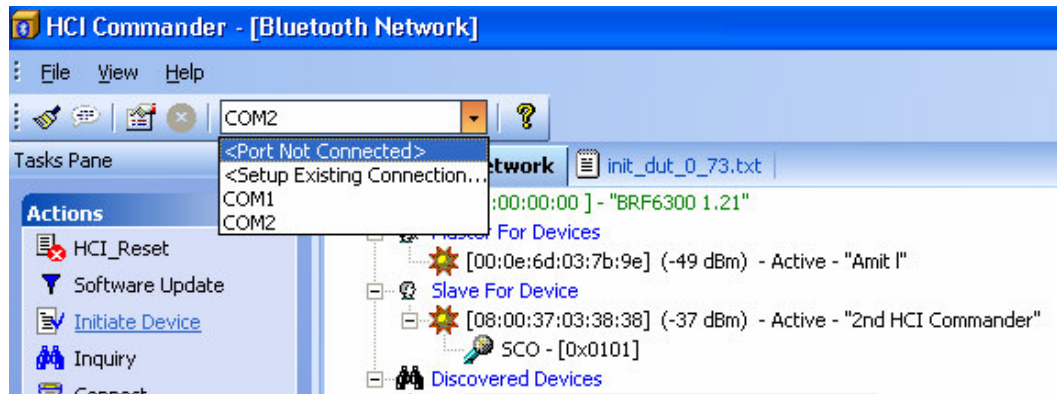
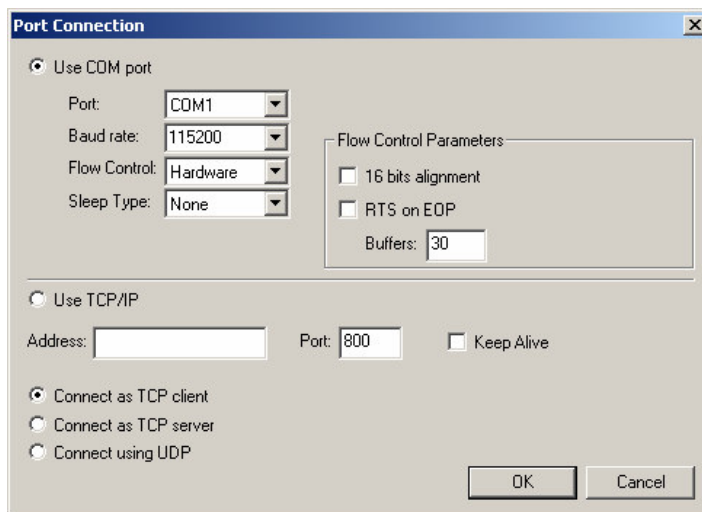


Figure 3: Selecting a COM Port from the Port Connection Dialog

6.3.1 Configuring the Selected Port

1. From the Port Connection box, as shown in Figure 2 above, Choose Setup Existing Connection. The **Port Connection** configuration window is displayed.



Notes

- Except for the port number, the port parameter values should generally be configured according to the default application values displayed in the figure on the left.
- If a "Port connection failed" message is displayed when trying to activate this port, verify that the selected port is not being used by another application.
- TCP/IP is not supported for BRFxxxx.

2. Configure the port.
3. Click **OK**. The changes are saved.

7. HCI Commander Functions

This section describes the functions performed by the HCI Commander.

7.1 Making a Connection

This section describes how to connect a pair of TI's Starter Kit modules.

1. Connect two Starter Kit modules to two PC serial ports, using a serial D-9 cable. They can be on different computers.
2. Connect the Starter Kit module power cables (supplied).
3. Power the modules **ON**. There is a toggle switch at the back of the module.
4. Ensure both LEDs are lit on the front of both modules.
5. Select the correct COM port (refer to Section 6.3).
6. Ensure the port speed is 115200.
7. In the *Tasks pane*, click **Initiate Device**.

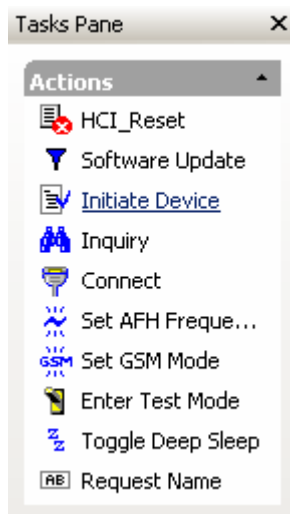


Figure 4: Making a connection using the Tasks Pane

8. In the *Tasks pane*, click **Inquiry**.
9. In the *Bluetooth Network* pane, select a **Discovered Device**.

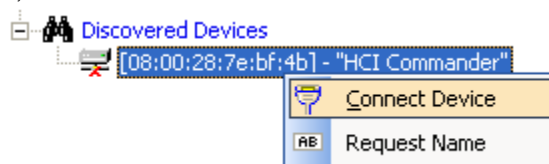


Figure 5: Connecting to a device using the Popup Menu

10. Double-click on the desired device **or** right-click on the desired device and on the popup menu, click **Connect Device**.

The *Log Pane* displays the communications information between the two devices (refer to Section 7.8).

7.2 Menu and Toolbar

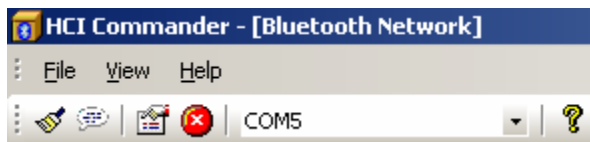







Figure 6: Menu and Toolbar

7.2.1 Menu Bar

Item	Sub-Menu	Description
<i>File Menu</i>	New	Create a new script that contains HCI commands.
	Open...	Open an existing script file.
	Run Script	Run currently loaded script.
	Exit	Exit the HCI Commander.
<i>View Menu</i>	Log	Displays or hides the Log pane.
	Tasks	Displays or hides the Task pane.
	Properties	Displays or hides the Properties pane.
	Chat	Displays or hides the Chat pane.
	Hex Dump	Log data in Hex format.
	Copy log information to clipboard	Copies the contents of the Log View pane to the clipboard.
<i>Help Menu</i>		HCI Commander Information and version number.

7.2.2 Tool Bar

Item	Sub-Menu	Description
 <i>Clear Log</i>		Clears the content of the Log View window.
 <i>Open Chat Box</i>		From the Properties pane, click the Chat tab. See section 7.7 on page 20.
 <i>Settings</i>		For details see section 7.3 on page 10.
 <i>Stop</i>		Stops current action (For example if a script is being executed, it'll be stopped)
<i>Port Connection box</i>	Select Port...	Select the port to configure the connection between the application and the device. See section 6.3 on page 7.
	Setup Existing Connection	Opens the Configuration window for the active port.
 <i>About</i>		Version information.

7.3 Settings Window

From the *Toolbar*, click the  icon to open the *Settings* window.
Click any row and then on the down arrow to change setting.

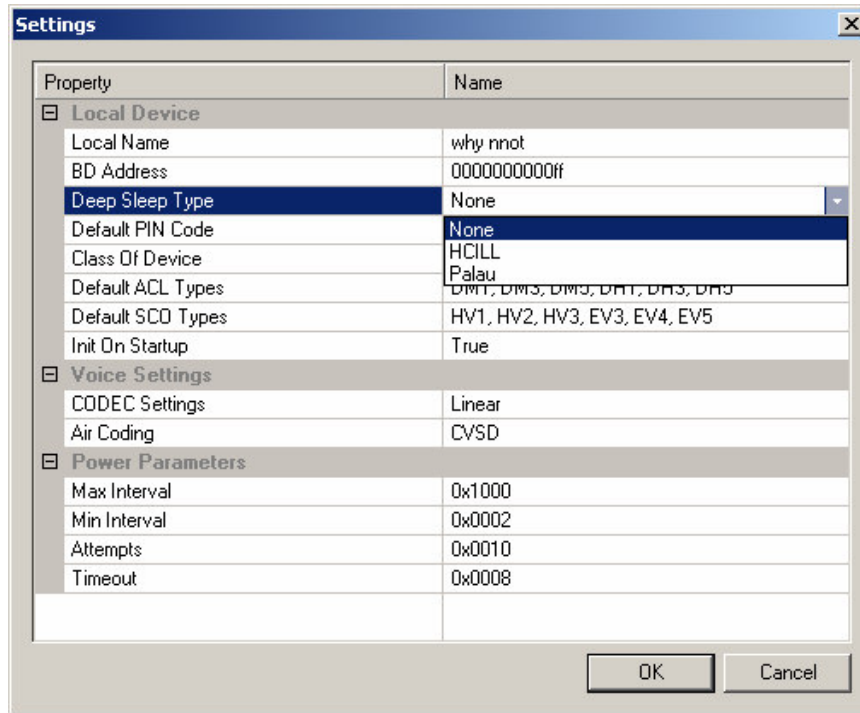


Figure 7: Setting Window

Click OK to save the settings and close the window.

Note: EDR packets are enabled by default. To disable EDR packets click on the packet types. A popup menu will appear and then tick the desired packet types you wish to disable.

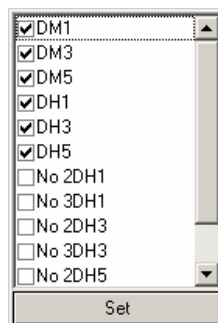


Figure 8: Selecting ACL packet types

7.4 Bluetooth Network Pane

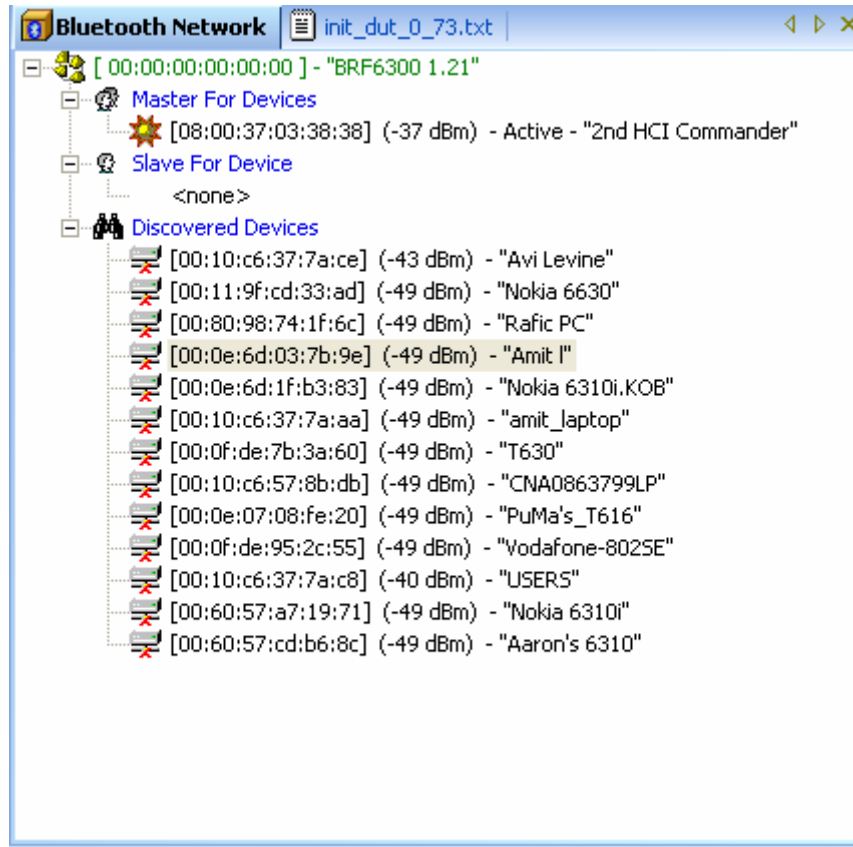


Figure 9: Bluetooth Network Pane

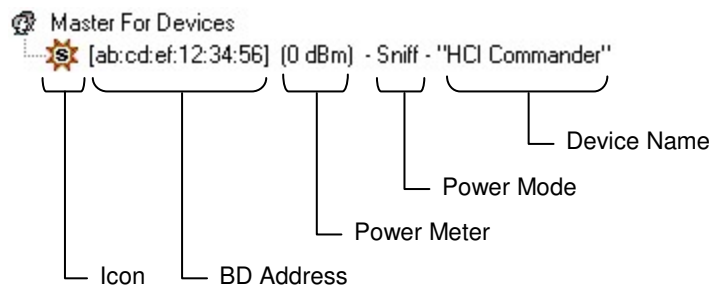
The *Bluetooth Network Pane* window uses a tree-like structure to display the current link status between the local device and the remote devices. The structure comprises a single “root” and three “branches”:

<i>Root</i>	Displays the local BD_ADDR and firmware version information.
<i>Master For Devices</i>	Lists connected devices where the local device is a Master.
<i>Slave For Device</i>	Lists the connected device where the local device is a Slave.
<i>Discovered Devices</i>	Displays all devices discovered by the “Look for devices” operation (inquiry).

7.4.1 Descriptive Line

Each device is displayed with a single line description.

The following example illustrates an example of the descriptive line:



The icon shown in the example above represents the power mode.











Examples of icons used are shown below:












-  Active
-  Sniff
-  Hold
-  Park

7.5 Tasks Pane (Actions) and Popup Menu

7.5.1 Function Buttons

The HCI commander supports the commands that are described in the table below. These commands can be found either in the *Tasks Pane* or in the *Popup Menu* in the *Bluetooth-Network Pane* (most of the commands appear in both menus).

Icon	Function	Function Description
	<i>Initiate Device</i>	Initializes the local device to its default state.
	<i>Inquiry</i>	Initiates the inquiry process.
	<i>Connect To Device</i>	Performs the paging operation for the selected device. The following function options are accessed from the Bluetooth Network pane <i>Popup Menu</i> , described in section 0 on page 8. To connect to a selected device, choose <i>Connect Device</i> . To authenticate a selected connection, choose <i>Authenticate</i> . To authenticate and encrypt the data transfer for a selected connection, choose <i>Authenticate & Encrypt</i> in the <i>Properties Pane</i> . To automatically authenticate the next selected connection, choose <i>Authenticate</i> next connection in the <i>Properties Pane</i> (Refer to Section 7.6). To automatically authenticate the next selected connection and encrypt the data transferred via the connection; choose <i>Authenticate & Encrypt</i> next connection in the <i>Properties Pane</i> (Refer to Section 7.6).
	<i>Disconnect From Device</i>	Disconnects the selected connection. Note From the Bluetooth Network pane right-click on the desired device and from the pop-up menu choose <i>Disconnect Device</i> .
	<i>Add Voice</i>	Adds a voice link (SCO, eSCO) to the selected connection. Note From the Bluetooth Network pane right-click on the desired device and from the pop-up menu choose <i>Add Voice</i> . Also see the example described in section 7.5.5 on page 18.
	<i>Remove Voice</i>	Disconnects the voice connection from the selected connection. Note From the Bluetooth Network pane <i>Popup Menu</i> , choose <i>Remove Voice</i> .
	<i>Chat</i>	Opens the Chat dialog box.
	<i>Enter Test Mode</i>	Sets the Bluetooth device to the Test Mode for connection to Bluetooth tester. See section 7.5.1.2 on page 14.
	<i>Software Update</i>	Executes the software update according to the device software version. The software update script is executed from the application directory according to the device software version. BRF6300 v1.21 device causes the script BRF6300_1.21.txt to execute. See section 7.5.1.1 on page 14.
	<i>Toggle Deep Sleep</i>	Activates/deactivates the device Sleep Mode. The Sleep Mode is set in the Settings dialog box. Note This function is disabled if a Sleep Mode has not been selected in the Settings dialog box.

	<i>HCI_Reset</i>	Resets the device to its startup state.
	<i>Authenticate</i>	Activates authentication procedure of the connection
	<i>Authenticate and Encrypt</i>	Activates authentication and encryption procedure of the connection
	<i>Request Name</i>	Request local name of remote device
	<i>Hold</i>	Enter Hold mode
	<i>Sniff</i>	Enter Sniff mode
	<i>Park</i>	Enter Park mode
	<i>Switch Role</i>	Swaps the roles of the Master and Slave between the local and remote device
	<i>Send File</i>	Enables the sending of files
	<i>Set AFH Channel Classifications</i>	Sets the adaptive frequency hopping scheme. See section 7.5.2. Note This function is only enabled for BFR6150 devices.
	<i>Send GSM Settings</i>	Sets the frequency hopping scheme to best match a GSM environment. Note This function is only enabled for BFR6150 devices.

7.5.1.1 Software Update Script

The software update function executes a script file located in the application directory. The name of the script file executed is dependent on the device version. For example, a BRF6300 v1.21 device causes the script BRF6300_1.21.txt to execute.

7.5.1.2 Test Mode

1. Do not click the **Init** button before entering test mode
2. Click the Software Update button for the device to achieve optimum performance.
3. Click the Test Mode button. This puts the device into test mode and waits for a connection.

7.5.2 AFH Frequency Selector Window

Using the buttons on the bottom of the AFH window, it is possible to select the frequencies for the Automatic Frequency Hopping function:

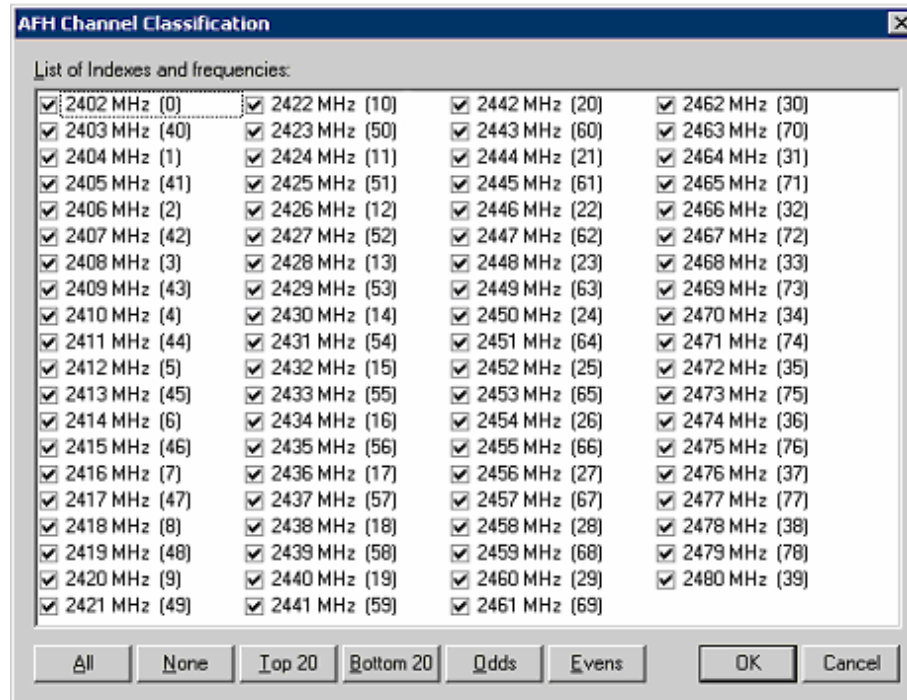



Figure 10: AFH Frequency Selector Window










7.5.3 HCI Commands












The first time the HCI Commander is connected to a device, it automatically executes a series of HCI commands in the following order:

1. HCI_Read_BD_Addr
2. HCI_Read_Buffer_Size
3. HCI_Read_Local_Supported_Features
4. HCI_Read_Local_Version_Information
5. HCI_Read_Scan_Enable
6. HCI_read_Local_Name
7. HCI_Read_Authentication_Enable
8. HCI_Read_Encryption_Mode
9. HCI_Read_Inquiry_Scan_Type
10. HCI_Read_Inquiry_Page_Type
11. HCI_Write_Inquiry_Mode

The following table lists the HCI commands sent by the Bluetooth Network pane functions. The HCI commands and events are displayed in the Log View pane.

Icon	Function	HCI Commands Sent to the Local Device	Notes
	HCI_Reset	HCI_Reset	Resets the device to its startup state.

Icon	Function	HCI Commands Sent to the Local Device	Notes
	<i>Initiate Device</i>	HCI_Read_Local_Version_Information	Initializes the local device.
		HCI_Read_Local_Supported_Features	The Initiate Device command does not destroy existing connections.
		HCI_Change_Local_Name	
		HCI_Write_Class_Of_Device	
		HCI_Write_InquiryScan_Activity	Note This command MUST be executed after hardware reset or HCI_RESET.
		HCI_Write_PageScan_Activity	
		HCI_Write_Scan_Enable	
		HCI_Write_Voice_Settings	TESTMODE : When testing the device in TEST MODE this command is not required.
		HCI_Read_BD_Addr	
		HCI_Write_Page_Timeout	
		HCI_Read_Buffer_Size	
		HCI_Read_Authentication_Enable	
		HCI_Read_Encryption_Mode	
		HCI_Write_Num_Broadcast_Retransmissions	
		HCI_Read_Inquiry_Scan_Type	
		HCI_Read_Inquiry_Page_Type	
		HCI_Write_Inquiry_Mode	
		HCI_Read_Scan_enable	
	<i>Inquiry</i>	HCI_Inquiry	Starts an inquiry process.
		HCI_Remote_Name_Request	
	<i>Connect To Device</i>	HCI_Create_Connection	1. Select a device in the Remote Devices window or type a BD_ADDR in the BD Addr edit box
		HCI_Write_Link_Policy_Setting	
		HCI_Remote_Name_Request	2. Click on the <i>Connect To Device</i> button.
		HCI_Read_remote_Supported_Features	
		HCI_Read_Remote_Version_Information	
	<i>Disconnect From Device</i>	HCI_Disconnect	-or- Double clicking on a device will create a connection. Note The default packet type is specified in the Packet Type page of the Configuration window.
	<i>Add Voice</i>	HCI_Add_SCO_Connection	Select a connected device and click on <i>Add Voice</i> button. Note The packet type is determined in the Packet Type page of the Setting window.
		-or-	
		HCI_Setup_Synchronous_Connection	
	<i>Remove Voice</i>	Depending on the voice packet types determined	Select a connected device and click on <i>Add Voice</i> button. Note: the packet type is determined by the SCO Types item in the <i>Setting</i> window.
		HCI_Disconnect	
	<i>Chat</i>	Uses ACL data packets	See Chat section 7.6 for details.
	<i>Enter Test Mode</i>	HCI_Enable_Device_Under_Test_Mode	Sets the Bluetooth device in Test Mode for connection to Bluetooth tester.
	<i>Toggle Deep Sleep</i>	HCI_VS_Set_Sleep_Mode	Activates/deactivates the device sleep mode. The sleep mode is set in the Settings dialog box.
			Note This function is disabled if a sleep mode has not been selected in the Settings dialog box.

Icon	Function	HCI Commands Sent to the Local Device	Notes
	<i>Settings</i>	HCI_VS_Write_BD_Addr HCI_Change_Local_Name HCI_Write_Class_Of_Device	See section 7.3 on page 10 for details.
	<i>Authenticate</i>	HCI_Authentication_Requested (HCI_Link_Key_Request)	Receives BD address of remote device
	<i>Authenticate and Encrypt</i>	HCI_Set_Connection_Encryption	Encrypts the connection and receives the BD address of the remote device
	<i>Remote Name Request</i>	HCI_Remote_Name_Request	Requests the remote name of the device
	<i>Hold</i>	HCI_Hold_Mode	Puts the device in hold mode
	<i>Sniff</i>	HCI_Sniff_Mode	Puts the device in sniff mode
	<i>Park</i>	HCI_Park_Mode	Puts the device in park mode
	<i>Switch Role</i>	HCI_Switch_Role	Select either the Master or Slave and from the right-click popup menu, choose Switch Role. Swaps the roles of the Master and Slave
	<i>Send File</i>	HCI_Receive_Buffer_Size HCI_Number_Of_Completed_Packets	Sends selected file as a HEX dump
	<i>Set AFH Channel Classifications</i>	HCI_Set_AFH_Channel_Classification	Enables the Bluetooth host to specify a channel classification based on its local data.
	<i>GSM</i>	HCI_Set_AFH_Channel_Classification	Sets the channel to GSM mode

7.5.4 Requesting the Name of a Remote Device

1. In the Bluetooth Network pane, from the Discovered Devices list, select the desired device.
2. Position the mouse cursor in the HCI Commander Bluetooth Network pane and right click; a Popup menu opens.
3. Choose **Remote Name Request**; a message is displayed in the Log View pane showing the name of the selected device.

7.5.5 Voice Link Example

The BRF6300 SDK consists of two CODEC types. One supports mono voice connection and the second supports stereo voice connection. By default the mono CODEC is enabled and the stereo CODEC is disabled.

7.5.5.1 Setting a Mono Connection

The following procedure is a simple example of creating a mono-SCO connection between two boards and establishing a mono voice link.

NOTE : Make sure JP23 is closed

1. Run the HCI Commander.
2. Verify that the connection settings are correct for both devices.
3. Initiate: choose **Initiate Device** on the HCI Commander for both sides.
4. Inquiry: choose **Inquiry** to list the discoverable Bluetooth devices in the environment.
5. Connection: when the inquiry process is completed, select the Bluetooth Device Address (BD_ADDR) from the **Discovered Devices** list on the Bluetooth Network pane and choose **Connect**.
6. Once the connection is established, an Active message appears in the Bluetooth Network pane next to the selected BD_ADDR (on both Master and Slave sides).
7. Voice (SCO/eSCO) connection: select an active connection from the Bluetooth Network pane and choose **Add Voice**.
 - a. Once a voice link is established, an SCO/eSCO icon and text, including the connection handle, will appear in the Bluetooth Network pane under the selected connection (on both the Master and Slave sides).
 - b. Headsets connected to the device are now operational and can be used to verify the voice connection.

7.5.5.2 Setting a Stereo Connection

The following procedure is a simple example of creating a stereo-eSCO connection between two boards and establishing a stereo voice link.

NOTE : Make sure JP23 is open

1. Run the HCI Commander.
2. Verify that the connection settings are correct for both devices (i.e. that eSCO packets are enable (EV3, EV4 and EV5).
3. Initiate: choose **Initiate Device** on the HCI Commander for both sides.
4. Inquiry: choose **Inquiry** to list the discoverable Bluetooth devices in the environment.
5. Configure the stereo CODEC : from the *Command Pane*, select:
 - a. **"config_stereo_code_headset"** when intending to connect headset
(NOTE : when using Philips headset JP31 should be open ; when using Kyocera headset JP31 should be closed)
 - b. **"config_stereo_code_speakers"** when intending to connect speakers

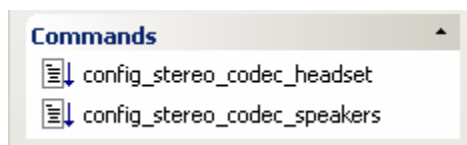


Figure 11: Stereo CODEC commands

6. Connection: when the inquiry process is completed, select the Bluetooth Device Address (BD_ADDR) from the **Discovered Devices** list on the *Bluetooth Network* pane and choose **Connect**.
7. Voice (eSCO) Connection: select an active connection from the Bluetooth Network pane and choose **Add Voice**.

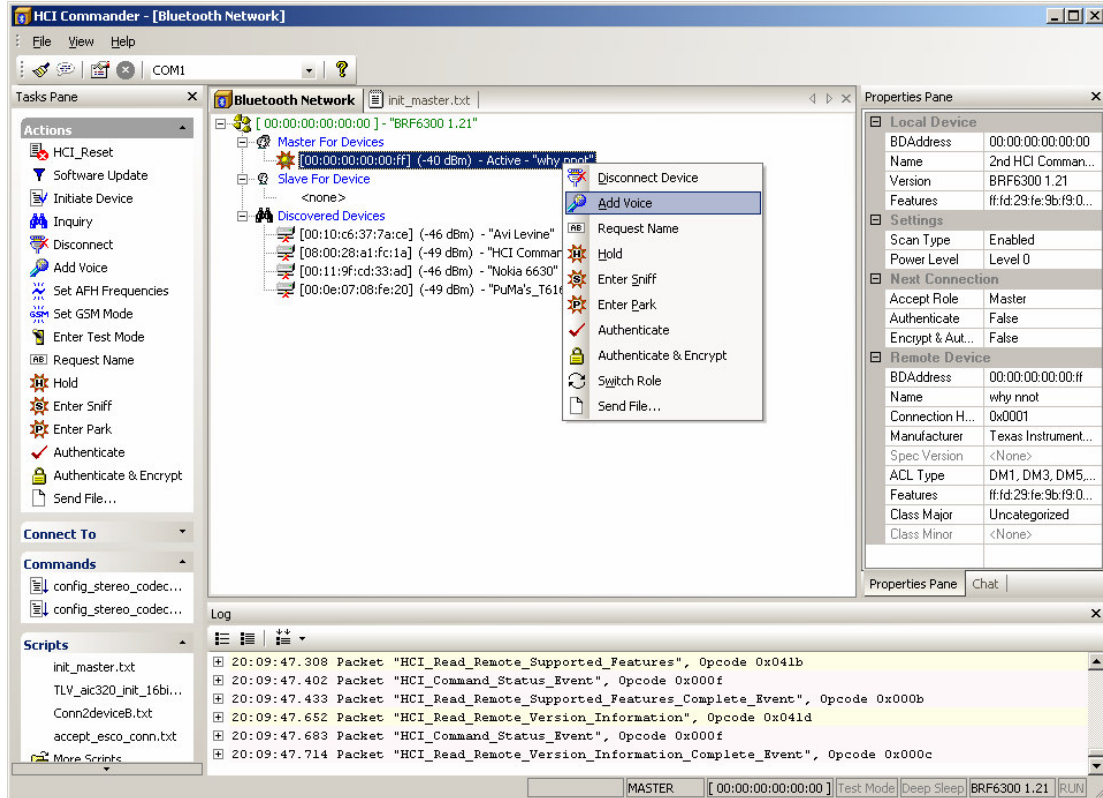


Figure 12: Adding voice connection

- a. Once a voice link is established, an eSCO icon and text, including the connection handle, will appear in the Bluetooth Network pane under the selected connection (on both the Master and Slave sides).

Repeat this procedure to add a second voice connection

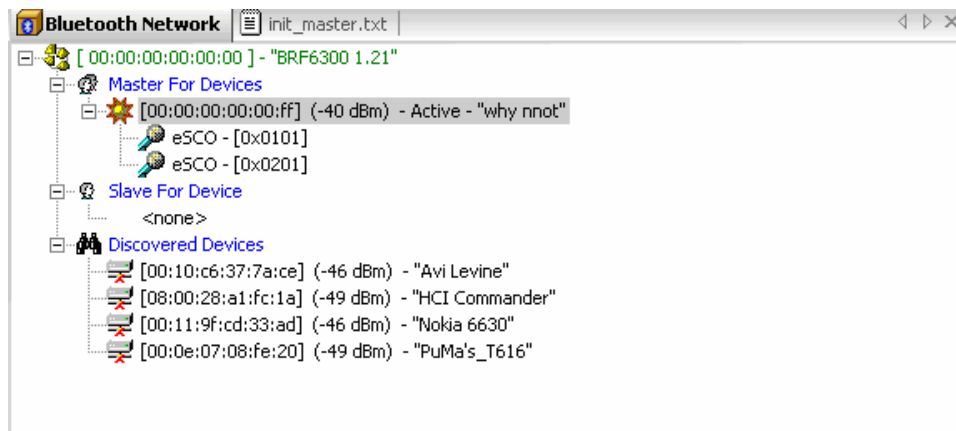


Figure 13: Two eSCO voice connections

- b. Headsets/speakers connected to the device are now operational and can be used to verify the voice connection.

7.6 Properties Pane

The properties pane is composed of four items.

1. *Local Device* – discloses the local device parameters: BD address, Name, Version and the feature list that the device supports
2. *Setting* – general settings for the local device
3. *Next Connection* – set of parameters that will be applied when a connection will be established with a remote device
4. *Remote Device* – This item will only be apparent when a connection has been established. It describes the parameters of the remote device (BD address, Name, Handle, list of features it supports and Class). The ACL packets that are supported in the connection are also depicted here.

All parameters can be changed (except for the parameters of the remote device) by clicking on the desired row and then the down-arrow to open the popup menu.

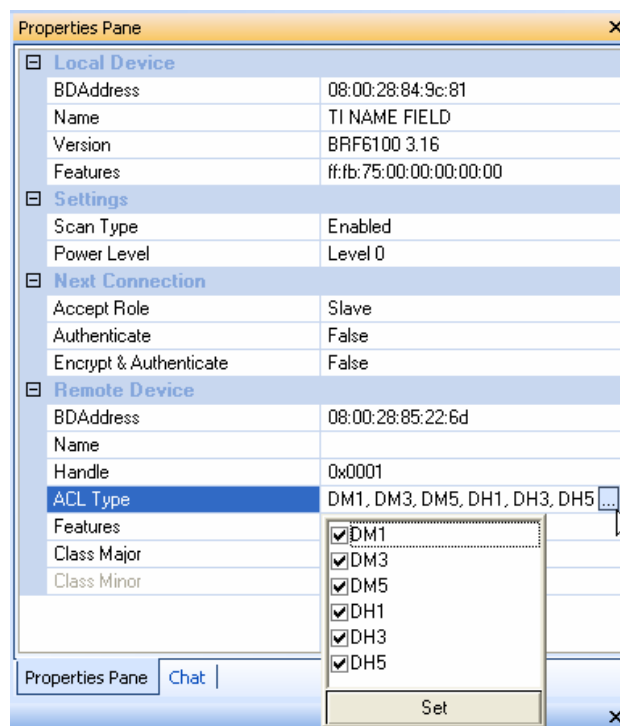


Figure 14: Properties Pane

7.7 Text Messaging and File Transferring

7.7.1 Sending a Text Message

The Chat Box is used for sending text messages from one device to another. The HCI Commander uses HCI data packets (ACL packets) to send the text messages.

If the *Chat Dialog Pane* is not opened by default, use the following procedure:

1. Right-click the HCI Commander upper toolbar to open the **Pane Selection** menu.

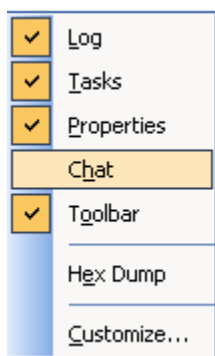


Figure 15: Opening the Chat Dialog Pane

2. Choose **Chat**, the *Chat Dialog Pane* is now displayed instead of the **Properties** pane.

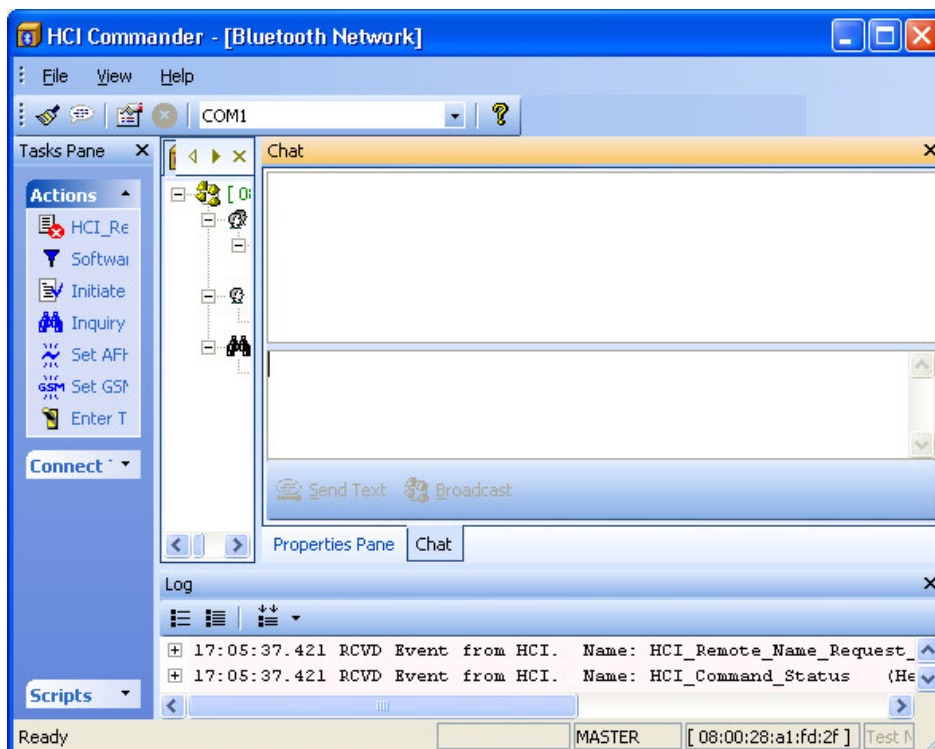


Figure 16: Chat Dialog Pane

3. Type your message in the lower box as shown below.

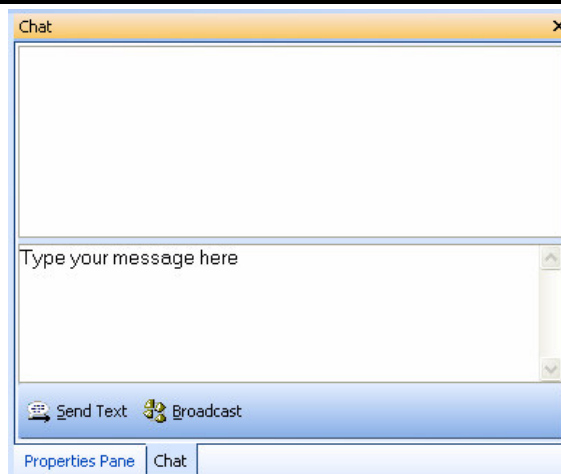


Figure 17: Typing a message in the Chat Dialog Pane

4. To send a message to a specific device, from the Bluetooth Network pane, select the corresponding active connection then click **Send Text** to send to a selected device.
-or-
To broadcast the message to multiple devices you do not have to select a connection, simply click **Broadcast** to send to all the connections.

7.7.2 Sending a File

The **Send File** action from the **Tasks Pane** or from the *Popup Menu* is used for sending a file of up to 64Kbytes to a device.

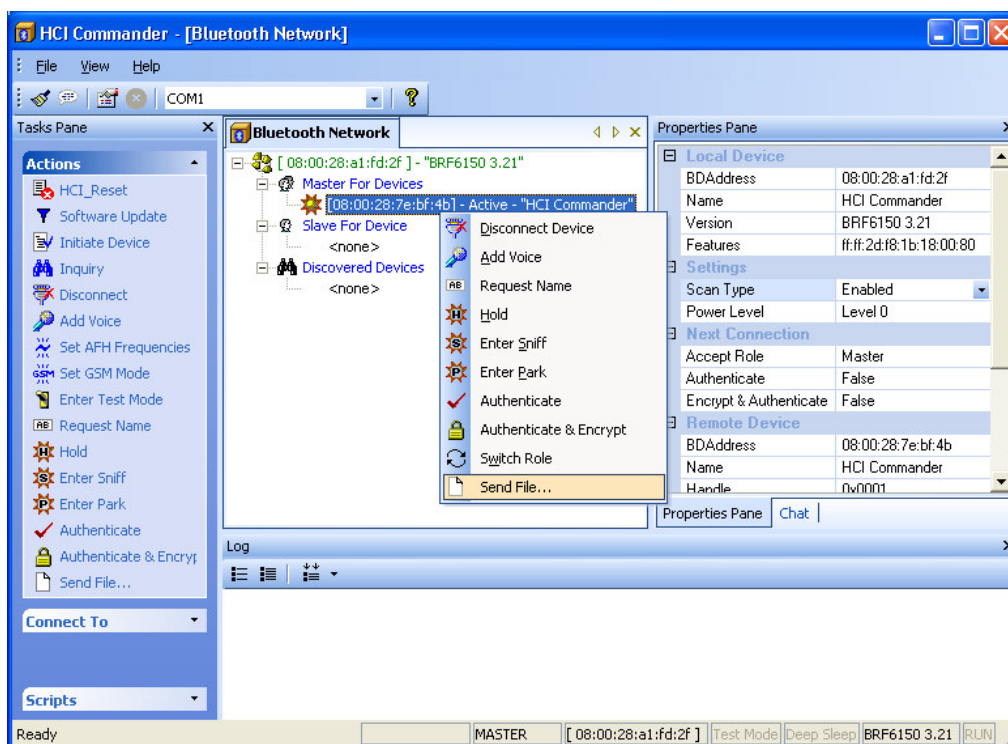


Figure 18: Send File Command

1. Click **Send File** from either the **Tasks Pane** or the *Popup Menu*. The **Open** window opens.

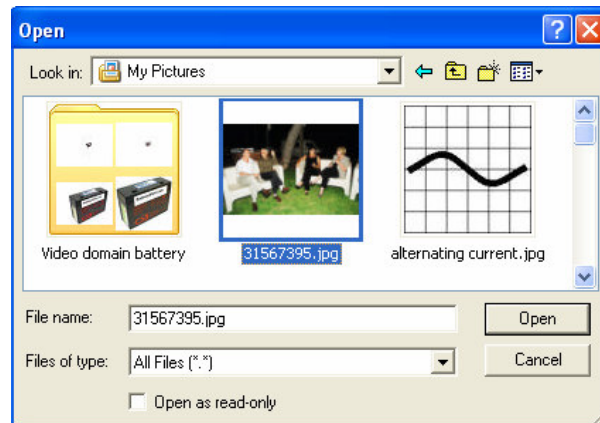


Figure 19: Selecting a file to send

2. Choose a file to send.
3. Click **Open** to send the file.

Note: Alternatively a file can be selected by opening the Windows Explorer folder and drag the file to the connected remote device in the *Bluetooth Network* pane.

7.7.3 Receiving a Message or a File

When a message from a remote device is received, the **Chat** Dialog box displays the message in the **Chat** box.

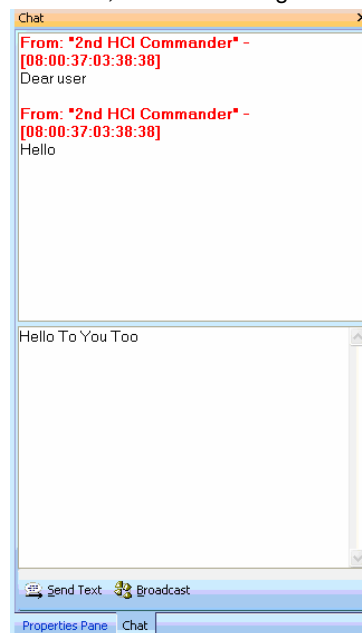


Figure 20: Receiving a message in the Chat Dialog Pane

When a file from a remote device is received, the following message will appear on the screen

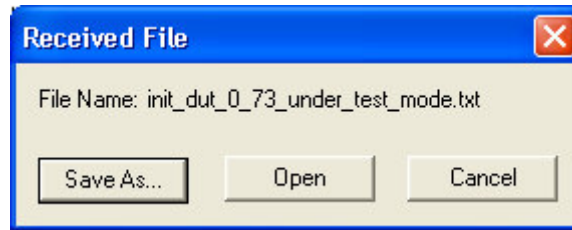


Figure 21: Received file message

7.8 Log View Pane

The Log View pane displays the HCI commands and events. HCI commands and events are displayed along with their parameters as defined in the Bluetooth Specification.

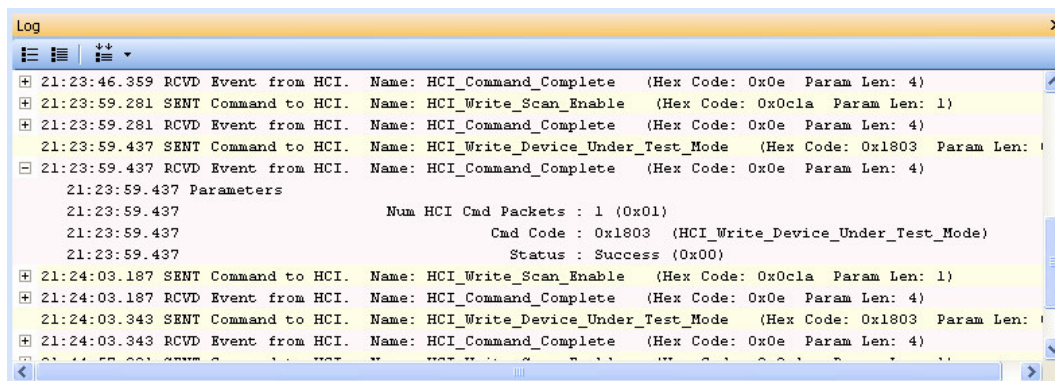


Figure 22: Log View Pane

7.9 Commands Pane

The *Commands Pane* shows the current scripts located in the installed folder that has .hcs file extension (hcs stands for HCI Commander Script).

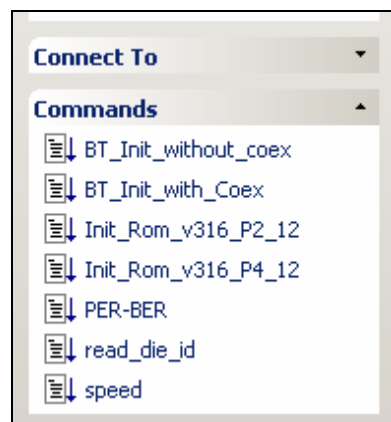


Figure 23: Commands Pane

7.10 Scripts Pane

The *Scripts Pane* shows the current scripts that were loaded (A script must be a .txt file). New script can be written by selecting the New **Script** option. Additional scripts can be loaded by selecting the **More Scripts** option and browsing to select the desired script.

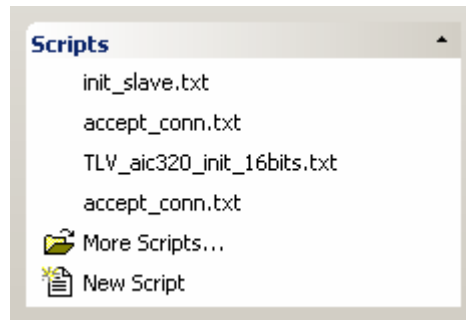


Figure 24: Scripts Pane

7.11 Status Bar

The Status Bar displays general information regarding the local device and the piconet connection:

- The BD Address of the local device, after receiving a command complete event for HCI_Read_BD_Addr.
- Software version
- Role indication (Slave, Master or Scatternet)
- Sleep mode indication
- Selected Mode indication

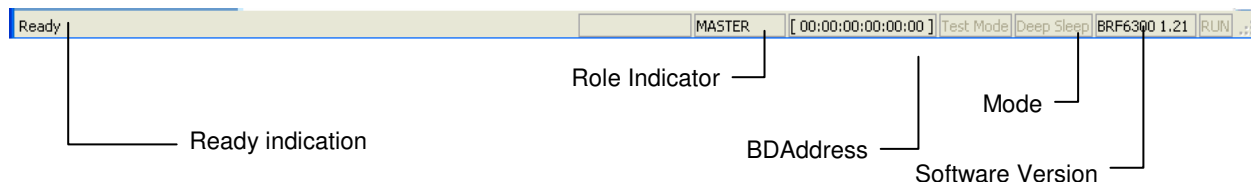


Figure 25: Status Bar

8. Customize Window

1. Right-click any pane except the *Tasks Pane*. The pop-up menu is shown below.

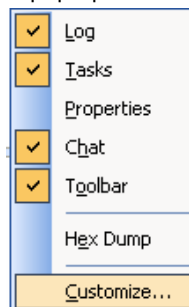


Figure 26: Customize Option

2. Choose Customize. The Customize window opens.

The Customize window is divided into five Tabs:

- Commands

- Toolbars
- Keyboard
- Menu
- Options

8.1 Command Tab

Using the **Command Tab** you can drag the commands from the Customize window and drop them onto the Menu or Tool bars.

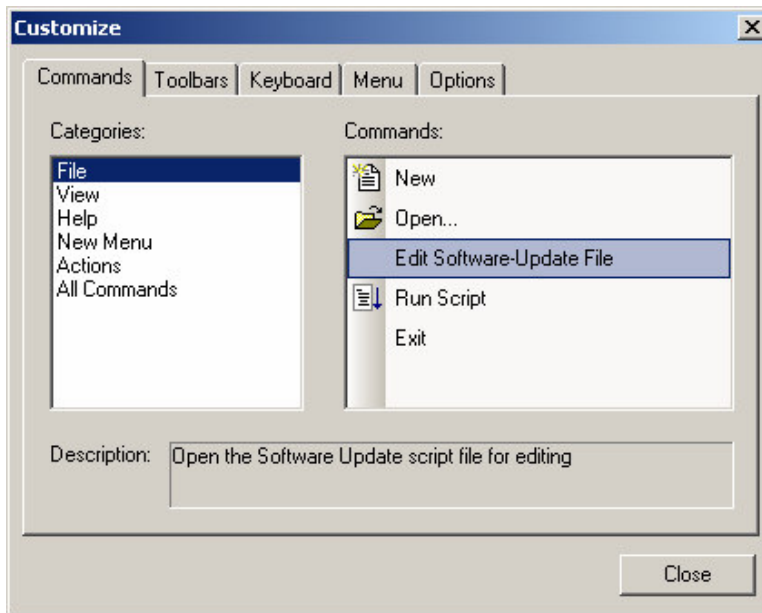


Figure 27: Command Tab

8.2 Toolbars Tab

The **Toolbars Tab** enables you to enable and disable the **Toolbars**.

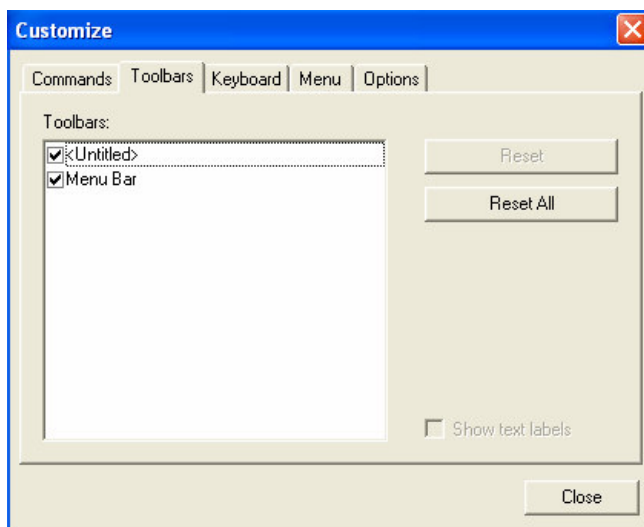


Figure 28: Toolbars Tab

8.3 Keyboard Tab

The **Keyboard Tab** enables you to make keyboard shortcuts for each item on the menus.

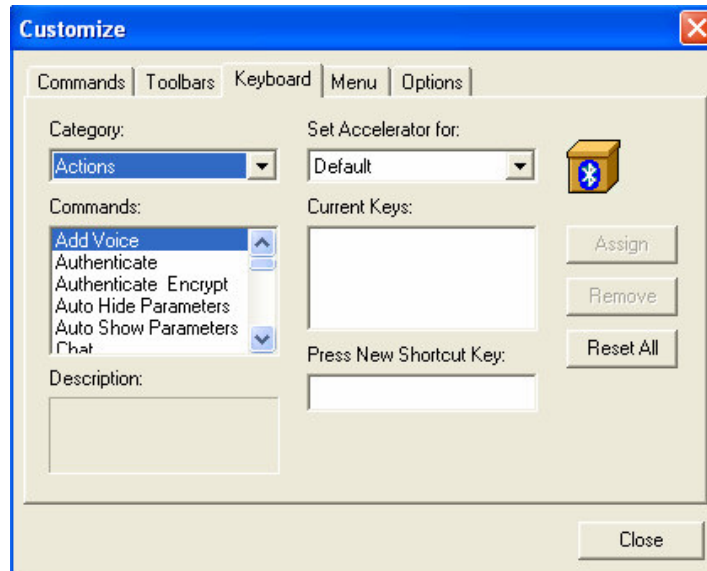


Figure 29: Keyboard Tab

8.4 Menu Tab

The **Menu Tab** enables the customization of the menus, which includes animations and shadows.

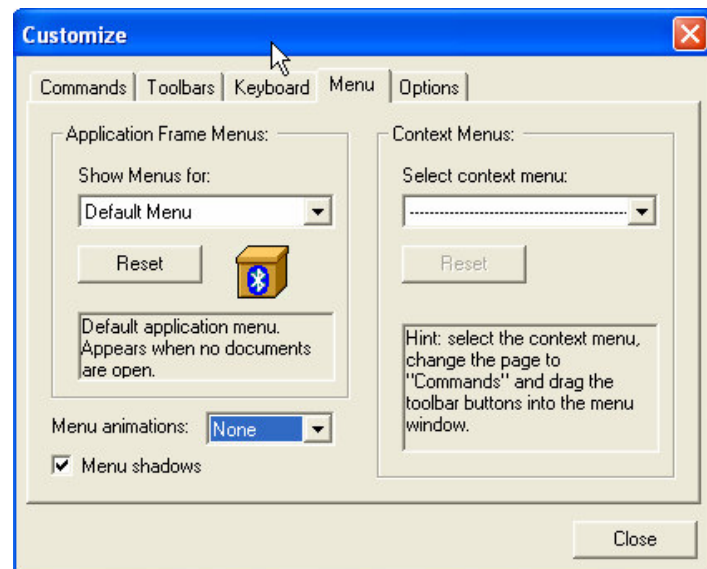


Figure 30: Menu Tab

8.5 Options Tab

The **Options Tab** customizes how the menus are viewed.

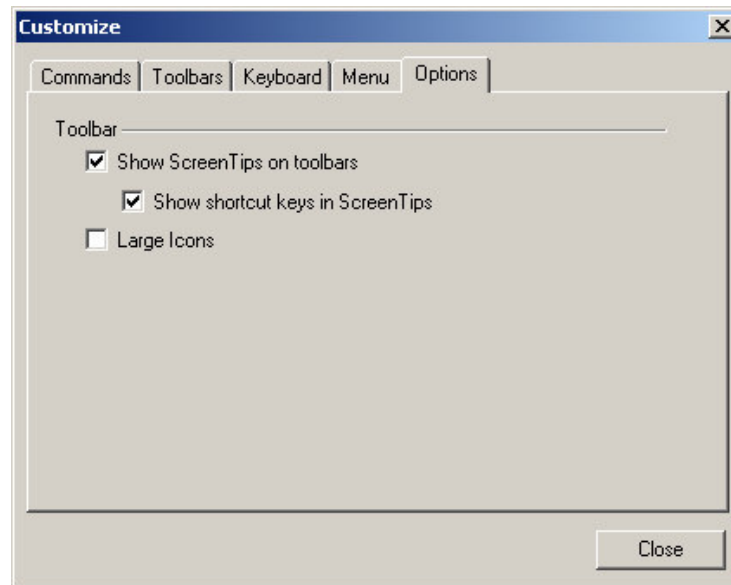


Figure 31: Options Tab

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