ZICM2410Px-KIT1
User Guide
Network Demonstration

0007-05-08-00-001
(Rev A)
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1 INTRODUCTION & PURPOSE

The ZICM2410Px-KIT1 provides a simple demonstration environment for the CEL ZigBee System-on-Chip devices and modules. The kit is based on the CEL’s ZIC2410 series of 802.15.4/ZigBee compliant transceiver products. It allows the user to build and demonstrate simple star and tree networks, and wirelessly monitor the packet data being sent throughout those networks. The evaluation boards in the kits can then be modified, using the tools contained in the kit, to create custom application prototypes.

This procedure explains the components of the kit, and instructs the user on how to install the software, and drivers, how to configure the two simple networks and how to demonstrate a few simple applications in each of these networks. Additional documentation contained on the included CD will direct the user on how to modify and customize the firmware contained on the evaluation boards.

1.1 DEFINITIONS

HARDWARE

- **ZIC2410QN48**: CEL’s single chip 802.15.4/ZigBee™ compliant transceiver (in a QFN-48 package)
- **ZICM2410Px-1**: CEL’s 802.15.4/ZigBee™ compliant transceiver module solution (containing the ZIC2410QN48)
- **ZIC2410 daughter board**: CEL’s 802.15.4/ZigBee™ compliant evaluation module (containing the ZIC2410QN48)
- **ZIC2410-EVB1**: a PC evaluation board containing a ZIC2410QN48 daughter board, to connect to host programs on a PC system. Using CEL software tools makes it possible to download user programs to the ZIC2410 for demonstration and customer application prototype development.
- **ZICM2410-EVB2**: a PC evaluation board containing a ZICM2410Px-1 Module, to connect to host programs on a PC system. Using CEL software tools makes it possible to download user programs to the ZIC2410 for demonstration and customer application prototype development.
- **ZIC2410-WNA**: Wireless Network Analyzer, a ZigBee 2006 and IEEE 802.15.4 compliant 2.4GHz ZigBee Module containing the ZIC2410 device, used to wirelessly check detailed information on each layer from the MAC to the Application layer by capturing RF packet data in real time.
- **ZICM2410Px-KIT1**: a ZigBee 2006 compliant ZigBee Engineering Development Kit

SOFTWARE TOOLS

- **Device-Programmer**: Software to download device firmware onto a ZIC2410 through either of the Evaluation Boards
- **Profile-Builder**: Software to create the user applications using CEL ZigBee™ Stack Library and Application interface functions
- **Profile-Simulator**: Software for configuring a demonstration network using multiple evaluation boards
- **Packet-Analyzer**: Software using the ZIC2410-WNA to wirelessly monitor the packet traffic being communicated throughout a demonstration PAN network.
- **CP210x Driver Software**: USB to COM port drivers to allow either a ZIC2410-EVB1, a ZICM2410-EVB2 or a ZIC2410-WNA to be connected to a PC through a USB cable...
• **USB Device Configuration Tools**: To set up/change USB device ID serial numbers for the CP210x in order to connect multiple USB devices to the same PC without conflict.

• **XPort Driver Software**: Facilitates communication to the ZIC2410-EVB1 through the optional Ethernet (TCP/IP) port. See Section 4.2 of the CEL document “ZIC2410 Getting Started Software Installation Manual” (CEL Doc #0005-05-08-11-001) [filename: zic11_getstrt_sm.pdf]

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<th>Part</th>
<th>Description</th>
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<td>One labeled as ‘Router (IEEE Addr: 0 x 00 22 A3 00 00 00 00 02)’</td>
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<td>One labeled as ‘End Device (IEEE Addr: 0 x 00 22 A3 00 00 00 00 03)’</td>
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<td>1</td>
<td>ZIC2410-WNA</td>
<td>Wireless Network Analyzer w/ white antenna</td>
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### 1.3 REFERENCED DOCUMENTS

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1.4 COMPONENT AND DEMONSTRATION DESCRIPTION

This kit contains three evaluation boards with firmware already loaded. The ZIC2410-EVB1 is configured and labeled as a Coordinator. The two ZIC2410-EVB2 evaluation boards are configured as a Router and as an End Device. All three are set to operate on a specific Channel and assigned a 16byte address (labeled on each of them).

The kit also includes a Wireless Network Analyzer (WNA) with its own antenna (5” white), through which the actual packet traffic created by the demonstration networks can be monitored. Batteries for the Router and End Device boards and cables to connect the Coordinator board and the WNA to USB 2.0 ports on the PC are also included.

A CD is also provided as part of the kit. It contains the software and drivers that will need to be installed on the user’s PC and all the documentation for the kit.

Sections 2 and 3 of this document are set-up procedures, which will instruct the user on how to install the programs necessary for this demonstration (Profile-Simulator and Packet-Analyzer), and the CP2101 USB Drivers from the CD and how to register the Coordinator board and the WNA for connection to the PC.

Sections 4 through 7 are demonstration procedures to show the capabilities of the hardware and software. Section 4 and 5 instruct the user on the procedures for using the Profile-Simulator program to set up a simple ZigBee Star Network, a Coordinator with a Router and an End Device connected directly to it. The Router has been configured with a Light ON/OFF switching application and the End Device with a Light ON/OFF switch function and an ADC Sensor application, the latter transmitting packet data to the Coordinator on a periodic basis. Both the switching and the sensor applications will then be demonstrated on the network.

In Section 6, the WNA and the Packet-Analyzer program will be used to selectively monitor the wireless traffic being communicated throughout the network.

Section 7, contains instructions on how to convert the star network to a simple ZigBee Tree Network, an End Device connected through a Router to the Coordinator, to demonstrate both extending the range of the network beyond the Personal Operating Space (POS) of the Coordinator and the ability of the devices to automatically re-configure the network. Finally, the functionality of the new network will be demonstrated, and the effects of the conversion on the network traffic will be observed using the Packet-Analyzer program.
2 GETTING STARTED

2.1 INSTALLING SOFTWARE PROGRAMS
In order to run the demonstrations in this Kit User Guide, it is only necessary to install two programs: (1) Profile-Simulator, and (2) Packet-Analyzer. Device-Programmer and Profile-Builder are used to customize firmware.
This user guide assumes that the user’s PC is running Windows XP. If the user is running Windows Vista, the procedure for adapting this software to Windows Vista Operating System is given in APPENDIX-1 of the document “ZIC2410 Getting Started Software Installation Manual” (CEL Doc #0005-05-08-11-001). [filename: zic11_getstrt_sm.pdf].
For each of the CEL supplied programs, there is a ‘Setup.exe’ file to be found on the CD in the directory \ZIC2410\Tools\CEL [program name #.##]. Double click on the appropriate ‘Setup.exe’ file and follow the procedure to install the program. Detailed instructions for each of the installations are given in Section 2 of the CEL document “ZIC2410 Getting Started Software Installation Manual” (CEL Doc #0005-05-08-11-001) [filename: zic11_getstrt_sm.pdf].
Once each program has been successfully installed, its icon should appear on the user’s desktop.

2.2 INSTALLING THE USB DRIVER
In order to interface a PC with the USB port on the ZIC2410-EVB1, the ZICM2410-EVB2 or the ZIC2410-WNA, a driver file must be downloaded to the PC. The procedure for installing the driver set-up program is given in Section 2.5 of the CEL document “ZIC2410 Getting Started Software Installation Manual” (CEL Doc #0005-05-08-11-001) [filename: zic11_getstrt_sm.pdf].
3 CONNECTING THE HARDWARE

Caution: Do not attempt to disassemble the evaluation boards. To do so incorrectly may damage the assemblies and will void their warranty.

3.1 EVB1 INITIAL SWITCH SETTINGS

(Please refer to Figure 3) The switches on the ZIC2410-EVB1 evaluation board should initially be set to the following positions:

- **‘LCD SWITCH’**
  - ‘OFF’
- **‘ISP Select SWITCH’**
  - ‘1 – 2’
- **‘ISP SWITCH’**
  - ‘NORMAL’
- **‘Battery ON/OFF SWITCH’**
  - ‘BAT OFF’ (located in the center of the board)
- **‘POWER SWITCH’**
  - ‘EXT’

This switch will be the power On/Off switch for the Coordinator.

For this demonstration, an antenna should **not** be connected to the evaluation board.
3.2 CONNECTING THE COORDINATOR TO THE PC
(Refer to the photo in Figure 3) The ZIC2410-EVB1 (labeled as the Coordinator) should be connected at the ‘USB1’ port on the board, through the USB cable to a USB 2.0 port on the PC. When a USB cable is connected to the ZIC2410-EVB1, the ‘USB0’ and ‘USB1’ LEDs will light, even though the board will NOT be turned on. Changing the setting on the ‘POWER SWITCH’ (SW1) to ‘USB’ mode, will light the ‘POWER’ LED as well, indicating that the board is powered up.

3.2.1 Registering the two USB driver devices on the Coordinator board
When the Coordinator evaluation board is powered up and connected to the PC for the first time, the PC will respond that it has detected two pieces of new hardware, a Cygnal USB Composite Device, and a CP2101 USB to UART Bridge Controller. Follow the instructions in the ‘Found New Hardware Wizard’ that will appear on the user’s screen for registering both hardware devices. A detailed procedure for this process can be found in Section 4.1 of the CEL document “ZIC2410 Getting Started Software Installation Manual” (CEL Doc #0005-05-08-11-001) [filename: zic11_getstrt_sm.pdf].

Hint: On the first two screens of the ‘Found New Hardware Wizard’, choose ‘Install from a list or specific location (Advanced)’ and choose ‘Don’t search. I will choose the driver to install’ for faster installation.

Once the Cygnal USB Composite Device has been successfully installed, the computer will prompt the user to install the CP2101 USB to UART Bridge Controller on the same Coordinator board.

For the Controller installation, the procedure is the same as it was for the Composite Device. The hardware drivers for the Coordinator evaluation board have now been successfully installed.

3.2.2 Identifying the COM port for the Coordinator
When new hardware is connected to a PC through a USB port, the PC assigns to that connection a COM port number which may vary from PC to PC.

It is necessary to determine the COM port number on the PC, to which the Coordinator evaluation board has been assigned. Windows Device Manager on the PC can be used to do so, and to check that the hardware and associated drivers have been properly installed.

The Windows Device Manager can be accessed by right clicking the mouse on the ‘My Computer’ icon (in the ‘Start’ Menu). Click on ‘Properties’ at the bottom of the pop-up menu. Click on the ‘Hardware’ Tab and find and click on ‘Device Manager’. Double-click on ‘Ports (COM & LPT)’.

The port ‘CP2101 USB to UART Bridge Controller (COM #)’ should be on the list as shown in Figure 5. If it is not on the list, then the drivers for the Coordinator have not been successfully installed, or the Coordinator board is not powered on. Insure that the ‘POWER SWITCH’ is in the ‘USB’ position and if necessary, reinstall the drivers.

It is important to take note here of the COM port number (#) that has been assigned to the Coordinator. It will be necessary later in this procedure for establishing a connection with the Profile-Simulator software. As an example, (highlighted on Figure 5), the Coordinator is connected to ‘COM4’.
3.3 CONNECTING THE WIRELESS NETWORK ANALYZER (WNA)
Attach the white antenna to the Wireless Network Analyzer. The ZIC2410-WNA that is being attached to the PC should be connected at its USB Type B port, through the USB cable to any USB port on the PC. Power for the WNA board is supplied through the USB cable, so the red LED should light on the side of the WNA. The WNA is powered up anytime that it is connected by the USB cable.

3.3.1 Registering the USB driver devices for the WNA
When the WNA is connected to the PC for the first time, the PC will respond (like it did for the Coordinator board) that it has detected two pieces of new hardware, a Cygnaal USB Composite Device, and a CP2101 USB to UART Bridge Controller. Follow the procedure that is given in Section 3.2.1 for registering both hardware devices from the WNA to the user’s PC.

3.3.2 Identifying the COM port for the WNA
It is necessary now to determine the COM port number on the PC, to which the Wireless Network Analyzer has been assigned. Windows Device Manager on the PC can be used to do so, and to check that the hardware and associated drivers have been properly installed.
The Windows Device Manager can be accessed by right clicking the mouse on the ‘My Computer’ icon (either on the desktop or in the ‘Start’ Menu). Click on ‘Properties’ at the bottom of the pop-up menu. Click on the ‘Hardware’ Tab and find and click on ‘Device Manager’. Double-click on ‘Ports (COM & LPT)’.
There should be two lines for ports ‘CP2101 USB to UART Bridge Controller (COM#)’ as shown in Figure 6. One is for the Coordinator, and the other is for the WNA. If the COM port for the Coordinator was noted previously, the WNA will be the other one. If it was not noted, it can be determined by unplugging the WNA USB cable while monitoring the port list in ‘Device Manager’. With the WNA disconnected, the COM port for the WNA will disappear from the list, leaving only the Coordinator COM port. Reattaching the USB cable for the WNA should restore the WNA COM port to the list

It is important to take note here of the COM port number (#) that has been assigned to the
WNA. It will be necessary later in this procedure for establishing a connection with the Packet-Analyzer software. For example, back in Figure 5 (page 9), the Coordinator was connected to ‘COM4’, so therefore in Figure 6 the WNA must be connected to ‘COM5’.

Figure 6 – Screen, Device Manager (2 USB devices)
4 CREATING A STAR NETWORK

4.1 CONFIGURING THE COORDINATOR USING PROFILE-SIMULATOR

4.1.1 Connecting the Profile-Simulator program to the Coordinator

Start Profile-Simulator by double-clicking the icon on the desktop. As shown in Figure 7, the ‘Device Manager’ Tool will be displayed.

Select ‘ZigBee 2006’ ZigBee Protocol version using on toolbar. The ZIC2410 currently supports ZigBee2006.

Click the connection icon ( ) to display the Communication window in Figure 8. Select ‘RS232 (Serial)’ to connect the ZIC2410-EVB1 to the PC.
Figure 8 – Screen, Profile-Simulator (Communications Window)

- **Port:** Select the COM port to which the Coordinator board is connected (as identified in Section 3.2.2 above using Windows ‘Device Manager’)
- **Rate:** 115,200 bps
- **Data:** 8-bit
- **Parity:** None
- **Stop:** 1-bit

For an RS232 connection, input the five parameters above, and click ‘Connect’.

If successful, Figure 9 will be displayed. If the COM port setting is incorrect or there is an unexpected error, the error message in Figure 9 will be displayed. If the COM port is correct, check the ‘ISP Switch’ (SW3) setting and/or press the ‘Reset’ button on the evaluation board. The ‘ISP Switch’ (SW3) must be set to ‘NORMAL’ mode, for the board to connect to the program. If any of the switches need to be changed, press the ‘Reset’ button after the changes are made and attempt to connect again.

Figure 9 – Screen, Profile-Simulator (Connected)

In either event, click ‘OK’ to continue.

Figure 10 – Screen, Profile-Simulator (Error Msg)
4.1.2 Formatting the PAN with the Coordinator board

Formatting a Coordinator Evaluation Board is in essence formatting a new ZigBee Personal Area Network (PAN) and this task is accomplished by the ‘ZigBee Device Wizard’ tool in the Profile-Simulator program. It will be necessary to reformat the network every time that the Coordinator board is turned on, reset, or reconnected to the Profile-Simulator program. The procedure for formatting a network is as follows:

1) To form a new ZigBee network, click ‘Tools’ → ‘ZigBee Device Wizard’ on the Menu bar or click the icon.

2) When the screen in Figure 11 is displayed; click ‘Next’.

3) When Figure 12 is displayed, check the five defined network information fields, and click ‘Next’. Descriptions of the five fields are given below: (changing from the default may change the output screens and is therefore not recommended for this demo)

- **IEEE Address**: IEEE Address of the connected device. (default is 00 22 A3 00 00 00 00 01)
- **Max Children**: Max number of routers and end devices that can be connected to a coordinator or router (default is 8)
- **Max Depth**: Max number of levels from coordinator to last end device (default is 4)
- **Max Router**: Max number of routers that can be connected at any level. (default is 5)
4) As shown in Figure 13, ZigBee Device Type window is displayed. Check ‘ZigBee Coordinator’ and click ‘Next’.

![Figure 13 – Screen, ZigBee Device Wizard (Device Type Selection – Coordinator)](image1)

Figure 13 – Screen, ZigBee Device Wizard (Device Type Selection – Coordinator)

5) Choose the channel written on the labels of the evaluation boards, the assigned channel for this kit, for the ‘Scan Channels’ value, leave all other settings as is and click ‘Next’.

(In Figure 14 above and in all screens that follow, ‘Channel 25’ was used. However, the user should insert or see the channel that has been assigned to this kit when and where appropriate. )

![Figure 14 – Screen, ZigBee Device Wizard (Setting Values for Coordinator)](image2)

Figure 14 – Screen, ZigBee Device Wizard (Setting Values for Coordinator)
6) In 5) above, clicking ‘Next’ starts the process of formatting the network. When the Coordinator has successfully formatted the network, Figure 15 will be displayed. If not, try again by pressing ‘Retry’ or ‘Back’ and starting again from step 5) above.

![Figure 15 – Screen, ZigBee Device Wizard (Coordinator Network Formation)](image1)

Click ‘Next’ to finish ZigBee Device Wizard, and then click ‘Close’. The ZIC2410-EVB1, labeled Coordinator, is now operating as a ZigBee PAN Coordinator ( ).

Figure 16 – Screen, ZigBee Device Wizard (Finish)

Figure 17 shows the heading of the Profile-Simulator program when this process has been completed successfully. Note that the ‘Channel’ should match what is labeled on the evaluation boards and that the ‘Device Type’ is ‘Coordinator’. Also note the ‘PANID’ for later use in this procedure. This number will change every time the ZigBee Device Wizard tool is run.

![Figure 17 – Screen, Profile-Simulator (Coordinator Configured)](image2)

### 4.2 JOINING THE ROUTER/END DEVICE IN A STAR NETWORK

The two ZICM2410-EVB2 evaluation boards have been configured as a Router and as an End Device and are marked accordingly.

End Devices ( ) and Routers ( ) automatically join to an operating network, when powered up within the Personal Operating Space (POS) of an operating coordinator, provided that they are assigned to the same channel as the coordinator. In this demonstration kit, the End Device and Router boards have been assigned to the channel written on their labels (which should be the same as listed in Figure 17 above). The Router and End Device boards are powered by two...
1.5V batteries on the board. For both boards, ensure that the batteries are in place, and the ‘ISP SWITCH’ is set to ‘NORMAL’.

First, for the Router board, slide the POWER Switch to position 2 ‘VBAT’. Within a few seconds, the Router will appear on the Profile-Simulator screens.

Next, turn on the End Device and after a few seconds, the screen will appear as it does in Figure 18. Note in the highlighted area on the left of the screen that the Router and End Device are both connected directly to the Coordinator, creating a simple ZigBee Star Network.

Please note that the devices are listed based on the order in which they were joined to the network; therefore, the End Device is on the bottom of the list and is considered the “Last Device Joined”. Also note the short addresses for the Router and End Devices, found in the highlighted area on the left, and the PANID of the network, found on the third line of the toolbar in the middle. (In the example in Figure 18 they are ‘0x0001’, ‘0x04DE’, and ‘0xE541’).

5 DEMO 1 – DEMONSTRATING THE STAR NETWORK

5.1 LIGHT ON/OFF APPLICATION

Locate button switch ‘INT0’ (SW10) on the right side of the Router board. Pressing that switch causes LEDs to light on both the Router and the End Device boards (two on the Router and four on the End Device), demonstrating that the boards are connected wirelessly. Pressing the switch again will turn all the LEDs off. By contrast, pressing the SW10 switch on the End Device board will only turn on the LEDs on its own board since in this network configuration, it is the “Last Device Joined”.

5.2 SENSOR APPLICATION

In Figure 18, the data in the highlighted columns on the right (marked ‘Receive(LSB->MSB)’ and ‘RSSI’) changes every few seconds, demonstrating that the sensor function of the End Device board is operating correctly, sending data back to the Coordinator on a periodic basis.
6 MONITORING THE STAR NETWORK WIRELESSLY

6.1 USING THE PACKET-ANALYZER

Start the Packet-Analyzer program by double-clicking the icon on the desktop and click ‘Setup-Connection’ icon ( ). The ‘Communication Window’ in Figure 19 will be displayed. Select RS232 (Serial) based on the method with which the ZIC2410-WNA is connected (USB).

![Figure 19 – Screen, Packet-Analyzer (Select Com Mode)](image)

- **Port**: Select the port for the USB cable connecting the PC and the ZIC2410-WNA. (as identified in Section 3.3.2 above using ‘Device Manager’)
- **Rate**: Baud Rate. Set to 460800.
- **Data**: Data Bit. Set to 8-bit.
- **Parity**: Error check bit. Set to ‘None’.
- **Stop**: Set to 1-bit.

For the RS232 connection, input the necessary parameters, and click ‘Connect’.

If the connection is successful, Figure 20 will be displayed. If not, Figure 21 will be displayed. In either event, click ‘OK’ to proceed. In the case of an error, check the cable connections, and check to be sure that the correct COM port has been input. (See Section 3.3.2)

![Figure 20 – Screen, Packet-Analyzer (Confirm)](image)

![Figure 21 – Screen, Packet-Analyzer (Error)](image)

When the WNA is properly connected, maximize the Packet-Analyzer window, and click on the menu items ‘Window’ → ‘Tile Default Layout’. The screen in Figure 22 will be displayed.
Note that the connection icons have changed (the Connect icon is no longer active, while the Disconnect icon has become active).

1. Select the Channel that is labeled on each of the evaluation boards in the kit.
2. Input the PANID number (noted from the Profile-Simulator) at the top of the ‘Network Tree’ view window (highlighted)
3. Maximize the ‘Network Tree’ view (see Figure 23) and set ‘Max Children’ to ‘8’, ‘Max Depth’ to ‘4’, and ‘Max Router’ to ‘5’. Minimize the ‘Network Tree’ view.
4. Change the ‘Total packet size’ to ‘20’, the AutoScroll to ‘AutoScroll ON’ and change the Repeat rate (the last field on the right of the second toolbar line) to ‘Clear and Repeat’.
5. Click the ‘Run’ icon ( ) to start Packet Capture.
6. To stop Packet Capture, click ‘Stop’ icon ( ).

Since there is traffic on the chosen channel, the ‘Packet View’ and ‘Packet List’ will start to populate with data within a few seconds of clicking the ‘Run’ icon, as shown in Figure 24 below. Also the ‘Network Tree’ will show a two Node network, the End Device (Short Address 0x04DE) and the Coordinator (0x0000)
6.2 DATA PACKET CAPTURES

Note that for the packet data being captured in Figure 24, the Source (‘SRC’) is from ‘04DE’, the address for the End Device, and the Destination (‘DST’) is ‘0000’, the Coordinator. This is the routine sensor data being sent by the End Device; with new packets approximately every three seconds. (In the Packet View screen, note the Time field and the difference between two consecutive sensor packets, Index 1 and 3 of Figure 24)

In the ‘Network Tree’ view, the pink arrow shows the sensor data transmitting from the End Device (0x04DE) to the Coordinator (0x0000).

This view does not show the Router because there are no routine packets being sent to or from the Router. Repeating the Light ON/OFF demonstration from Section 5.1 (pressing SW4 on the Router board) will cause the Router to transmit a command through the Coordinator to the End Device resulting in a view similar to Figure 25 below. In the ‘Network Tree’ view in Figure 25, the pink arrows show the command being transmitted from the Router through the Coordinator, to the End Device, and the End Device sending a response back to the Router through the Coordinator. (Note that the pink arrows are all double-pointed.)

Figure 25 – Screen, Packet-Analyzer (Switch Command)

In both the ‘Packet View’, and the ‘Packet List’, the Index numbers ‘21’ through ‘28’ shows the entire sequence of packet messages for the light switch command:

Table 2 – Packets of a Light Switch Command

<table>
<thead>
<tr>
<th>‘Index’</th>
<th>From (‘Mac Src’)</th>
<th>To (‘Mac Dst’)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>‘0001’ Router</td>
<td>‘0000’ Coordinator</td>
<td>light switch command initiated; SW packet reception acknowledged</td>
</tr>
<tr>
<td>22</td>
<td>‘0000’ Coordinator</td>
<td>‘04DE’ End Device</td>
<td>packet reception acknowledged</td>
</tr>
<tr>
<td>23</td>
<td>‘004DE’ End Device</td>
<td>‘0000’ Coordinator</td>
<td>light switch command relayed to destination packet reception acknowledged</td>
</tr>
<tr>
<td>24</td>
<td>‘0000’ Coordinator</td>
<td>‘0001’ Router</td>
<td>light switch execution confirmation initiated packet reception acknowledged</td>
</tr>
<tr>
<td>25</td>
<td>‘0000’ Coordinator</td>
<td>‘0001’ Router</td>
<td>light switch execution confirmation relayed to source packet reception acknowledged</td>
</tr>
</tbody>
</table>
7 DEMO 2 – RECONFIGURING AS A TREE NETWORK

7.1 EXTENDING THE NETWORK RANGE THROUGH A ROUTER
In order to re-configure the network, the End Device will be moved out of the range (POS) of the coordinator, and then reset within the POS of the Router.

Bring up the ‘Device Manager’ screen of the Profile-Simulator showing the network with the sensor data from the End Device to the Coordinator changing as highlighted in Figure 26 on the right side of the screen. Move the End Device physically away from the Coordinator until the sensor data no longer updates (about 30-50 feet away). Move the Router about half the distance closer to the End Device. Push the Reset button on the End Device (simulating the periodic Power-Down Reset of a battery powered network End Device), and watch it re-join the network through the Router, creating a simple ZigBee Tree network, as highlighted in Figure 26 on the left side of the screen.

Also note (on the right side) that the sensor data is now periodically updating again.

Please notice that the address of the End Device has changed to ‘0x00F7’

(The coordinator, the EVB1 board) should not have an antenna connected to it in order to limit its range for this demo to a reasonable distance. With an antenna, the range of these devices can be more than 1,000 feet per link.)

![Figure 26 – Screen, Profile-Simulator (End Device and Router in a Tree Network)](image)

Once the End Device has joined successfully to the Router, it is no longer necessary for it to be located any distance away from the other boards. The network will remain in this configuration until the End Device board is reset.
7.2 MONITORING THE TREE NETWORK

Open Packet-Analyzer and click ‘Run’ ( ). After 8 to 10 packets, click ‘Stop’ ( ). The screen in Figure 27 will be displayed, showing by pink arrows in the ‘Network Tree’ view, the sensor data being transmitted from the End Device (0x00F7) to the Router (0x0001) then to the Coordinator (0x0000). In the ‘Packet View’ and ‘Packet List’ screens of Figure 27, Index numbers ‘5’ through ‘8’ represent that same process.

Repeating the Light ON/OFF demo in this configuration will show the packets going back and forth between the Router (0001) and the End Device (00F7) without the Coordinator (0000) being involved.

This concludes the demonstration of the ZICM2410Px-KIT1 Evaluation Kit.

8 REVISION HISTORY

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>13Jan09</td>
<td>Released</td>
</tr>
</tbody>
</table>
APPENDIX 1: RF CERTIFICATION

- FCC certification is pending
- IC certification is pending
- CE certification is pending