FlexiPanel

Pixie Evaluation Kit™

Evaluation kit for Pixie and Pixie Lite modules

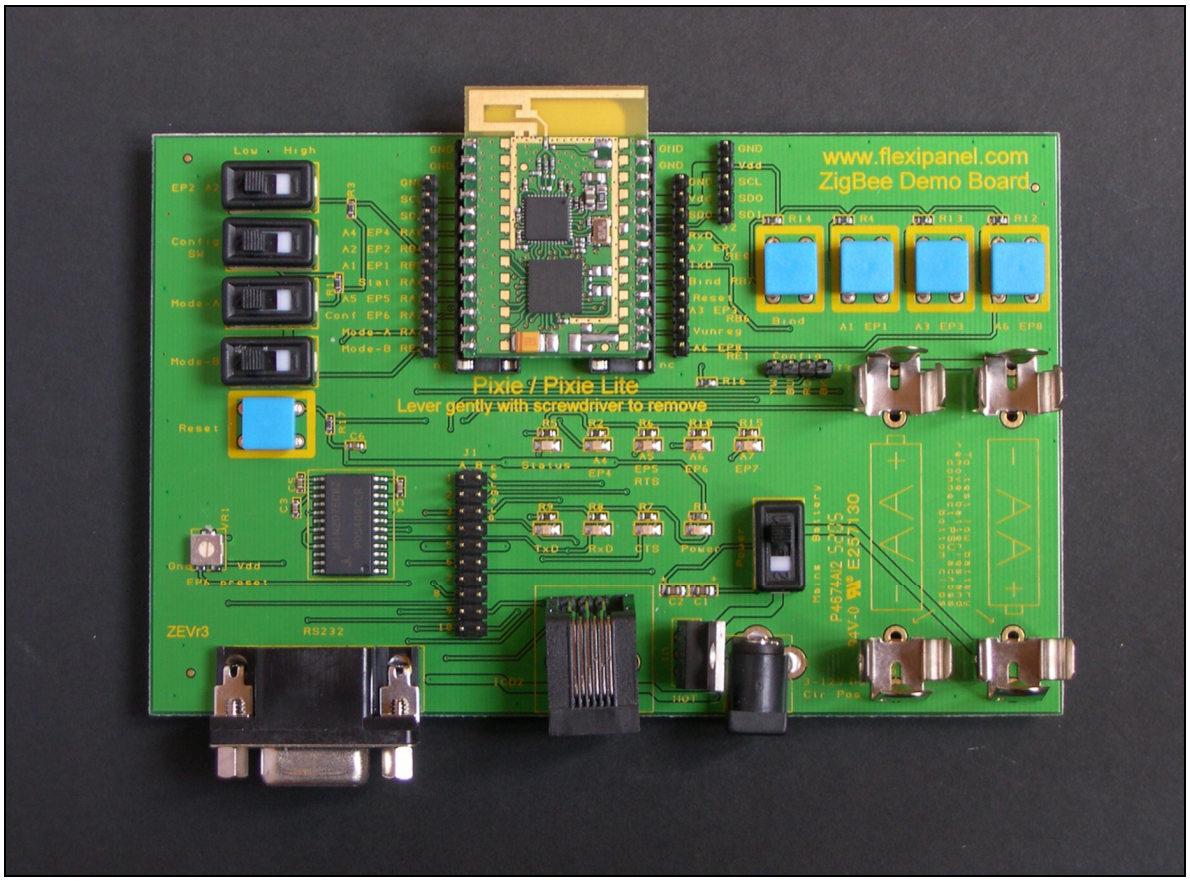
Summary

The Pixie Evaluation Kit is designed for research and development with FlexiPanel Ltd's Pixie ZigBee modules. It is designed to be compatible with FlexiPanel's forthcoming schedule of firmware solutions, including:

- Switcher HC-L profile (preloaded)
- Sniffer packet eavesdropping
- DataStream serial profile
- Trace asset tracking
- DARC data acquisition & remote control

Board Features

- *4 switch inputs*
- *4 pushbutton inputs*
- *8 LED outputs*
- *1 trimmer input*
- *RS232 serial port and TTL to RS232 converter*
- *ICD2 programming socket*
- *Configuration tool socket*
- *Power regulator and battery clips.*
- *Solder pads for custom development*



Ordering Information

Manufactured to ISO9001:2000

FM76316

Part No	***Description***
PIXIE-EVAL	ZigBee Evaluation Kit: 2 boards, including 1 Pixie and 1 Pixie Lite

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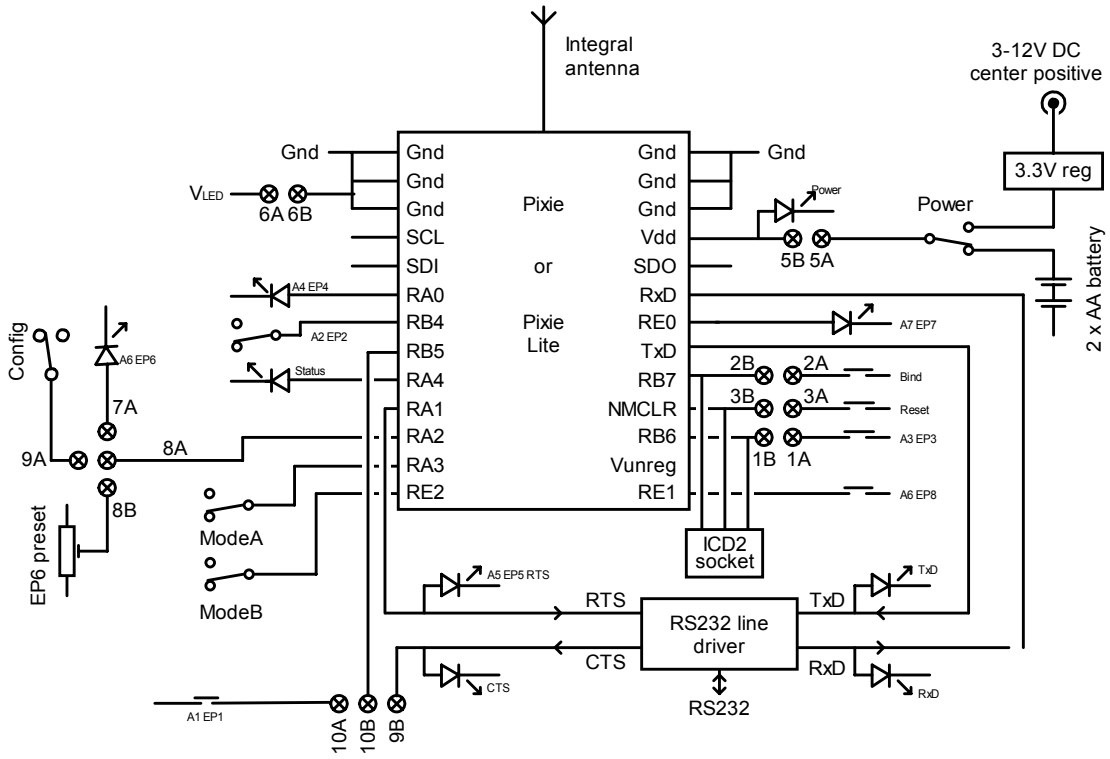
Schematic diagram



Firmware

The Pixie Evaluation boards are supplied in sets of two, one with a Pixie module mounted onboard, the other with a Pixie Lite module mounted on-board.

The modules are preloaded with Pixie Switcher firmware. This is simple switching firmware using the ZigBee HC-L profile for turning things on and off. A short tutorial is given on the next page. For detailed instructions, please read the Pixie Switcher data sheet. Contact us regarding the availability of other firmware.

Power

Power may be provided from a 3-12 VDC supply using the 2.5mm center positive connector. Alternatively, two AA batteries can be connected. The cylindrical wall of the battery must be insulating to be compatible with the metal battery clips supplied.

Jumper switches

Connect 1A-1B, 2A-2B, 3A-3B during normal use. Remove them to program via the ICD2 connector.

4A-4B is not connected.

Connect 5A-5B during normal use. Connect an ammeter across these pins for current consumption measurement.

Connect 6A-6B during normal use. Remove to disconnect power from LEDs and trimmer for current measurements.

Connect 8A-7A for an LED on the RA2 pin, or 8A-8B for a trimmer, or 8A-9A for push switch.

Connect 10B-9B for RB5 to connect to CTS flow control input, or 10B-10A for push switch.

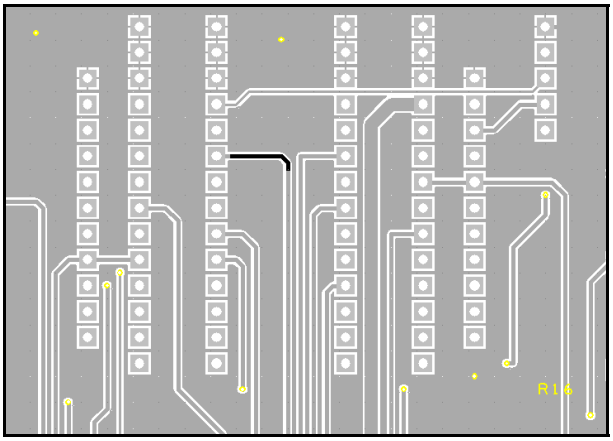
Programming with ICD2

To program the Pixies using the ICD2 programmer / debugger form Microchip Technology, connect the ICD2 programmer using the RJ11 socket marked ICD2. Jumper switches 1A-1B, 2A-2B, 3A-3B should be removed while program the Pixies.

Revision ZEVr3 notes

(1) Config tool port will be TxD only unless the RxD input from the RS232 line driver and the LED is disconnected. To do this (irreversibly), use a sharp knife to cut the track on the board underside highlighted in black in the diagram below. Take care not to cut any other tracks, not to short the track to the ground plane, and not to damage the Pixie by

leaning the board on it. Alternatively, remove the RS232 line driver entirely – see note (2).



(2) RS232 driver is not powered down by removing jumper 6A-6B. For accurate power consumption measurement this component must be removed. (The Config tool can still be used for serial communications.)

Quick Start Guide – Switcher

The firmware loaded on the evaluation boards is Pixie Switcher. This is simple switching firmware using the ZigBee HC-L profile for turning things on and off. Contact us regarding the availability of other firmware.

This documentation assumes the Switcher firmware you have loaded is version 1.0-3.5-2.0. You can find out which firmware you have loaded in step 6 of tutorial 1.

The Pixie Evaluation Board (larger PIC chip) is loaded with ZigBee HC-L *coordinator* firmware. The Pixie Lite evaluation board (smaller PIC chip) is loaded with ZigBee HC-L *sleepy end device* firmware. You might want to label them:

Pixie Board = Coordinator

Pixie Lite Board = Sleepy End Device

In the first tutorial you will set up endpoints for switching between the coordinator and the sleepy end device. You will need a PC and at least one RS232 serial port, preferably two.

In the second tutorial you will set up failsafe alarm which allows battery powered devices to confirm that they are working correctly.

In the third tutorial you will add an additional router and end device. In the fourth tutorial, you will reprogram the router for use as a sniffer so you can watch messages being sent. To perform the third and fourth tutorials you will need:

- A Pixie Switcher Firmware License. This is free on application from FlexiPanel Ltd and enables us to send you the switcher firmware hex files.
- A second Pixie Evaluation Kit
- An ICD2 programmer to program the Pixies. This is available from Microchip Technology.
- MPLAB PIC development environment software for controlling the ICD2. This is a free download from Microchip Technology.
- Pixie Sniffer Development Kit. This is a free download from FlexiPanel Ltd.

Tutorial 1 – ZigBee Switching Concepts

In this tutorial you will cover basic ZigBee concepts such as joining and binding while setting up a ZigBee switching system.

Configuring the boards

The purpose of configuring the board is to tell the firmware what hardware is connected to it. This would usually be done at the OEM's factory with the use of a serial port or configuration tool.

1. Connect the serial port to the D9 socket on the Coordinator.

2. Set up a HyperTerminal session on the PC with the serial port set at 19200 baud, 8N1, no flow control.

3. Connect the jumpers on the Coordinator as follows: 1A-1B, 2A-2B, 3A-3B, 5A-5B, 6A-6B, 8A-8B, 10A-10B

4. Power up the Coordinator. Various LEDs may turn on and initialization messages may appear in the HyperTerminal window.

5. If at step 4 you received the message

   ```
   MAC ->
   ```

   you must type in a MAC address. (If you don't, go to step 6.) For evaluation purposes, type in any 10-hex-digit value in the range 3841000000 to 384100FFFF. ***Note: the MAC address of each device MUST be different!*** You will only have to do this once after programming using the ICD2.

6. Verify that you get a startup message containing the version number 1.0-3.5-2.0, e.g.:

DIFC PXSC=1.0-3.5-2.0 (Coordinator)

DIFC PLFE=1.0-3.5-2.0 (Sleepy End Device)

This confirms you are running the correct firmware for this tutorial. If you don't see 1.0-3.5-2.0, contact us to obtain the correct firmware.

7. Enter the letter ***F*** into HyperTerminal to perform a factory reset. This ensures that the firmware is in the configuration this tutorial expects it to be in. You will need to press ***Y*** to confirm.

   Note that when you power up any Switcher unit except the Coordinator, it will look for a network. If it can't find one, it will enter a sleep state. So if you get no response when you type something, the device may be sleeping. Press the bind button once to wake it up again.

8. When the device has reset, enter ***M*** to turn on diagnostic messages. These are very useful if you wish to understand the internal workings of the Switcher devices. The messages are explained in the document *Pixie Switcher Message Reference DS493*.

   Note that messages are not normally available for Pixie Switcher Lite. However, an alternate hex file is included in the development kit with diagnostic messages enabled and failsafe disabled for the Fast End Device. You will use this is in Tutorials 3 and 4.

9. You will now specify the function of the input and output pins. Press type ***E*** into the HyperTerminal window, and when prompted, the following characters:

   TLD00M0T

   (That's three zeroes, not the letter O.) You have specified the following I/O:

Endpoint (EP)	***Function***
1	Toggle switch (T)
2	Latching switch (L)
3	Time delay input (D)
4	Output, initially off (0)
5	Output, initially off (0)
6	Time delay setpoint input (M)
7	Output, initially off (0)
8	Toggle switch (T)

10. On the Sleepy End Device, connect jumpers as follows: 1A-1B, 2A-2B, 3A-3B, 5A-5B, 6A-6B, 7A-8A, 10A-10B. Note this is slightly different from the coordinator board.

11. Power up the Sleepy End Device. If you have two serial ports, connect the second to the board; if not, just swap over the connector from the first as needed.

12. Repeat steps 2 to 8 for the Sleepy End Device.

13. You will now specify the function of the input and output pins. Enter ***E*** and, when prompted, the following characters:

    TLT01TUU

    (That's zero-one.) Remember you may need to wake it by pressing the Bind button first. You have specified the following I/O:

Endpoint (EP)	***Function***
1	Toggle switch (T)
2	Latching switch (L)
3	Toggle switch (T)
4	Output, initially off (0)
5	Output, initially on (1)
6	Toggle switch (T)
7	Unassigned (U)
8	Unassigned (U)

14. Enter ***W*** repeatedly until you get the message:

    DWKI WkUp=04

    You have specified that you want the device to sleep and wake up every 2 seconds to check for messages. If the any of EP1 – EP3 or the Bind switch change state, the device will wake immediately. (If you have only inputs connected to EP1 – EP3, no wakeup would be required at all.)

Note that input and output settings must correspond to the circuit that the Pixie Switcher is connected to. All the steps to this point are product specific and you would normally execute them at the factory during product manufacture.

Joining

The rest of the tutorial does not require the serial connections, but you may wish to leave them connected to read the diagnostic messages out of interest.

The following steps are one-time only and would normally be done on-site at the time the equipment is installed by the customer or technician.

15. Power up and/or reset the Coordinator with the Bind button held down. Once the Status LED lights, you may release the button. This performs an erase reset. The settings programmed in

steps 1-14 will not be changed, but any network membership information will be erased. This ensures that the firmware is in the configuration this tutorial expects it to be in.

16. After initializing, the Status LED will flash the letter ***L*** in Morse code (•–••) while it is looking for a frequency to operate on. When it is ready, it will flash the letter ***Y*** (–•––).

17. Press the Bind button on the Coordinator once to tell it to permit another device to join. The LED will flash the Morse letter ***J*** (•–––) to indicate that it is allowing a device to join. You have one minute within which to join another device.

18. Power up and/or reset the Sleepy End Device. Then it will look for a network to join. The LED will flash the letter ***L*** in Morse code (•–••). When it finds the network, it will flash the Morse letter ***Y*** (–•––). It has successfully joined. If the letter ***N*** (–•) flashes, it failed to find the network and you should repeat this step again.

19. The Sleepy End Device is now a member of the Coordinators network.

20. Press the Bind button on the Sleepy End Device once. The Status LED will flash a number as a series of 0-10 long pulses (tens) followed by series of 0-9 short pulses (units). This is the signal strength, an indication of the quality of the link between the end device and its parent. This signal strength indication is only available for Fast and Sleepy End Devices. (Routers and coordinators use a single press of the bind button instead to permit joining.)

    The signal strength can be used to establish the effect of various obstacles during network installation. The value reported is the signal strength of the last packet of data received from the parent. Signal strength is on a scale of 0 (-110dBm, weakest) to 110 (0dBm, strongest).

Binding and Switching

You will now bind individual endpoints together. This involves multiple presses of the Bind button on both devices. Note that the number of times the button is pressed is always the endpoint number plus one, e.g. to bind EP2, press the button 3 times.

21. Press the bind button on the coordinator twice in reasonably quick succession, then on the end device 6 times. After a few seconds, both devices will flash the letter ***Y*** (–•––) indicating that the bind was successful.

22. You have bound pushbutton EP1 on the coordinator to LED EP5 on the end device. Press the button EP1 on the coordinator and it will toggle the state of the EP5 LED on the end device. Note it can take up to two seconds to respond, because the end device spends much of its time sleeping.

23. Press the bind button on the coordinator 9 times, then on the end device 6 times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (–•––) indicating that the bind was successful.

24. You have also bound pushbutton EP8 on the coordinator to LED EP5 on the end device. Pressing either button EP1 or EP8 on the coordinator will toggle the state of the EP5 LED on the end device. This is how multiple inputs can control one output.

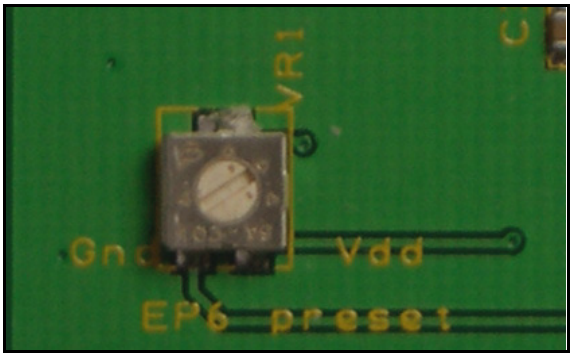
25. Press the bind button on the end device 3 times, then on the coordinator 5 times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (–•––) indicating that the bind was successful.

26. You have bound latching switch EP2 on the end device to LED EP4 on the coordinator. Throwing switch EP2 on the end device will set the state of the EP4 LED on the coordinator. Note the response is immediate, since the end device is woken by interrupt and sends the message immediately. If this doesn't work, check the jumper settings.

27. Press the bind button on the end device 3 times, then on the coordinator 6 times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (–•––) indicating that the bind was successful.

28. You have also bound latching switch EP2 on the end device to LED EP5 on the coordinator. Throwing switch EP2 on the end device will set the state of both EP4 and EP5 LEDs on the coordinator. This is how one input can control multiple outputs. You could, for example, have one pushbutton light switch turn off all the lights in a house.

29. Set the position of trimmer EP6 to the position shown, so the wiper is approximately 0.48V.



30. Press the bind button on the coordinator 4 times, then on the end device 5 times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (– • – –) indicating that the bind was successful.

31. You have bound timer switch EP3 on the coordinator to LED EP5 on the end device. Pressing EP3 on the coordinator will light EP5 on the end device and then extinguish it after about 8 seconds. The time delay can be set from 1 second to 18 hours using the trimmer EP6.

Voltage range	*Time delay*
0.00V – 0.67V	From 1 sec to 10 sec in 1 sec steps
0.67V – 1.33V	Varies linearly from 10 sec to 60 sec
1.33V – 2.00V	Varies linearly from 1 min to 10 min
2.00V – 2.67V	Varies linearly from 10 min to 60 min
2.67V – 3.33V	Varies linearly from 1 hr to 18 hrs

Not all endpoints specified in steps 6 and 10 have been bound. So experiment with binding them. Also try un-binding, which is simply to repeat the binding process on an already bound input / output. Remember, to bind endpoint EP*x,* you will need to press the Bind button *(x+1)* times.

Tutorial 2

This tutorial illustrates the use of the failsafe input and output. A failsafe input regularly sends messages to the failsafe output. If the failsafe output does not receive the messages, it raises an alarm.

Configuring the boards

1. The serial connections, HyperTerminal sessions and jumper switch connections may stay the same as for Tutorial 1.

2. On the coordinator board, enter the letter ***F*** into HyperTerminal to perform a factory reset. This ensures that the firmware is in the configuration this tutorial expects it to be in. You will need to press ***Y*** to confirm.

3. When the device has reset, enter ***M*** to turn on diagnostic messages.

4. Press type ***E*** into the HyperTerminal window, and when prompted, the following characters:

   UUU0BUUU

   (That's a zero, not the letter O.) You have specified the following I/O:

Endpoint (EP)	*Function*
1, 2, 3	Unassigned (U)
4	Output, initially off (0)
5	Failsafe output, initially on (B)
6, 7, 8	Unassigned (U)

5. Enter ***A*** and, when prompted, the following settings:

   Retransmit = 0000
   Quiet = 000A
   Undervolt = 0000

   The Quiet = 000A setting indicates that if a failsafe output does not hear from the input for 10 seconds (000A in hex), it should turn on automatically.

6. Repeat steps 2 and 3 for the Sleepy End Device.

7. Enter ***E*** and, when prompted, the following characters:

   TSUUUUUU

   Remember you may need to wake it by pressing the Bind button first. You have specified the following I/O:

Endpoint (EP)	*Function*
1	Toggle switch (T)
2	Failsafe input (S)
3, 4, 5, 6, 7, 8	Unassigned (U)

8. Enter ***A*** and, when prompted, the following settings:

   Retransmit = 0004
   Quiet = 0000
   Undervolt = 0898

   The Retransmit = 0004 setting indicates that the failsafe input should transmit an "I'm OK" message every 4 seconds. Likewise, the Undervolt = 0898 indicates that if the battery voltage falls below 2300mV (0898 in hex), it should transmit an "I'm not OK" message.

9. Enter ***W*** repeatedly until you get the message:

   DWKI WkUp=04

   You have specified that you want the device to sleep when not busy and wake up every 2 seconds to check for messages

Joining

10. Power up and/or reset the Coordinator with the Bind button held down. Once the Status LED lights, you may release the button.

11. After initializing, the Status LED will flash the letter ***L*** in Morse code (·–··) while it is selecting a frequency to operate on. When it is ready, it will flash the letter ***Y*** (–·––). Note that the EP5 LED is on, indicating that a failsafe alarm condition exists – it will not extinguish until it receives a message from the failsafe input.

12. Press the Bind button on the Coordinator once to tell it to permit another device to join. The LED will flash the Morse letter ***J*** (·–––) to indicate that it is allowing a device to join. You have one minute within which to join another device.

13. Power up and/or reset the Sleepy End Device. It will look for a network to join. The LED will flash the letter ***L*** in Morse code (·–··). When it finds the network, it will flash the Morse letter ***Y*** (–·––). It has successfully joined. If the letter ***N*** (–·) flashes, it failed to find the network and you should repeat this step again.

14. The Sleepy End Device is now a member of the Coordinator's network.

Binding and Switching

You will now bind individual endpoints together. This involves multiple presses of the Bind button on both devices. Note that the number of times the button is pressed is always the endpoint number plus one, e.g. to bind EP2, press the button 3 times.

15. Press the bind button on the end device twice, then on the coordinator 5 times. After a few seconds, both devices will flash the Morse letter ***Y*** (–·––) indicating that the bind was successful.

16. You have bound pushbutton EP1 on the coordinator to LED EP4 on the end device. Press the button EP1 on the coordinator and it will toggle the state of the EP4 LED on the end device. This input / output relationship performs the normal switching function of the devices.

17. Ensure the Sleepy End Device's EP2 button is in the off ('high') position.

18. Press the bind button on the end device 3 times, then on the coordinator 6 times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (–·––) indicating that the bind was successful.

19. You have bound pushbutton EP2 on the end device to LED EP5 on the coordinator. This input / output relationship performs the failsafe alarm function between the two devices. Note how the LED on EP5 extinguished once it started receiving messages from the failsafe input every four seconds. (Normally the delays would be hours, not seconds, to conserve battery life.)

20. There are four ways to trigger the failsafe alarm EP5 on the coordinator:

    - If you turn on the failsafe input switch EP2, an alarm is signaled immediately.
    - If the input device cease to function (e.g. try turning it off) the alarm triggers after the failsafe quiet period.
    - If the power supply to the end device falls below the undervolt level, 2300mV. This is not easy to simulate unless you connect a laboratory power supply to the battery clips. (Make sure the voltage does not fall below 2000mV. This is the brownout reset voltage.)

Tutorial 3

To perform tutorials 3 and 4 you will need:

- A Pixie Switcher Firmware License. This is free on application from FlexiPanel Ltd and enables us to send you the switcher firmware hex files.
- A second Pixie Evaluation Kit
- An ICD2 programmer to program the Pixies. This is available from Microchip Technology.
- MPLAB PIC development environment software for controlling the ICD2. This is a free download from Microchip Technology.
- Pixie Sniffer Development Kit. This is a free download from FlexiPanel Ltd.

Tutorial 3 illustrates how routers may be used to send messages longer distances. The network will have one coordinator, one router and two end devices.

Reprogramming the Pixies

You will need to reprogram some of the Pixies for this tutorial.

1. The Coordinator you have been using does not need reprogramming, but you should type ***F*** to make it perform a factory reset.

2. Both Pixie Lite boards will be programmed as Fast End Devices. They are called "fast" because they do not sleep. Normally, diagnostic messages are not available for Pixie Lite products, but there is an alternate build which provides them in place of failsafe alarms. You are about to load this firmware so you can see the diagnostic messages for the end devices.

3. On your Windows PC, start up MPLAB and connect the ICD2 In-Circuit Debugger.

4. Choose *Programmer* > *Select Programmer* > *MPLAB ICD2* from the MPLAB menu. You should see the message "...Connected". (Don't worry if you get an "Invalid Target ID" message.) If you get the message "Failed to open port", check the USB connection and choose *Programmer* > *Connect* from the menu. You may have to do this several times.

5. Choose *Programmer* > *Settings* > *Power tab*. Ensure the check box "Power target circuit from MPLAB ICD2" is ***not*** checked.

6. Remove the jumper pins A1-B1, A2-B2, A3-B3 from one of the Pixie Lite boards. This is necessary for programming. Connect the RJ11 programming connector from ICD2 to the RJ11 socket marked IDC2 on the board. Power up the board.

7. Select *File* > *Import* in the MPLAB menu. Open the file `PLFV-1.0-3.5-2.0.hex` which is in the Pixie Switcher Development Kit. This is the firmware for the Fast End Device with diagnostic messages.

8. Choose *Programmer* > *Program* to reprogram the Pixie. After a few moments you should get the message "…Programming Succeeded".

   Note that if you buy Pixies in volume from us, they can be preloaded with the firmware of your choice.

9. Turn off the power to the board and replace jumper pins A1-B1, A2-B2, A3-B3. Reprogramming of this board is complete.

10. Repeat for the other Pixie Lite board.

11. The second Pixie Board is to be reprogrammed as a router. Remove the jumper pins A1-B1, A2-B2, A3-B3 from on of the Pixie board connect the RJ11 programming connector and apply power as before.

12. Choose *File* > *Import* in the MPLAB menu. Open the file `PXSR-1.0-3.5-2.0.hex` which is in the Pixie Switcher Development Kit. This is the firmware for the Router.

13. Select Programmer > Program to reprogram the Pixie. After a few moments you should get the message "…Programming Succeeded".

14. Turn off the power to the board, replace jumper pins A1-B1, A2-B2, A3-B3. Reprogramming of this board is complete.

Configuring the boards

All boards will be configured with two of input end points and twoof output endpoints.

15. Power up each board in turn with the serial connector connected. Set a unique MAC address if prompted to do so. Use the ***F*** command to perform a full factory reset on the board and an ***M*** command to switch on diagnostic messages.

16. Use the ***E*** command to set the following endpoints:

    TLU00UUU

    You have specified the following I/O:

Endpoint (EP)	***Function***
1	Toggle switch (T)
2	Latching switch (L)
3	Unassigned (U)
4	Output, initially off (0)
5	Output, initially off (0)
6	Unassigned (U)
7	Unassigned (U)
8	Unassigned (U)

Joining

If, as you are performing the following steps, you need to restart the network, turn off all devices, then turn on the coordinator and wait for it to initialize. Then turn on the router and let it find the network. Finally turn on the children. This is the quickest way to return them to the initial state.

17. Power up and/or reset the Coordinator with the Bind button held down. Once the Status LED lights, you may release the button. When it has completed setting up a network, press the Bind button once so it will allow another device to join.

18. Power up one of the Fast End Devices with the Bind button held down. Once the Status LED

lights, you may release the button. The LED will flash the letter ***L*** in Morse code (•–••). When it finds the network, it will flash the Morse letter ***Y*** (–•––). It has successfully joined. If the letter ***N*** (–•) flashes, reset the board and try again.

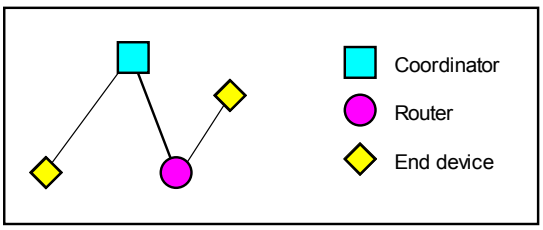
19. Press the Bind button once on the coordinator so it will allow another device to join.

20. Power up the Router. The LED will flash the letter ***L*** in Morse code (•–••). When it finds the network, it will flash the Morse letter ***Y*** (–•––). It has successfully joined. If the letter ***N*** (–•) flashes, reset the board and try again.

21. Press the Bind button once on the Router so it will allow another device to join.

22. Power up the second Fast End Device. The LED will flash the letter ***L*** in Morse code (•–••). When it finds the network, it will flash the Morse letter ***Y*** (–•––). It has successfully joined. If the letter ***N*** (–•) flashes, reset the board and try again

23. You now have a network with the following architecture:



24. Press the bind button on one of the End Devices twice and on the other End Device five times. After a few seconds, both devices will flash the letter ***Y*** in Morse code (–•––) indicating that the bind was successful. (If one registers success and the other doesn't, try resetting both devices and continuing. This is an occasional bug in version 1.0-3.5-2.0.)

25. You have bound pushbutton EP1 on first end device to EP4 on the second end device. Press EP1 on the first end device and the LED EP4 should toggle on the second end device, routing through the coordinator and the router.

26. Each unit has an input on EP1 and EP2, and an output endpoint on EP4 and EP5. Try binding further inputs and outputs. Remember, to bind endpoint EP*x,* you will need to press the Bind button *(x+1)* times.

Tutorial 4

Tutorial 4 illustrates the use of a sniffer. The network will use the same coordinator and two end devices as tutorial 3, but the router will be reprogrammed and used as a sniffer.

Reprogramming the Router

To reprogram the router as a sniffer:

1. On your Windows PC, start up MPLAB and connect the ICD2 In-Circuit Debugger.

2. Remove the jumper pins A1-B1, A2-B2, A3-B3 from the router board. Connect the RJ11 programming connector from ICD2 to the RJ11 socket marked IDC2 on the board. Power up the board.

3. Choose *File* > *Import* in the MPLAB menu. Open the file `15.4_Sniffer 2.0.hex` which is in the Pixie Switcher Development Kit. This is the firmware for the Sniffer.

4. Choose *Programmer* > *Program* to reprogram the Pixie. After a few moments you should get the message "…Programming Succeeded".

5. Turn off the power to the board, replace jumper pins A1-B1, A2-B2, A3-B3. Reprogramming of this board is complete.

Starting the sniffer

6. Turn off the End Devices. Turn on the Coordinator with the Bind button pressed down so that it establishes a new network.

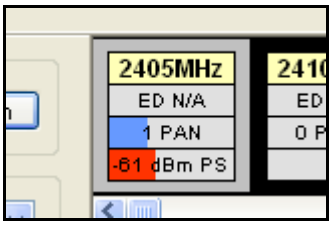
7. Ensure a serial cable is connected to the Sniffer board but that HyperTerminal is not connected to the COM port.

8. Start the Sniffer application. This can be downloaded from www.flexipanel.com.

9. In the Port / Channel Select box, select the COM port connected to the Sniffer. Press the Scan button.

   Verify that the status bar in the sniffer says "Scanning" or "Sniffing". This confirms that it is communicating with the Eval Board.

10. When the scan of all frequencies is complete, the sniffer should detect the coordinator on one of the operating frequencies (see graphic below). The sniffer will then continue to listen on this frequency and display any messages which are transmitted. If it fails to find the network, try again.



11. Press the Bind button on the Coordinator so it allows another device to connect to the network. Then power up one of the end devices with the Bind button held down so it erases and joins the new network.

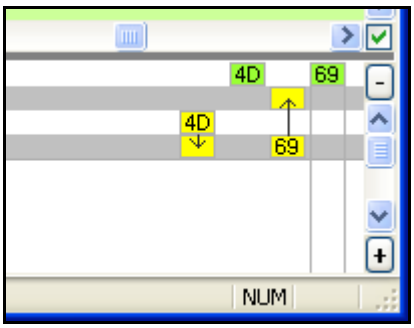
12. Repeat the previous step for the second end device. Exhibit A shows the typical exchange of messages seen when new devices join, which you should see in the sniffer.

13. Reset one of the end devices. It will rejoin the network. Exhibit B shows the typical exchange of messages seen when a device rejoins.

14. Press the Bind button on one end device twice and on the second end device five times. This binds an endpoint on each end device. Exhibit C shows the typical exchange of messages seen when devices bind.

15. Press the EP1 button on the first end device. The EP4 light should toggle on the other end device. Exhibit D shows the typical exchange of messages seen when a switch message is sent.

16. Note, in Exhibit D, the bottom pane where the timeline is shown. It is reproduced below:



The yellow 4D frame is the input sending the message to the coordinator. The coordinator acknowledges (green). Then it forwards the message to the other end device (yellow 69 frame), which then acknowledges (green).

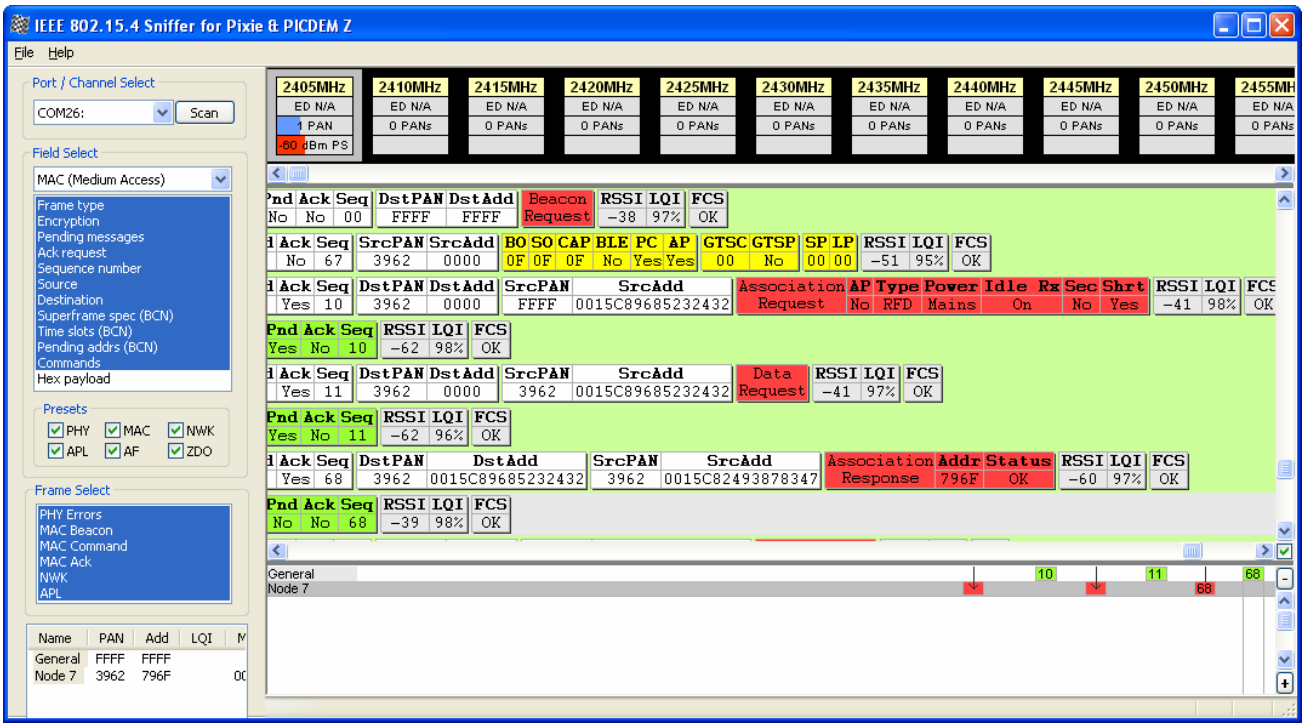


Exhibit A: Typical sniffer log when joining

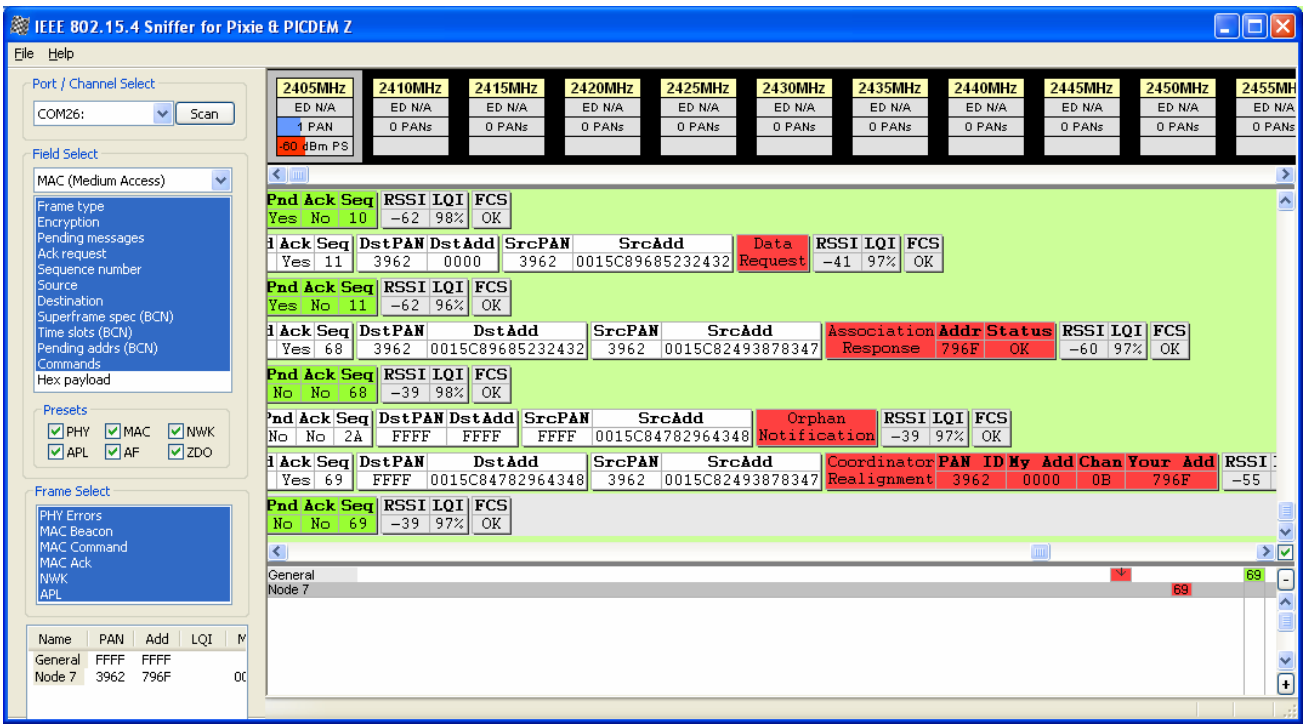


Exhibit B: Typical sniffer log when rejoining (from the “Orphan Notification” line onwards)

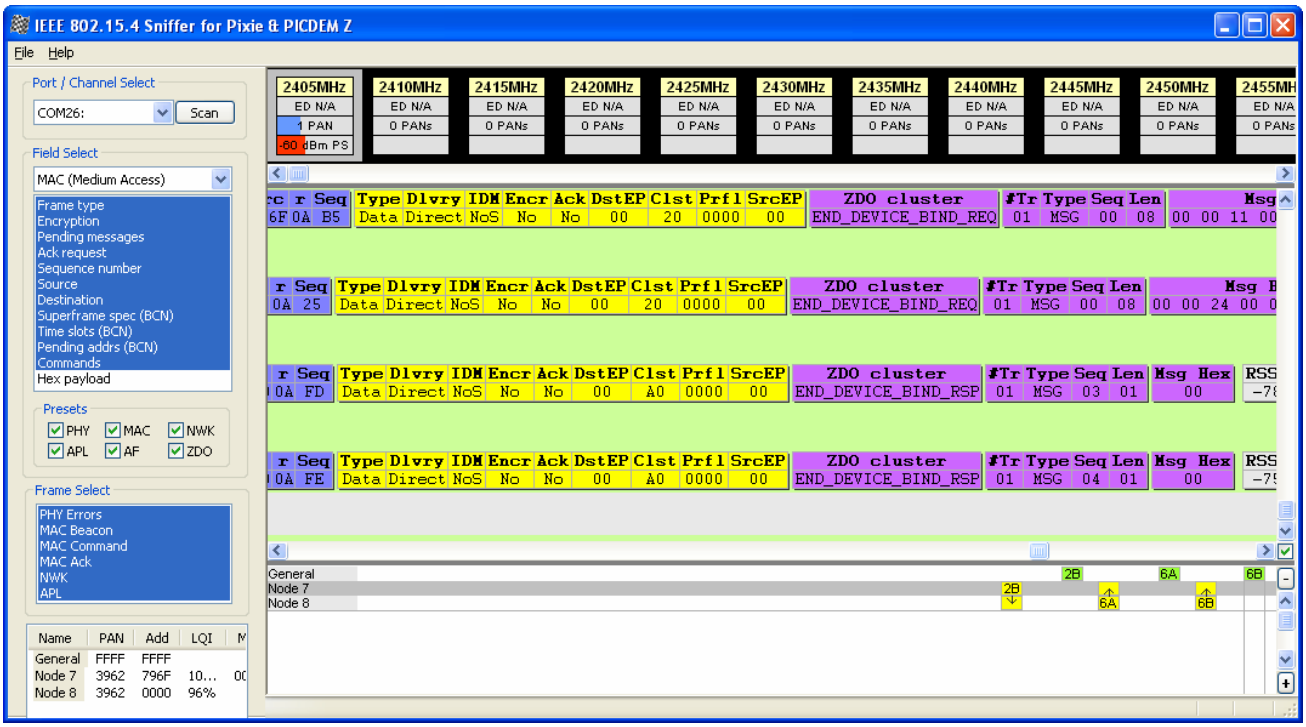


Exhibit C: Typical sniffer log when binding

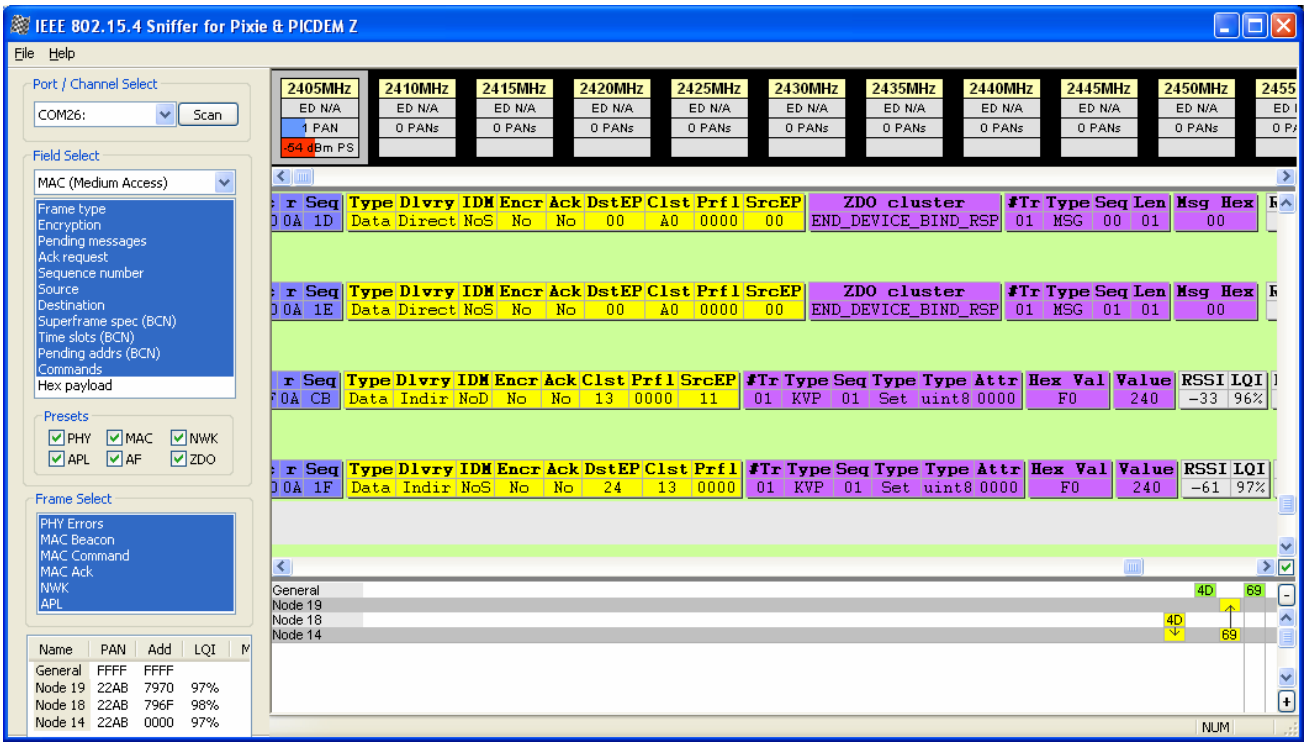


Exhibit D: Typical sniffer log when sending a switch message (from **`Seq CB`** onwards).

Contact Details

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