Wireless SPI link using AmbioMote24 rev.1.0

December 20, 2007

Table of Contents

1 INTRODUCTION

Digital devices using Serial Peripheral Interface (SPI) can be connected over a high-speed wireless link. The useful data rate of the wireless connection is 500kbps, which significantly outperforms a Zigbee or a Bluetooth connection.

Using AmbioMote24 (either type A or B) one can establish a high-speed wireless link on distances up to 80m (~250 feet). The link is established by a pair of properly configured AmbioMote24 nodes (see application note ANN-07-0001-1.0).

The pair consists of a sender and a receiver forming a unidirectional SPI link. Any information passed to over the SPI sender will be sent wirelessly to the receiver and output on the SPI interface of the receiver. The wireless protocol has provisions for recovering from RF interference and packet loss by implementing internal multi-level buffering.

2 USING WIRELESS SPI LINK

2.1 Getting started

To implement a high speed wireless SPI link you will need the following items:

- USB interface board for AmbioMote24 (SKU: USB-00001)
- 5 pin miniUSB cable
- Serial USB drivers for the USB interface board. Available on AmbioSystems Web site.
- Configuration utility software. Available on AmbioSystems Web site
- Two AmbioMote24-A or AmbioMote24-B (SKU: AMB-00001-221A or AMB-00001-221B)
- Two SPI interface boards (SKU: INT-00001)

2.2 Transmitter Setup

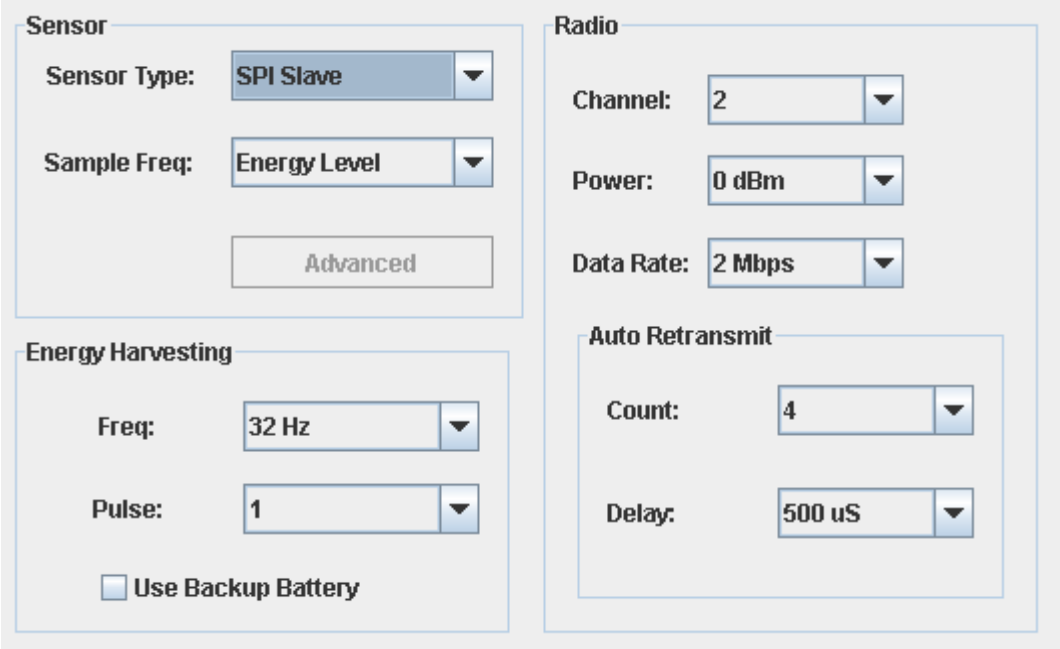

Figure 1. Sender configuration using AmbioMote24 configuration utility.

1. Program the sender node using AmbioMote Configuration Utility. Recommended configuration is shown on Figure 1.
2. Connect Signals and Power
    1. CLK – Input from master
    2. MISO – Output to master
    3. SIMO – Input from master
    4. GND
    5. VDD – 3Volts to 4 Volts
3. Power the sender node by holding the CLK line low and supplying power to the VDD pin. The CLK line should be held low for for a minimum of 200uS after VDD voltage is stable. If this is not followed the device will not perform correctly or firmware corruption may occur.
4. Incoming SPI data will be transmitted in packets of 32 Bytes. We recommend using 500kbps or 1Mbps clock. However, the instantaneous data rate should not exceed 500kbps, otherwise some data packets will be lost.

2.3 Receiver Setup

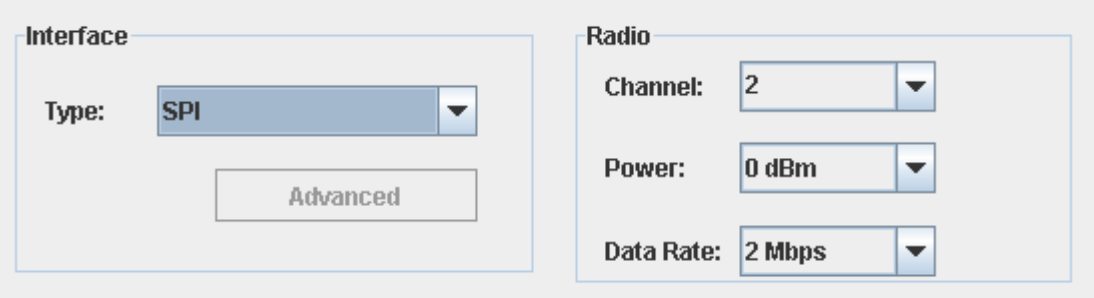

Figure 2. Receiver configuration for SPI communications.

1. Program the receiver node using AmbioMote Configuration Utility. Recommended parameters are shown in Figure 2.
   Important: make sure that the radio channel configuration matches the sender unit.
   Important: should you need to change the channel (for example, to accommodate multiple links) the channel number should be incremented by 2 (2,4,6,etc...)
2. Connect Signals and Power
   1. CLK – Output to slave
   2. MISO – Input from slave
   3. SIMO – Output to slave
   4. GND
   5. VDD – 3.3Volts to 4 Volts
3. Power the receiver. The CLK pin must be held low for 200uS after VDD is stable. We recommend using a 100K pull-down resistor.
4. Data received from the sender unit will be sent out SPI interface in packets of 32 bytes. The SPI clock rate will be set to 1Mbps.

3 TROUBLESHOOTING

3.1 CLK on transmitter/receiver is not held low during start up and device no longer functions

The firmware may have been corrupted and need to be reflashed using the AmbioMote Configuration utility.

3.2 Data rate is low / packet loss

There may be inteference on the channel, reconfigure the transmitter and receiver to use a different RF channel.

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