APPENDIX III

Use of PoE

1. Problem of PoE on Soekris**[1]

The Power-over-Ethernet (PoE) implementation on the net4826 is not fully 802.3af compliant. This has been confirmed via email with Soekris. 802.3af, the PoE specification, provides two ways to deliver power to compliant devices.

Option 1 is placing the voltage on the unused data pairs of the Cat-5 cable. The unused pairs are numbered 3 and 4. Pair 3 is composed of pins 4 and 5, while pair 4 is composed of pins 7 and 8. The second option is delivering the power on the two used data pairs. These are pairs 1 and 2 composed of pins 1+2, and 3+6 respectively. The circuitry for accepting the power varies depending on which pairs the power is delivered on. The 802.3af specification mandates that devices accept both power delivery options, however, as designed, the net4826 only accepts power on the unused pair. Unfortunately the PoE switches we used in our network deliver power on the data pairs, and as such are incompatible with the 4826's.

2. Solution 1 of PoE problem**[2]

Figure 1 is an external PoE splitter, used to isolate the power from the PoE supply, and forward it to a specific output, toward the net4826 board. We use this item, because we did not manage to boot the net4826 directly from PoE. Hence, this adapter enables both power and data transmission to any non-PoE Ethernet device that is deployed up to 100m away. The DWL-P50 is capable of receiving data and power to any 5V or 12V network device. For powering the net4826, we use the 12V setting.

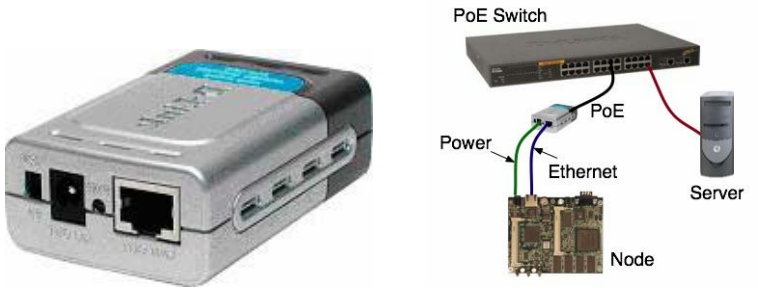

Figure 1: D-Link DWL-P50 PoE adapter and use of PoE adapter

[1] This part is from http://sysnet.ucsd.edu/wireless/poe/

[2] This part is based on http://networks.cs.ucr.edu/testbed/hw.htm

3. Solution 2 of PoE problem**[3]

Fortunately there is a way to modify the 4826's to accept power on the data pairs, but it does require a steady hand with a soldering iron. Note that this process worked for me, however I make no promises and guarantees that it will work for you. I am not an electrical engineer, and in no way certify that this is a safe solution to the PoE problem. In fact, depending on your situation, there may be more appropriate solutions. That said, accepting the power over the data pairs requires an Ethernet isolation transformed with a center tap. The power is extracted using the center taps to avoid degrading the data signal past the point of usefulness. The Ethernet isolation transformer used in the 4826, a MIDCOM 7090-37, includes pins for the center taps. The PoE modification solders wires to those two pins, and loops them underneath the logic board to connect with the power input circuitry. Detailed soldering instructions are presented in the next paragraph.

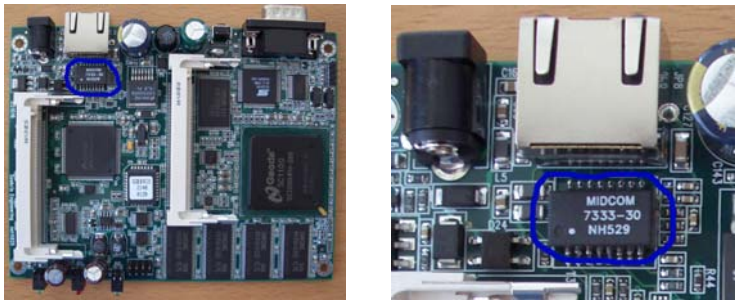

Figure 2: The location of the Ethernet isolation transformer on the Soekris net4826 board. The image on the left shows the whole board, while the image on the right is a close up shot of the transformer. In both images the transformer is circled.

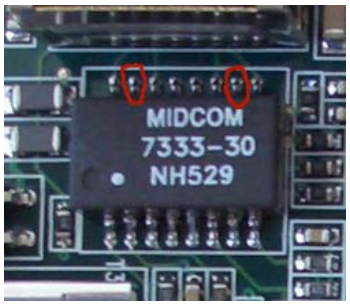

Figure 3: The location of the center tap pins for the Ethernet isolation transformer on the Soekris net4826 board. Each of the two pins is circled.

The first step is to locate the Ethernet isolation transformer IC. It is immediately behind the Ethernet jack as indicated in figure 2. Once located identify the two center tap pins. They are pins 2 and 7 of the IC as depicted in figure 3. It may also be useful to refer to the data sheet for the IC.

[3] This part is from http://sysnet.ucsd.edu/wireless/poe/

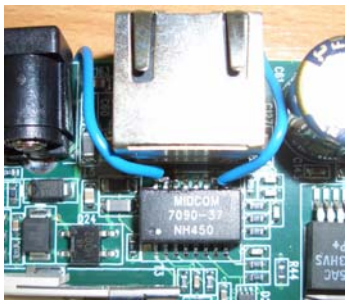

Figure 4: A wire soldered to each of the center tap pins.

Once the pins are located solder one wire to each pin, being careful not to short other pins on the chip. This may require multiple attempts so keep some solder wick handy. Figure 4 shows the IC with wires soldered to the pins. Loop the wires around the side of the Ethernet jack to the underside of the board. Instead of attempting to locate a more appropriate location I simply soldered the other end of the wires to the unused pins in the Ethernet jack. This has to effect of taking the power from the data pairs and placing it on the unused pairs, which is where the board expects the power to be delivered. It also has the effect of transmitting the power back through the unused pairs to whatever device, most likely a switch of some sort, the 4826 is connected to. Depending on the device this may or may not cause damage.

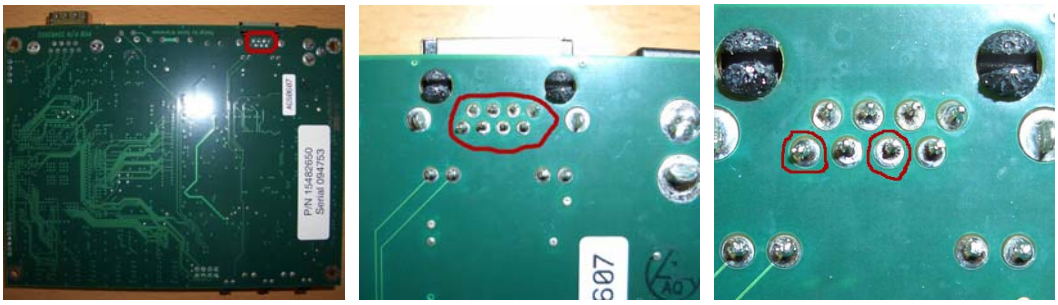

Figure 5: The location of the ethernet jack pins on the bottom of the Soekris net4826 board. The image on the top left shows the whole board, the image on the top right is a close up shot of the ethernet jack pins, and the image on the bottom identifies the particular pins in question. The interesting parts of all images are circled.

Figure 6: The wires soldered to the ethernet jack pins on the bottom of the Soekris net4826 board.

Use figure 5 to locate the soldering locations for the other end of the wires. Note this is on the bottom of the logic board. Figure 6 shows the wires soldered in the correct location. That is it. Reassemble the case then enjoy. In case you are concerned, there is still adequate clearance for the logic board despite the newly added wires and their routing around the edge of the board. And remember, it is not my fault if you harm your 4826, yourself, or other property using information provided on this document.