NovaLab Merlin-2 Radio Board Interface Manual

Rev 2.0 8/3/2010

This document describes how to integrate the NovaLab Merlin-2 radio into a system.

The interface to/from the NL radio board (Merlin-2) consists of three connectors:

- Power
- Signal
- Programming/Aux

Power

The power interface is a four pin, 2mm center-to-center connector. The pinout is as follows:

1,2 Power – Unregulated power that provides the board power through a Micrel 5233 3.3V regulator. Voltage range is 3.5-12VDC at 50mA max.
Also, provides power through a second linear regulator for the PA. Max current draw is approximately 350mA. Max 5% duty cycle max.

3,4 GND

Signal Interface Connector J2

The signal interface connector is a ten pin, 2mm center-to-center connector. The pinout is as follows:

1. Analog input 1, Digital I/O.
2. Analog input 0, Digital I/O.
3. SPI SSn
4. PB1 – Digital I/O.
5. SPI SCK
6. SPI MOSI
7. Attnention – HW Handshake Line (Output)
8. SPI MISO
9. Regulated 3.3V from radio digital supply
10. Radio DIG1 Output

Programming/AUX Connector J4

This is a ten pin connector with 2mm center-to-center spacing. It is arranged in a 5x2 pattern. The pinout is as follows:

1. External Watchdog Reset. Toggled every time SW goes through the main loop for external watchdog reset. Needs to be cycled at least every ½ second.
2. NC
3. PDI Data (Processor JTAG interface)
4. Wakeup – HW Handshake Line (Output)
5. RESET/n – Processor Reset – Should be pulled high on motherboard.
6. NC
7. UART TX
8. UART RX
9. NC
10. NC

SPI Interface

The radio module is often used as a SPI slave to another application processor. In this case, the following connections must be made from the radio to the AP:

Signal Interface Connector

Pin 3 (P1.2 SPI1_SS) – SPI slave select aka Chip Select. Input to radio. CS must be asserted before each packet, and must be negated between packets.

Pin 5 (P1.3 SPI1_SPCK) – SPI clock. Input to radio.

Pin 6 (P1.5 SPI1_MOSI) – SPI Master out, slave in. Input to radio.

Pin 7 (P1.7) – Radio Attention. Output from radio module. Set when the radio has a packet waiting for the host, and will be set after the host asserts CS to indicate the radio is ready for the transfer to begin.

Pin 8 (P1.4 SPI1_MISO) – SPI Master In, slave out. Output from radio.

AUX Connector

Pin 4 (P0.6) – Radio Wakeup. Input to radio. Must be set at least xxms before CS is asserted. Radio will not go to sleep when this is asserted low.

APPENDIX - FCC and IC Statements

This module may only be used in NovaLab end products or products designed by NovaLab for a 3rd party. Changes or modifications not expressly approved by NovaLab could void the user's authority to operate the equipment.

NovaLab Merlin-2 – This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which
- the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

The final end product must be labeled in a visible area with the following:
Contains FCC ID: : **XMPNL72742**

This device has been designed to operate with the antennas listed below, and having a maximum gain of 7 dB. Antennas not included in this list or having a gain greater than 7 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e. i. r. p.) is not more than that permitted for successful communication.

Antennas:

SFTS	Model 9-4-ANT (SignalFire W-Pole Antenna)
Pacific Wireless	MA9-5N
Pacific Wireless	MA9-7N

WARNING!

FCC and IC Radiation Exposure Statement:

This equipment complies with FCC's and IC's RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) & user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Revision List

Date	Rev	Author	Change
7/28/10	1.0	Scott K.	Initial Release
8/3/10	2.0	Scott K.	Updated with antenna information