Integrating Piksi with RFD900+ Long Range Telemetry Modules

Contents

Introduction

This guide presents a step-by-step tutorial for integrating the RFD900+ radios with Piksi.

The RFD900+ modems also operate in point to multi-point mode, where one base station can provide corrections to multiple rovers. These radios are shipped with SiK V1.9 which supports single point communication ONLY. Refer to the Multi-Point Setup section for detailed instructions.

Please note that Swift Navigation has only recently started shipping 915MHz kits with RFD900+ radios.

You can also purchase them directly from RFDesign's web-store here (http://store.rfdesign.com.au/rfd-900p-modem/).

One Time Hardware Setup

- Screw the two radio antennas onto the circular connectors of the RFD900+ radios.
- Use the radio cables provided in the kit to connect the UART ports on the radios to the UART A receiving ports on the Piksi boards. Note that the 16 pin connector on the radio end is reversible. Ensure that the black wire is on the left side when facing up.

    - Alternatively, you can make that cable. This can be done using the 5-pin Picoblade cable provided in the RTK kit.

        - You only need 4 of the 5 wires on the cable, so remove the wire beside the RED power line.

- Using crimp tools or solder tools to connect 0.1" female connectors to the other end of the wires.
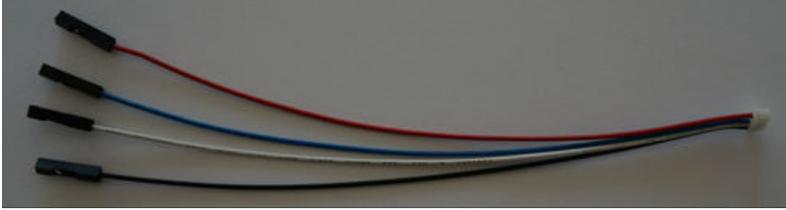
- Connect the UART port GND, V+, TX and RX to pin 1, 4, 7, 9 respectively. Detailed pin layout available in the data-sheet (http://files.rfdesign.c
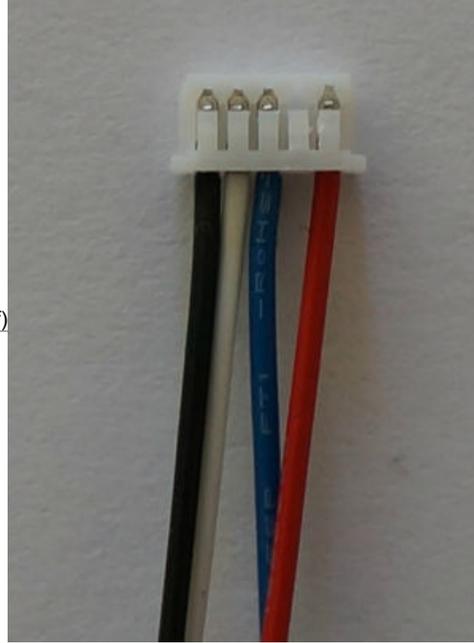
om.au/Files/documents/RFD900%20DataSheet.pdf)

One Time Software Setup

RFD900+ radios can be configured using AT commands. The AT commands can be configured through the console.

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- The default AT commands have been optimized for Piksi.
- If there are other SiK based radios in the same vicinity, make sure that the Net-ID doesn't conflict

  - ATS3 configures the Net-ID. Changing that setting in the Piksi console will implement those changes to the radio on the next boot.

CAUTION : Refer to the RFD900+ data-sheet (http://files.rfdesign.com.au/Files/documents/RFD900%20DataSheet.pdf) before changing any AT commands. Changing the wrong setting can cause the system to fail.

- DO NOT increase the TX Power from the default 20 dBm. If higher power is required, the RFD900+ will need to be powered from a separate 5V source. Higher transmit power and increased range can be achieved if the modem is powered from a source other than Piksi.

Multi-Point Setup

Software

1. Download and install the latest Modem Tools available here (http://files.rfdesign.com.au/tools/)
2. Download the latest SiK Firmware for the modules available here (http://files.rfdesign.com.au/firmware/)

   - For multi-point communication (piksi to multiple piksis) , download the latest multi-point firmware (2.x)
   - The firmware should be located in the same folder as the Modem Tools

3. Flash the modules with the SiK Firmware

   - Instructions available in the RFD900+ data-sheet (http://files.rfdesign.com.au/Files/documents/RFD900%20DataSheet.pdf)

4. Verify that the jumper connects pins 4 and 6 as noted in the data-sheet

One-time Piksi Setup

Configure the radio module settings for multi-point features.

- For the multi-point firmware, the nodes need to be set appropriately.

  - The AT command "ATS15" sets the node. The base-station Piksi needs to be set to node 0. All other piksi modules can be set to node 1-29
  - The AT command "ATS18" sets the node count. This parameter represents the number of radios involved. For example, if sending base data to 2 radios, ATS18 = 3
  - Since we don't want any of the rover PIksi to send observations back to the base,the UART message mask on the rover Piksis must be set to 0.
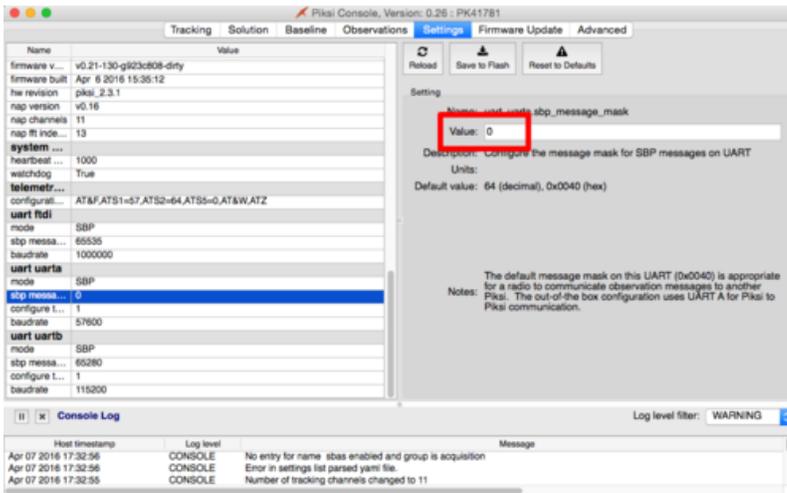
- Examples on how to modify the radio configuration string can be found in Integrating Piksi with the Pixhawk platform guide

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**Example strings for 2 rover setup. ATS15 = 0 is for the base Piksi

TroubleShooting

- When the radios are communicating with each other, they will show a SOLID GREEN light .
- If the radios are not communicating with each other, they will show a FLASHING GREEN light.
- Many AT settings need to be identical for both radios for them to be able to talk to each other.

  - Parameters such as Baud-Rate, Net-ID, ECC and AIR_SPEED must be same on both radios. Refer to this guide (http://ardupilot.org/copter/docs/common-3dr-radio-advanced-configuration-and-technical-information.html) for a full list.

Multi-Point Troubleshooting

If there is a problem connecting 2 modules, there are many ways to find the problem.

1. If you see a blinking green light on ONLY ONE of the modules, it means that some communication settings don't match.

   - A good way to fix this problem is to connect one of the modules to Modem Tools and take a picture of the "Configuration" tab
   - Then connect the other module and make sure that all the settings match with the previous module
   - NOTE : This DOES NOT include "Node ID" . The "Node ID" must be different on the modules.

2. If you see a blinking green light on both modules, there could be 2 causes.

   - Check to make sure that the "Node ID" for one of the modules equals 0 .
   - Make sure that the "Telemetry Configuration String" in Piksi settings doesn't have any access commands.

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