1km Pi Radio Link

- Plug 'n' Play RF Modem Link

- Direct Cable Replacement

- Range upto 1KM

- Host Data Rate to 38K4

- RF Data Rates to 115Kbps

- 8 User Selectable Channels

- 868MHz CE Compliant for European Licence Free Use

- 100mW Transmit Power (+20dBm)

- Receiver Sensitivity –121dBm

Applications
- USB Cable Replacement
- M2M Communications
- Remote Networking

The PI Dongle radio Modem is a simple to use and very versatile. It will communicate directly with our BLIZZARD Radio Modem and ZULU Radio Modules to provide a PC / Raspberry Pi interface to RF Gateway

Operation Modes

One-to-One operation; for point to point cable replacement comms

Broadcast Mode; where a single master, addresses many Modems concurrently. (Using many Modems set to the same address),

One-to-Many; a network consisting a master and many slaves (the receivers all have the same address)

Many-to-One; where the transmitters all send to a single receiver address.

Part No	Description
RADIOPi	Radio Modem 868MHz +20dBm

PI Dongle Radio Modem

Product Overview

This product is Plug and Play, Connect the antenna to the SMA connector and plug into a USB port.

Power

Power is supplied directly from the USB port

Tx / Rx LED

The LED's operates whenever there is RF activity.

Operating Modes

Each Modem has its own preset address. This is user set during configuration. Any data received is examined and the address header embedded within the data packet is compared with its address. Only data received with matching address will be processed and output to the host, all other data will be discarded.

All Modems are shipped with a default address of 7E7E7E.

The Modem contains an on-board data buffer equal to two data packets. Therefore if RTS is asserted (then the host is unable to receive data) the module will store a max of two data packets, all further data packets received will be discarded.

Normal Operation : Modem is 'Online' automatically transmitting and receiving data from its host and across the RF network.

Configuration Mode: In Configuration mode the Modem can receive a number of commands and the internal registers can be preset to control its operation. In this mode the MODEM is 'Offline' and cannot send or receive RF data.

Possible Modes of Operation:

One-to-One operation; for point to point data communication
1.   Plug in the PI Dongle to a PCB or host via USB
2.   Set the Addresses for both modems to the same
3.   The Two Modems will provide wire replacement comms link

One-to-Many; A network consisting a master and many slaves (the Slave Modems each have a unique address and the Master Modem addresses each Slave individually)

Broadcast operation; where a single 'master' MODEM addresses many 'slave' MODEMS concurrently. (using all PI MODEM modules set to the same address), There is no acknowledgement.

PI Dongle Radio Modem

Host Terminal Software

Any Terminal emulation program can interface the Eval board, one we have found to be easy to use and powerful is 'Terminal' This can be downloaded from :

https://sites.google.com/site/terminalbpp/

Ping Pong Mode

This test mode is built into the modem to enable two modems to pin pong signals to each other and report the (RSSI) on the originating modem. To initiate Ping Pong;

1. Connect Modems to Host PC USB Ports
2. Run Terminal Emulation program
3. Determine the USB port Modem is connected to (from Device Manage under Computer Properties)
4. Set the Terminal emulation to 'port' as above, 8, n, 1, CTS/RTS,
5. Enter AT mode by sending '+++'
6. Send the character 'P' from one modem. This Modem will now Ping and report back the reply with RSSI indication

RF Channel Selection 868MHz version

The EU standard sets maximum power transmission limits dependent on frequency, bandwidth and application. Please check the relevant standards are being met when implementing your Application. A rough guidance applicable to the PI channel numbers is given below

Channel Number	Frequency Centre (MHz)	EU Power Allowance mW / dBm	Notes
0	868.400	25 / 14	Applicable standard - EN300-220
1	868.900	25 / 14	
2	869.450	100 / 20	
3	869.600	100 / 20	
4	869.800	25 / 14	

PI Dongle Radio Modem

Configuration Mode (offline)

Commands can be set using a standard Terminal program or by sending the relevant ASCII characters.
Each Command must be followed by the Carriage Return <CR> or 'Enter'
Note All commands are entered in upper case

Command	Description	Response from Zulu
+++	Enter Configuration Mode Note: these must be sent as a string with no char in front or behind this is to ensure that the +++ is not mistakenly received in mid data.	Pi responds with Status
?	retrieve the current register values	Pi responds with all Register Values
F	set factory defaults; R1=7F7F7F R2=7F7F7F R3 = Ch2 (869.450MHz) R4 = 7 (+20dBm) R5 = 1 (19K2)	'OK'
H	Help	Brief description of commands available
P	Ping Mode This sends a ping request . On receiving, the recipient Pi Modem will respond with its address and the level of RSSI (Received Signal Strength) The Ping command is continuously repeated every 1 second until any command or character is entered.	The originating Pi Modem will respond with the Recipient Pi Modems' response, eg. Received from 7F7F7F (D5) Where 7F7F7F = the recipient Address D5= RSSI **RSSI** Is a Hex value corresponding to the received signal strength Min = 20hex Max =E0hex
S	Save Configuration	'SAVED'
Q	exit configuration mode and return to online mode	No response

PI Dongle Radio Modem

Register Setting (Configuration Mode)

The internal registers enable various parameters to be controlled.
To set a register type 'R#=x' where # is the register number and **x** is the value to set
For example, to set the channel to channel 3 type : R3=3<CR>
(Where <CR> is carriage return or enter on the keyboard) The modem will then return 'OK' or 'Error' if an incorrect command is entered. Save the changes by typing S<CR>
The modem will return with 'SAVED'
Default values are shown in **BOLD**

Register	Value Range	Description	Example
R1	0000 - FFFFFF (24 bit address)	Sets the recipient Pi MODEM Address	R1=0001 (Data sent is addressed to Pi MODEM with address 0001)
R2	0000 - FFFFFF (24 bit address)	Set own Pi Modem address	R2=F001 (Data sent is from Pi MODEM with address F001)
R3	CH0 to CH4	Sets the RF Channel See "RF channel Selection"	R3=2 (Transmit on Channel 2)
R4	0 = +1dBm 1 = +2dBm 2 = +5dBm 3 = +8dBm 4 = +11dBm 5 = +14dBm 6 = +17dBm **7 = +20dBm**	Set the RF Transmit Power output*	R4=7 (sets Transmit Power to max)*
R5	0 = 9,600 **1 = 19,200** 2 = 28,800 3 = 56,000	Set the RF baud rate	R5=3 (sets the RF data rate to 56Kbps)

*Note :   Reducing Tx power reduces battery consumption!
           Reducing the baud rate will increase the range!

Technical Specifications

Absolute Maximums:
Temperature Range: Storage –50 to +125°C.
Weight: SMT version 7grams, DIP Part 13grams
Electrical Characteristics:

Parameter	Min	Max	Units
Supply Voltage	-0.3	25	V
Voltage on any Input	-0.3	Vcc+0.	V
Max Input power (thro Antenna)		+10	dBm

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DC Characteristics

Parameter	Min	Typical	Max	Units
Supply Voltage	9		25	V
Operating Temperature	-40		+85	ºC
Pi Tx Supply Current: When Transmitting When sleeping		100 1		mA uA
Pi Rx Supply Current: When Receiving When sleeping		18.5 1		mA uA

AC Characteristics

Parameter	Min	Typical	Max	Units
Operating Frequency - 868: see freq channel setting	868		870	MHz
Operating Temperature	-40		+85	ºC
Band width per channel		100		KHz
Deviation		45		KHz
Pi Tx MAX Output Power			+20	dBm
Pi Tx—Rx FSK Raw RF Data Rate			256	Kbps
Pi Rx Sensitivity		-116		dBm

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