



RFPixelControl Packet Specifications

v 0.3

Revised 8/22/2013

Revision Information	Revision #	Author	Date
Initial Draft	.1	Greg Scull	7.3.2013
Removed OTA configuration elements for Protocol configuration. Reordered bytes in the data packets to lead with command and offset bytes.	.2	Greg Scull	7.4.2013
Reordered bytes to reflect current implementation for the 2013 season	.3	Greg Scull	8.22.2013

Purpose

The purpose of this document is to describe the packet format for the RFPixelControl compliant receivers and transmitting devices.

Scope

Initially this document will focus only on the specifics of the RFPixelControl Packet Structure and general communication details.

Packet Structure

Definitions

- a. **RFPacket**: A 32 byte packet used by the RFTransceivers
- b. **Octet**: An eight bit byte within a rf packet.
- c. **Receiver Node**: A node within the RFPixelControl network which is a

receive only device. The Receiver nodes are limited to read/receive only due to the limitations in distance with the cheaper nRF24L01+ transceivers. Because the recommended most cost effective setup will utilize one or more Transmitters that may be equipped with amplifiers and antennas, a receiver node with a on pcb antenna may not have sufficient transmit power to send acknowledgements to the transmitter nodes. Therefore the RFPixelControl protocol will assume that all information transmitted to the Receiver Nodes is received, when possible (during configuration mode) Data may be transmitted more than once to ensure that data is received.

- d. **Transmitter Node:** A node within the RFPixelControl network which is dedicated to transmitting data to receivers.
- e. **Configuration Node:** A specialized transmitter node whose dedicated function will be to send OTA configuration data to receiver nodes. The Configuration Node will transmit on RFChannel 125 at 250kbps data rate. The Configuration node is not intended to be a permanent fixture in a display.

Configuration Process and Settings

When a receiver starts it will tune its transceiver to listen for data on the configuration RFChannel. If it does not receive data it will default to EEPROM settings. If no EEPROM settings exist it will fall back on hard-coded values in the firmware.

If a configuration node is present the data is captured and stored in EEPROM.

Configuration Packet Structure

**Field Size is listed in increments of 8 bit Octets (bytes)*

Receiver Packet Structure

One receiver packet sent per receiver, this packet is sent first.

Octet	Field Size	Field Name	Field Description	Field Contents
0	1	Configuration Packet	Type Identifier to determine if the	CONTROLLERINFOINIT=1, LOGICALCONTROLLER_LED=2,

		Type	packet is a Receiver Control Packet or a Logical Controller Packet	LOGICALCONTROLLER_SERIAL=3 LOGICALCONTROLLER_CUSTOM=9
1-4	4	Unique Controller ID	It is intended to store the Receiver ID which should be unique for all receivers in this RFPixelControl setup. This is the only property which will need to be specified at Firmware Load time.	This ID is currently specified as a 32 Bit Unsigned Integer.
5-6	2	RF Listen Channel	This is the RF Channel which the receiver will listen for its packet data once configuration is complete	In 250kbps mode and 1Mbps mode this will be values 1-124 (125 is the configuration channel) In 2Mbps mode we only have Even number channels in this range.
7-10	4	RF Listen Rate	This is the RF Speed setting of the transceiver. Values obtained by the rf24_datarate_e	RF24_1MBPS = 0 RF24_2MBPS =1 RF24_250KBPS =2

			enum In the RF24 Library.	
11	1	Number of Logical Controllers	This is the count of Logical Controllers.	Integer value

Logical Controller Packet Structure

For each receiver there will be a Logical Controller Packet sent for each Logical Controller on a receiver.

Octet	Field Size	Field Name	Field Description	Field Contents
0	1	Configuration Packet Type	Type Identifier to determine if the packet is a Receiver Control Packet or a Logical Controller Packet	CONTROLLERINFOINIT=1, LOGICALCONTROLLER_LED=2, LOGICALCONTROLLER_SERIAL=3 LOGICALCONTROLLER_CUSTOM=9
1-4	4	Unique Controller ID	It is intended to store the Receiver ID which should be unique for all receivers in this RFPixelControl setup. This is the only property which will need to be specified at Firmware Load time.	This ID is currently specified as a 32 Bit Unsigned Integer.
5	1	Logical Controller	Unique to each Logical	Integer sequence number

		Number	Controller on a given receiver. These will be sent in ascending order from the transmitter starting at 0	
6-9	4	Logical Controller Start Channel	The data channel to start storing data for	Integer 1-512 (not zero indexed)
10-13	4	Logical Controller Number of Channels	The total number of data channels associated with this logical controller	Integer 1-512 (not zero indexed)
Serial Based Logical Controllers			The Serial Controllers will include both receiving and transmitting controllers, DMX and Renard	
14	1	Output Format	Renard or DMX	RENARD=1 DMX=2
15-18		Baud Rate	This is baud rate to use for the serial output	For example: 57600, 115200, 250000, 1000000
19-21	3	RESERVED	Reserved for future use	TBD
22-31	10	Custom	To be used for	

		Controller Expansion	configuration needs of custom controllers	
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Receive Mode Packet Structure

After configuration nodes will listen on the RF Channel they were configured for. The packets they will be listening for are in the following format.

Octet	Field Size	Field Name	Field Description	Field Contents
1-30*	30	Channel Data	Each byte in represents one channel of data	0-255
31	1	Offset Multiplier	This Offset multiplier will be multiplied by 30. It is a 0 indexed number. It is used to calculate the actual Channel number in the data stream	0-17 Zero indexed so that $0*30=0$ indicating this will indicate the first byte in this packet contains the first channel of data $1*30=1$ would be the first channel in the packet represents channel 30 in the data stream.
32	1	Command	This command will be used by certain controllers.	* This field is not used. ¹ Proposed Command bytes ConfigMode - 0x??

¹ The addition of a control code to force a receiver into a listening state will include some changes to all of the transmitters. I am not sure there will be time for this in the first release.

				Diagnostic mode - 0x?? could use the LEDs to print a diagnostic sequence using morse code or something :)
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