

WI.FREESTAR MODULE HOST INTERFACE PROTOCOL



905 Messenger Lane
Moore, OK 73160
405-794-7730

© 2004 Radiotronics Inc, all rights reserved

TABLE OF CONTENTS

1.0	SCOPE	3
2.0	REVISION CONTROL	3
3.0	APPLICABLE DOCUMENTS	3
4.0	PROTOCOL OVERVIEW.....	4
5.0	MESSAGES OVERVIEW.....	5
6.0	MESSAGE DEFINITIONS.....	8

1.0 SCOPE

This document describes in detail the host protocol required to communicate with the Wi.Freestar/Zigbee Ready Transceiver.

2.0 REVISION CONTROL

DATE	CHANGES	REVISION
-	ORIGINAL RELEASE	0.1
4/10/06	ADDED PROGRAMMABLE SETTINGS MESSAGES	0.5

3.0 APPLICABLE DOCUMENTS

4.0 PROTOCOL OVERVIEW

Host Interface Type
TTL Serial (TX, RX, RTS, and CTS)

Notes
1) For message type 0x15 (Send n RF Data Bytes To Short Destination Transceiver ID), the maximum number of data bytes that can be sent is 96 bytes.
2) For message type 0x16 (Send n RF Data Bytes To Long Destination Transceiver ID), the maximum number of data bytes that can be sent is 96 bytes.
3) For message type 0xA9 (Received n RF Data Bytes From Source Transceiver ID Sent To Destination Transceiver ID), the maximum number of data bytes that can be received is 96 bytes.

Host RS-232 Serial Interface Communications Protocol Parameters	
Parameter	Parameter Description
Baud Rate	19.2k
Start Bits	1
Data Bits	8
Stop Bits	1
Parity	None

Data Packet Structure

	Header			Payload	Trailer	
	Start Byte 0x01	Length	Type	Data	Checksum	End Byte 0x04
Size (bytes)	1	1	1	n	1	1

Field Name	Field Description
Start Byte	The first byte in any data packet is a 0x01 (SOH).
Length	The total length of the entire packet in bytes.
Type	The packet type byte designates the type of packet.
Data	n bytes of data which pertains to the type of the packet.
Checksum	Eight bit Checksum of bytes from the Start Byte through the Data. The checksum is the result of adding the bytes of interest.
End Byte	The last byte in any packet is a 0x04 (EOM).

5.0 MESSAGES OVERVIEW

Communication Packets Sent From Host To Transceiver

Message Type	Message Length	Message Description
0x01	7	Set PAN ID.
0x02	5	Query PAN ID.
0x03	15	Set transceiver address.
0x04	5	Query transceiver address.
0x05	6	Set RF channel.
0x06	5	Query RF channel.
0x07	6	Enable/Disable receive all RF messages.
0x08	5	Query receive all RF messages status.
0x09	6	Enable/Disable RF acknowledgements and retries.
0x0A	5	Query RF acknowledgements and retries status.
0x0B	7	Set radio features and options.
0x0C	5	Query radio features and options.
0x0D	5	Query statistics.
0x0E	5	Clear statistics.
0x0F	6	Set transmit power level.
0x10	5	Query transmit power level.
0x11	5	Save configuration values to non-volatile memory.
0x12	5	Query firmware version.
0x13	6	Set low power mode.
0x14	(10+n) or (16+n)	Send n RF data bytes to destination transceiver ID.
0x15	-	Not available.
0x16	-	Not available.
0x17	-	Not available.
0x18	5	Reset request.
0x19	5 + n	Send message to application.
0x1A	-	Not available.
0x1B	15	Initiate firmware download.
0x1C	79	Transfer firmware block.
0x1D	13	Terminate firmware download.
0x1E	8	Set digital pin configuration.
0x1F	5	Query digital pin configuration.
0x20	6	Set digital pin state.
0x21	5	Query digital pin state.
0x22	5	Query analog pin values.
0x23	7	Set analog pin sleep state.
0x24	5	Query analog pin sleep state.
0x25	8	Set digital pin sleep state.
0x26	5	Query digital pin sleep state.
0x27	6	Set debug mode.
0x28	6	Set LED functionality.
0x29	-	Not available.
0x2A	21	Set programmable settings.
0x2B	5	Query programmable settings.

Communication Packets Sent From Transceiver To Host

Message Type	Message Length	Message Description
0x81	5	Set PAN ID acknowledged.
0x82	7	Respond with PAN ID.
0x83	5	Set transceiver address acknowledged.
0x84	15	Respond with transceiver address.
0x85	5	Set RF channel acknowledged.
0x86	6	Respond with RF channel.
0x87	5	Enable/Disable receive all RF messages acknowledged.
0x88	6	Respond with receive all RF messages status.
0x89	5	Enable/Disable RF acknowledgements and retries acknowledged.
0x8A	6	Respond with RF acknowledgements and retries status.
0x8B	5	Set radio features and options acknowledged.
0x8C	7	Respond with radio features and options.
0x8D	21	Respond with statistics.
0x8E	5	Clear statistics acknowledged.
0x8F	5	Set transmit power level acknowledged.
0x90	6	Respond with transmit power level.
0x91	5	Save configuration values to non-volatile memory acknowledged.
0x92	11 + n	Respond with firmware version.
0x93	5	Set low power mode acknowledged.
0x94	8	Send n RF data bytes to destination transceiver ID ack/nack.
0x95	(13+n) to (25+n)	Received n RF data bytes from transceiver ID.
0x96	-	Not available.
0x97	-	Not available.
0x98	5	Reset request acknowledged.
0x99	5	Sent message to application acknowledged.
0x9A	5 + n	Received message from application.
0x9B	14	Initiate firmware download acknowledged.
0x9C	16	Transfer firmware block acknowledged.
0x9D	13	Terminate download acknowledged.
0x9E	5	Set digital pin configuration acknowledged.
0x9F	8	Respond with digital pin configuration.
0xA0	5	Set digital pin state acknowledged.
0xA1	6	Respond with digital pin state.
0xA2	9	Respond with analog pin values.
0xA3	5	Set analog pin sleep state acknowledged.
0xA4	7	Respond with analog pin sleep state.
0xA5	5	Set digital pin sleep state acknowledged.
0xA6	8	Respond with digital pin sleep state.
0xA7	5	Set debug mode acknowledged.
0xA8	5	Set LED functionality acknowledged.
0xA9	(13+n) to (25+n)	Received n RF data bytes from source transceiver ID sent to destination transceiver ID.
0xAA	7	Set programmable settings ack/nack.

0xAB	21	Respond with programmable settings.
------	----	-------------------------------------

6.0 MESSAGE DEFINITIONS

0x01 – Set PAN ID (Host -> RF Transceiver)

	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0x01)	PAN ID	Checksum	End Byte (0x04)
Size (bytes)	1	1	1	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0x01 – Set PAN ID.
PAN ID	Two byte PAN ID (LSB to MSB) of the network this transceiver should operate on. Note that only the 14 least significant bits are valid.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x81 – Set PAN ID Acknowledged (RF Transceiver -> Host)

	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x81)	Checksum (0x87)	End Byte (0x04)
Size (bytes)	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x81 – Set PAN ID Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x02 - Query PAN ID (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x02)	Checksum (0x08)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x02 - Query PAN ID.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x82 - Respond With PAN ID (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0x82)	PAN ID	Checksum	End Byte (0x04)
	1	1	1	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0x82 - Respond With PAN ID.
PAN ID	Two byte PAN ID (LSB to MSB) of the network this transceiver is operating on. Note that only the 14 least significant bits are valid.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x03 - Set Transceiver Address (Host -> RF Transceiver)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x0F)	Type (0x03)	Transceiver Long Address	Transceiver Short Address	Checksum	End Byte (0x04)
	1	1	1	8	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0F.
Type	0x03 - Set Transceiver Address.
Transceiver Long Address	Eight byte transceiver long address (LSB to MSB).
Transceiver Short Address	Two byte transceiver short address (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x83 - Set Transceiver Address Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x83)	Checksum (0x89)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x83 - Set Transceiver Address Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x04 - Query Transceiver Address (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x04)	Checksum (0x0A)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x04 - Query Transceiver Address.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x84 - Respond With Transceiver Address (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x0F)	Type (0x84)	Transceiver Long Address	Transceiver Short Address	Checksum	End Byte (0x04)
	1	1	1	8	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0F.
Type	0x8F – Respond With Transceiver Address.
Transceiver Long Address	Eight byte transceiver long address (LSB to MSB).
Transceiver Short Address	Two byte transceiver short address (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x05 - Set RF Channel (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x05)	RF Channel (11-26)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x05 - Set RF Channel.
RF Channel	The RF channel that the transceiver will operate on (11-26).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x85 - Set RF Channel Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x85)	Checksum (0x8B)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x85 - Set RF Channel Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x06 - Query RF Channel (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x06)	Checksum (0x0C)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x06 - Query RF Channel.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x86 - Respond With RF Channel (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x86)	RF Channel (11-26)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x86 - Respond With RF Channel.
RF Channel	The RF channel that the transceiver will operate on (11-26).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x07 - Enable/Disable Receive All RF Messages (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x07)	Enable/Disable (0x00-0x01)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x07 - Enable/Disable Receive All RF Messages.
Enable/Disable	Enable (0x01) or disable (0x00) receive all RF messages.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x87 - Enable Enable/Disable Receive All RF Messages Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x87)	Checksum (0x8D)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x87 - Enable/Disable Receive All RF Messages Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x08 – Query Receive All RF Messages Status (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x08)	Checksum (0x0E)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x08 - Query Receive All RF Messages Status.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x88 - Respond With Receive All RF Messages Status (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x88)	Enable/Disable (0x00-0x01)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x88 - Respond With Receive All RF Messages Status.
Enable/Disable	RF acknowledgements are enabled (0x01) or disabled (0x00).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x09 - Enable/Disable RF Acknowledgements And Retries (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x09)	Enable/Disable (0x00-0x01)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x09 - Enable/Disable RF Acknowledgements And Retries.
Enable/Disable	Whether or not RF acknowledgements and retries are enabled or disabled (0x01 = enabled, 0x00 = disabled).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x89 - Enable/Disable RF Acknowledgements And Retries Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x89)	Checksum (0x8F)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x89 - Enable/Disable RF Acknowledgements And Retries Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x0A – Query RF Acknowledgements And Retries Status (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x0A)	Checksum (0x10)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x0A - Query RF Acknowledgements And Retries Status.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x8A - Respond With RF Acknowledgements And Retries Status (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x8A)	Enable/Disable (0x00-0x01)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x8A - Respond With RF Acknowledgements And Retries Status.
Enable/Disable	Whether or not RF acknowledgements and retries are enabled or disabled (0x01 = enabled, 0x00 = disabled).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x0B – Set Radio Features And Options (Host -> RF Transceiver)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0x0B)	Features 1	Features 2	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0x0B – Set Radio Features And Options.
Features 1	TBD
Features 2	TBD
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x8B – Set Radio Features And Options Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x8B)	Checksum (0x91)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x8B – Set Radio Features And Options Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x0C - Query Radio Features And Options (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x0C)	Checksum (0x12)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x0C - Query Radio Features And Options.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x8C - Respond With Radio Features And Options (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0x8C)	Features 1	Features 2	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0x8C - Respond With Radio Features And Options.
Features 1	TBD
Features 2	TBD
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x0D - Query Statistics (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x0D)	Checksum (0x13)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x0D - Query Statistics.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x8D - Respond With Statistics (RF Transceiver -> Host)

Size (bytes)	Header			Payload				Trailer	
	Start Byte (0x01)	Length (0x15)	Type (0x8D)	Packets Sent	Acks Sent	Packets Received	Acks Received	Checksum	End Byte (0x04)
	1	1	1	4	4	4	4	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x15.
Type	0x8D - Respond With Statistics.
Packets Sent	Four byte value for RF packets sent (LSB to MSB).
Acks Sent	Four byte value for RF acknowledgements sent (LSB to MSB).
Packets Received	Four byte value for RF packets received (LSB to MSB).
Acks Received	Four byte value for RF acknowledgements received (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x0E - Clear Statistics (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x0E)	Checksum (0x14)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x0E - Clear Statistics.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x8E - Clear Statistics Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x8E)	Checksum (0x94)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x8E - Clear Statistics Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x0F - Set Transmit Power Level (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x0F)	RF Power Level	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06
Type	0x0F - Set RF Power Level.
RF Power Level	RF transmitter power level.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x8F - Set Transmit Power Level Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x8F)	Checksum (0x95)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x8F - Set Transmit Power Level Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x10 - Query Transmit Power Level (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x10)	Checksum (0x16)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x10 - Query Transmit Power Level.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x90 - Respond With Transmit Power Level (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x90)	RF Power Level	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x90 - Respond With Transmit Power Level.
RF Power Level	RF transmitter power level.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x11 – Save Configuration Values To Non-Volatile Memory (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x11)	Checksum (0x17)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x11 – Save Configuration Values To Non-Volatile Memory.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x91 – Save Configuration Values To Non-Volatile Memory Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x91)	Checksum (0x97)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x91 – Save Configuration Values To Non-Volatile Memory Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x12 - Query Firmware Version (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x12)	Checksum (0x18)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x12 - Query Firmware Version.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x92 - Respond With Firmware Version (RF Transceiver -> Host)

Size (bytes)	Header			Payload							Trailer	
	Start Byte (0x01)	Length (11-43)	Type (0x92)	Ver Major	Ver Minor	Ver Month	Ver Day	Ver Year	Version String Length	Version String	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1	1	1	0-32	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	11-43.
Type	0x92 - Respond With Firmware Version.
Version Major	Version major number.
Version Minor	Version minor number.
Version Month	Version month (1 - 12).
Version Day	Version day (1 - 31).
Version Year	Version year (0 - 99).
Version String Length	Length of version string (0 - 32 bytes).
Version String	Version string (0 - 32 bytes in length).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x13 - Set Low Power Mode (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x13)	Low Power Mode (0x00-0x02)	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x13 - Set Low Power Mode.
Low Power Mode	The value representing which low power mode the transceiver should enter (0x00 – sleep, 0x01 – idle, 0x02 - wakeup)
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x93 - Set Low Power Mode Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x93)	Checksum (0x99)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x93 - Set Low Power Mode Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x14 - Send n RF Data Bytes To Destination Transceiver ID (Host -> RF Transceiver)

Size (bytes)	Header			Payload				Trailer		
	Start Byte (0x01)	Length	Type (0x14)	Packet ID	Target/Sender	Addr Mode	Dest Txcvr Address	n Data Bytes	Checksum	End Byte (0x04)
1	1	1	1	1	1	1	2 or 8	n	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	Ten or sixteen plus the number of data bytes ((10 or 16) +n).
Type	0x14 - Send n RF Data Bytes To Destination Transceiver ID.
Packet ID	Packet ID.
Target/Sender	Upper nibble is the target of the message and lower nibble is the source (0 = app, 1 = host).
Address Mode	Upper nibble describes the destination transceiver address and lower nibble is not used and should be set to 0 (0 = short 2 byte address, 1 = long 8 bytes address).
Destination Transceiver Address	Two or eight byte destination transceiver address (LSB to MSB). The number of bytes (2 - short or 8 - long) is determined by the upper nibble of the Address Mode field.
n Data Bytes	Data to be sent over the RF link (n bytes).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x94 - Sent n RF Data Bytes To Destination Transceiver ID Ack/Nack (RF Transceiver -> Host)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x08)	Type (0x94)	Packet ID	Ack/Nack (0x00-0x01)	Number Of Retries	Checksum	End Byte (0x04)
1	1	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x08.
Type	0x94 - Sent n RF Data Bytes To Destination Transceiver ID Ack/Nack.
Packet ID	Packet ID.
Ack/Nack	Nack = 0x00, Ack = 0x01.
Number Of Retries	Number of retries it took to get the packet through the RF.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x95 - Received n RF Data Bytes From Transceiver ID (RF Transceiver -> Host)

Size (bytes)	Header			Payload							Trailer	
	Start Byte (0x01)	Length	Type (0x95)	Packet ID	Target/Sender	LQI	Addr Mode	Dest Txcvr Address	Source Txcvr Address	n Data Bytes	Csum	End Byte (0x04)
	1	1	1	1	1	1	1	2 or 8	2 or 8	n	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	Between thirteen and twenty-five plus the number of data bytes ((13 to 25) +n).
Type	0x95 - Received n RF Data Bytes From Transceiver ID.
Packet ID	Packet ID.
Target/Sender	Upper nibble is the target of the message and lower nibble is the source (0 = app, 1 = host).
LQI	Link Quality Indicator which gives feedback to the strength of the received packet.
Address Mode	Upper nibble describes the destination transceiver address and lower nibble describes the source transceiver address (0 = short 2 byte address, 1 = long 8 bytes address).
Destination Transceiver Address	Two or eight byte destination transceiver address (LSB to MSB). The number of bytes (2 - short or 8 - long) is determined by the upper nibble of the Address Mode field.
Source TransceiverAddress	Two or eight byte source transceiver long address (LSB to MSB). The number of bytes (2 - short or 8 - long) is determined by the upper nibble of the Address Mode field.
n Data Bytes	Data bytes received over the RF link (n bytes).
Csum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x18 – Reset Request (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x18)	Checksum (0x1E)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x18 – Reset Request.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x98 – Reset Request Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x98)	Checksum (0x9E)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x98 – Reset Request Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x19 - Send Message To Application (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (5+n)	Type (0x19)	n Data Bytes	Checksum	End Byte (0x04)
	1	1	1	n	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	Five plus the number of data bytes (5+n).
Type	0x19 - Send Message To Application.
n Data Bytes	Data to be sent to the application (n bytes).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x99 – Send Message To Application Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x99)	Checksum (0x9F)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x99 – Send Message To Application Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x9A – Received Message From Application (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (5+n)	Type (0x9A)	n Data Bytes	Checksum	End Byte (0x04)
	1	1	1	n	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	Five plus the number of data bytes (5+n).
Type	0x9A – Receive Message From Application.
n Data Bytes	Data to be sent to the application (n bytes).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x1B – Initiate Firmware Download (Host -> RF Transceiver)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x0F)	Type (0x1B)	Transceiver ID	Block Count	Checksum	End Byte (0x04)
	1	1	1	8	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0F.
Type	0x1B – Initiate Firmware Download.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Block Count	Two byte firmware block count consisting of the total number of 64 byte blocks needed for the new firmware image. (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x9B – Initiate Firmware Download Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x0E)	Type (0x9B)	Transceiver ID	Ack/Nack	Checksum	End Byte (0x04)
	1	1	1	8	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0E.
Type	0x9B – Initiate Firmware Download Acknowledged.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Ack/Nack	Nack = 0x00, Ack = 0x01.
Csum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x1C – Transfer Firmware Block (Host -> RF Transceiver)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x4F)	Type (0x1C)	Transceiver ID	Block Number	Firmware Block	Checksum	End Byte (0x04)
	1	1	1	8	2	64	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x4F.
Type	0x1C – Transfer Firmware Block.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Block Number	Two byte firmware block number. (LSB to MSB).
Firmware Block	A 64 byte user code firmware block.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x9C – Transfer Firmware Block Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x10)	Type (0x9C)	Transceiver ID	Block Number	Ack/Nack	Checksum	End Byte (0x04)
	1	1	1	8	2	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x10.
Type	0x9C – Transfer Firmware Block Acknowledged.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Block Number	Two byte firmware block number. (LSB to MSB).
Ack/Nack	Nack = 0x00, Ack = 0x01.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x1D – Terminate Download (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x0D)	Type (0x1D)	Transceiver ID	Checksum	End Byte (0x04)
	1	1	1	8	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0D.
Type	0x1D – Terminate Download.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x9D – Terminate Download Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x0D)	Type (0x9D)	Transceiver ID	Checksum	End Byte (0x04)
	1	1	1	8	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x0D.
Type	0x9D – Terminate Download Acknowledged.
Transceiver ID	Eight byte transceiver long address (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x1E – Set Digital Pin Configuration (Host -> RF Transceiver)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x08)	Type (0x1E)	Direction	Pullup	Output Value	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x08.
Type	0x1E – Set Digital Pin Configuration.
Direction	This is a bitmask that contains the pin direction (0 = input, 1 = output) for all of the digital I/O pins (refer to Table 1 for bit positions).
Pullup	This is a bitmask that determines whether the internal pullup resistor is used (0 = disabled, 1 = enabled) for any pins that are configured as inputs (refer to Table 1 for bit positions).
Output Value	This is a bitmask that contains the initialized output value (0 = low, 1 = high) for any pins that are configured as outputs (refer to Table 1 for bit positions).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

Pin Number	Bit Position (LSB to MSB)	Pin Description
0	0b00000001	MC9S08GT60 micro pin PTD3 (pin 23)
1	0b00000010	MC9S08GT60 micro pin PTD4 (pin 24)
2	0b00000100	MC9S08GT60 micro pin PTA4 (pin 39)
3	0b00001000	MC9S08GT60 micro pin PTA5 (pin 40)
4	0b00010000	MC9S08GT60 micro pin PTA6 (pin 41)
5	0b00100000	MC9S08GT60 micro pin PTC0 (pin 2)
6	0b01000000	MC9S08GT60 micro pin PTC1 (pin 3)
7	0b10000000	MC9S08GT60 micro pin PTC5 (pin 7)

Table 1

0x9E – Set Digital Pin Configuration Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x9E)	Checksum (0xA4)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x9E – Set Digital Pin Configuration Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x1F – Query Digital Pin Configuration (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x1F)	Checksum (0x25)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x1F – Query Digital Pin Configuration.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x9F – Respond With Digital Pin Configuration (RF Transceiver -> Host)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x08)	Type (0x9F)	Direction	Pullup	Output Value	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x08.
Type	0x9F – Respond With Digital Pin Configuration.
Direction	This is a bitmask that contains the pin direction (0 = input, 1 = output) for all of the digital I/O pins (refer to Table 1 for bit positions).
Pullup	This is a bitmask that determines whether the internal pullup resistor is used (0 = disabled, 1 = enabled) for any pins that are configured as inputs (refer to Table 1 for bit positions).
Output Value	This is a bitmask that contains the initialized output value (0 = low, 1 = high) for any pins that are configured as outputs (refer to Table 1 for bit positions).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x20 – Set Digital Pin State (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x20)	State	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x20 – Set Digital Pin State.
State	This is a bitmask that contains the output value (0 = low, 1 = high) for any pins that are configured as outputs (refer to Table 1 for bit positions).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xA0 – Set Digital Pin State Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0xA0)	Checksum (0xA6)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0xA0 – Set Digital Pin State Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x21 – Query Digital Pin State (Host - > RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x21)	Checksum (0x27)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x21 – Query Digital Pin State.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0xA1 – Respond With Digital Pin State (RF Transceiver -> Host)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0xA1)	Pin State	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0xA1 – Respond With Digital Pin State.
Pin State	This is a bitmask that contains the input value (0 = low, 1 = high) for any pins that are configured as inputs (refer to Table 1 for bit positions). Pins not configured as inputs will be represented as low (0).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x22 – Query Analog Pin Values (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x22)	Checksum (0x28)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x22 – Query Analog Pin Values.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0xA2 – Respond With Analog Pin Values (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x09)	Type (0xA2)	Analog Value PTB0	Analog Value PTB1	Checksum	End Byte (0x04)
	1	1	1	2	2	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x09.
Type	0xA2 – Respond With Analog Pin Values.
Analog Value PTB0	The 10 bit unsigned ADC reading value for analog input PTB0 (LSB to MSB).
Analog Value PTB1	The 10 bit unsigned ADC reading value for analog input PTB1 (LSB to MSB).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x23 – Set Analog Pin Sleep State (Host -> RF Transceiver)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0x23)	Sleep State PTB0	Sleep State PTB1	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0x23 – Set Analog Pin Sleep State.
Sleep State PTB0	The state of the analog pin PTB0 when sleep mode is enabled (0x00 = output set to 0, 0x01 = output set to 1, and 0x02 = analog input).
Sleep State PTB1	The state of the analog pin PTB1 when sleep mode is enabled (0x00 = output set to 0, 0x01 = output set to 1, and 0x02 = analog input).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xA3 – Set Analog Pin Sleep State Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0xA3)	Checksum (0xA9)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0xA3 – Set Analog Pin Sleep State Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x24 – Query Analog Pin Sleep State (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x24)	Checksum (0x2A)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x24 – Query Analog Pin Sleep State.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0xA4 – Respond With Analog Pin Sleep State (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0xA4)	Sleep State PTB0	Sleep State PTB1	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0xA4 – Respond With Analog Pin Sleep State.
Sleep State PTB0	The state of the analog pin PTB0 when sleep mode is enabled (0x00 = output set to 0, 0x01 = output set to 1, and 0x02 = analog input).
Sleep State PTB1	The state of the analog pin PTB1 when sleep mode is enabled (0x00 = output set to 0, 0x01 = output set to 1, and 0x02 = analog input).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x25 – Set Digital Pin Sleep State (Host -> RF Transceiver)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x08)	Type (0x25)	Direction	Pullup	Output Value	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x08.
Type	0x25 – Set Digital Pin Sleep State.
Direction	This is a bitmask that contains the pin direction (0 = input, 1 = output) for all of the digital I/O pins (refer to Table 1 for bit positions).
Pullup	This is a bitmask that determines whether the internal pullup resistor is used (0 = disabled, 1 = enabled) for any pins that are configured as inputs (refer to Table 1 for bit positions).
Output Value	This is a bitmask that contains the initialized output value (0 = low, 1 = high) for any pins that are configured as outputs (refer to Table 1 for bit positions).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xA5 – Set Digital Pin Sleep State Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0xA5)	Checksum (0xA9)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0xA5 – Set Digital Pin Sleep State Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0x26 – Query Digital Pin Sleep State (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x26)	Checksum (0x2C)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x26 – Query Digital Pin Sleep State.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0xA6 – Respond With Digital Pin Sleep State (RF Transceiver -> Host)

Size (bytes)	Header			Payload			Trailer	
	Start Byte (0x01)	Length (0x08)	Type (0xA6)	Direction	Pullup	Output Value	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x08.
Type	0xA6 – Respond With Digital Pin Sleep State.
Direction	This is a bitmask that contains the pin direction (0 = input, 1 = output) for all of the digital I/O pins (refer to Table 1 for bit positions).
Pullup	This is a bitmask that determines whether the internal pullup resistor is used (0 = disabled, 1 = enabled) for any pins that are configured as inputs (refer to Table 1 for bit positions).
Output Value	This is a bitmask that contains the initialized output value (0 = low, 1 = high) for any pins that are configured as outputs (refer to Table 1 for bit positions).
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x27 – Set Debug Mode (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x27)	Debug Mode	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x27 – Set Debug Mode.
Debug Mode	Sets the mode of operation for the mode select debug pins. When a debug mode is selected (non zero), the mode select pins are used to output debug information. Refer to table on the following page for a description of the debug modes.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xA7 – Set Debug Mode Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0xA7)	Checksum (0xA6)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0xA7 – Set Debug Mode Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

Debug Mode	Debug Mode Description
0	Disabled.
1	Transmit and receive debug mode. Mode 0 pin is high during transmit and pulses on startup or wakeup when the crystal stabilizes. Mode 1 pin pulses on a receive packet addresses to transceiver. Mode 2 pin pulses on receiving any packet.

Table 2 – Debug Modes

0x28 – Set LED Functionality (Host -> RF Transceiver)

Size (bytes)	Header			Payload	Trailer	
	Start Byte (0x01)	Length (0x06)	Type (0x28)	LED Mode	Checksum	End Byte (0x04)
	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x06.
Type	0x28 – Set LED Functionality.
LED Mode	Sets the mode of operation for the on board LEDs. Multiple modes may be active at any given time. Refer to table on the following page for a description of the LED modes.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xA8 – Set LED Functionality Acknowledged (RF Transceiver -> Host)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0xA8)	Checksum (0xA6)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0xA8 – Set LED Functionality Acknowledged.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

LED Functionality Bitmask	LED Mode Description
Bit 0 (lsb)	Heartbeat LED flash (LED2).

Bit 1	LED flash on serial activity -- RX (LED2) and TX (LED3).
Bit 2	LED flash on RF activity -- RX (LED2) and TX (LED3).
Bit 3	Unused.
Bit 4	Unused.
Bit 5	Unused.
Bit 6	Unused.
Bit 7 (msb)	Unused.

Table 2 – LED Modes

0xA9 - Received n RF Data Bytes From Source Transceiver ID Sent To Destination Transceiver ID (RF Transceiver -> Host)

Size (bytes)	Header			Payload							Trailer	
	Start Byte (0x01)	Length	Type 0xA9	Packet ID	Target/Sender	LQI	Addr Mode	Dest Txcvr Address	Source Txcvr Address	n Data Bytes	Csum	End Byte (0x04)
	1	1	1	1	1	1	1	2 or 8	2 or 8	n	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	Between thirteen and twenty-five plus the number of data bytes ((13 to 25) +n).
Type	0xA9 - Received n RF data bytes from source transceiver ID sent to destination transceiver ID.
Packet ID	Packet ID.
Target/Sender	Upper nibble is the target of the message and lower nibble is the source (0 = app, 1 = host).
LQI	Link Quality Indicator which gives feedback to the strength of the received packet.
Address Mode	Upper nibble describes the destination transceiver address and lower nibble describes the source transceiver address (0 = short 2 byte address, 1 = long 8 bytes address).
Destination Transceiver Address	Two or eight byte destination transceiver address (LSB to MSB). The number of bytes (2 - short or 8 - long) is determined by the upper nibble of the Address Mode field.
Source TransceiverAddress	Two or eight byte source transceiver long address (LSB to MSB). The number of bytes (2 - short or 8 - long) is determined by the upper nibble of the Address Mode field.
n Data Bytes	Data bytes received over the RF link (n bytes).
Csum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x2A - Set Programmable Settings (Host -> RF Transceiver)

Size (bytes)	Header			Payload							Trailer	
	Start Byte (0x01)	Length (0x15)	Type (0x2A)	PAN ID	Txcvr Long Address	Txcvr Short Address	RF Channel (11-26)	Receive All	RF Acks/Retries	RF Power Level	Csum	End Byte (0x04)
	1	1	1	2	8	2	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x15.
Type	0x2A - Set Programmable Settings.
PAN ID	Two byte PAN ID (LSB to MSB) of the network this transceiver should operate on. Note that only the 14 least significant bits are valid.
Txcvr Long Address	Eight byte transceiver long address (LSB to MSB).
Txcvr Short Address	Two byte transceiver short address (LSB to MSB).
RF Channel	The RF channel that the transceiver will operate on (11-26).
Receive All	Enable (0x01) or disable (0x00) receive all RF messages.
RF Acks/Retries	Whether or not RF acknowledgements and retries are enabled or disabled (0x01 = enabled, 0x00 = disabled).
RF Power Level	RF transmitter power level.
Csum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0xAA - Set Programmable Settings Ack/Nack (RF Transceiver -> Host)

Size (bytes)	Header			Payload		Trailer	
	Start Byte (0x01)	Length (0x07)	Type (0xAA)	Ack/Nack (0x00-0x01)	Status	Checksum	End Byte (0x04)
	1	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x07.
Type	0xAA – Set Programmable Settings Ack/Nack.
Ack/Nack	Nack = 0x00, Ack = 0x01.
Status	Status of the Nack.
Checksum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).

0x2B - Query Programmable Settings (Host -> RF Transceiver)

Size (bytes)	Header			Trailer	
	Start Byte (0x01)	Length (0x05)	Type (0x2B)	Checksum (0x31)	End Byte (0x04)
	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x05.
Type	0x2B - Query Programmable Settings.
Checksum	Checksum of bytes from the Start Byte through the Type.
End Byte	0x04 (EOM).

0xAB - Respond With Programmable Settings (RF Transceiver -> Host)

Size (bytes)	Header			Payload							Trailer	
	Start Byte (0x01)	Length (0x15)	Type (0xAB)	PAN ID	Txcvr Long Address	Txcvr Short Address	RF Channel (11-26)	Receive All	RF Acks/ Retries	RF Power Level	Csum	End Byte (0x04)
	1	1	1	2	8	2	1	1	1	1	1	1

Field Name	Field Description
Start Byte	0x01 (SOH).
Length	0x15.
Type	0xAB - Respond With Programmable Settings.
PAN ID	Two byte PAN ID (LSB to MSB) of the network this transceiver should operate on. Note that only the 14 least significant bits are valid.
Txcvr Long Address	Eight byte transceiver long address (LSB to MSB).
Txcvr Short Address	Two byte transceiver short address (LSB to MSB).
RF Channel	The RF channel that the transceiver operates on (11-26).
Receive All	Enable (0x01) or disable (0x00) receive all RF messages.
RF Acks/ Retries	Whether or not RF acknowledgements and retries are enabled or disabled (0x01 = enabled, 0x00 = disabled).
RF Power Level	RF transmitter power level.
Csum	Checksum of bytes from the Start Byte through the Payload.
End Byte	0x04 (EOM).