ISP Receiver Board Message protocol

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1 Introduction

The Following is a description of the messages used to communicate with the satellite receiver board. This document is intended for ISPs (Independent Software Programmers) writing software to interface with the satellite receiver.

Some messages that are sent from the PC to the Receiver will generate a response message for the PC with the requested information/data.

Some messages are sent to the PC when a communication link is established with a specified Ethernet port number, through USB or through a serial connection. These messages are sent continuously until the communication link is removed.

2 General format of the message:

#	Value	Description
0	BB	Header
1	D2	
2	XX	Length (N+1)
3	XX	
4	XX	Command Type
	…	Data (N bytes)

The table above represents the common format any message transmitted to or from the receiver. Each message is composed of a common header made up of bytes 0 through 4 and described as follows:

- Byte 0 thru 1 — This is the header identifier for all messages and is comprised of the bytes BB(hex) and D2(hex).
- Byte 2 thru 3 — This is the lenght of the message(number of bytes) following the length field.
- Byte 4 — This is the Command byte. When a command is sent to the receiver, this command is echoed back in the response message to the PC. Any additional data bytes required for the command will follow byte 4.

The following sections detail each of the messges implemented in the WX-14 receiver and the perspective layout is from the PC side of the communications.

3 Messages

3.1 Hello message(Command 0x00):

This message is merely used to establish communications with the receiver and obtain version information about the firmware running on the ATMEL microprocessor and the firmware running in the FPGA.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	00	Command Type

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	08	
4	00	Command Type
5	XX	Major Atmel FW Version
6	XX	Minor Atmel FW Version
7	XX	Release Atmel FW Version
8-11	XX	4-digits FPGA version (build, release, minor, major)

3.2 EMWIN data packet message(Message 0x0B):

The message transmits raw EMWIN data to the PC when the PC software is connected to one of the data ports. It will continue to send data packets until disconnected from the PC.

The EMWIN data is format is defined in the document "EMWIN OQPSK Transmit and Receiver Prototype Specifications", Document *#TR-05-004,* prepared by Avtec Systems, Inc for NOAA.

Answer only:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	XX	
4	0B	Command Type
5-??	XX	EMWIN raw data, length is defined by bytes 2-3

3.3 Get VCDU status(Command 0x0D):

This message is used to get the status of the VCDU(virtual channel data unit). This is a running status which is maintained by the microprocessor. This can be cleared using a clear message described in Section 3.11. The following statuses are returned:

- Corrected Bytes – This is the number bytes that needed to be corrected.
- Corrected VCDU – This is the number of VCDU blocks that needed to be corrected.
- Ignored VCDU – This is the number of VCDU blocks that were ignored.
- Loss VCDU – This is the number of VCDU blocks that could not be recovered.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	0D	Command Type

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	11	
4	0C	Command Type
5-8	XX	Corrected bytes (64-bit, dword)
9-12	XX	Corrected VCDU (64-bit, dword)
13-16	XX	Ignored VCDU (64-bit, dword)
17-20	XX	Loss VCDU (64-bit, dword)

3.4 Clear VCDU status(Command 0x0E):

This message is used to clear the current running status of the VCDU blocks.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	0E	Command Type

3.5 Get Network Config message(Command 0x15):

This message is used to retrieve the current IP network configuration settings as follows:

- IP – The current IP address of the receiver
- Mask – The current IP mask.
- Gateway – The current IP Gateway setting.
- Control Port – The port for sending and receiving control messages
- Data Port – The port for receiving Data messages

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	15	Command Type

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	11	
4	15	Command Type
5-8	XX	IP
9-12	XX	Mask
13-16	XX	Gateway
17-18	XX	Port for control connection
19-20	XX	Port for data connection

3.6 Set Network Config message(Command 0x16):

This message is used to set the current IP network configuration settings as follows:

- IP – The current IP address of the receiver
- Mask – The current IP mask.
- Gateway – The current IP Gateway setting.
- Control Port – The port for sending and receiving control messages
- Data Port – The port for receiving Data messages

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	11	
4	16	Command Type
5-8	XX	IP
9-12	XX	Mask
13-16	XX	Gateway
17-18	XX	Port for control connection
19-20	XX	Port for data connection

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	16	Command Type

3.7 Get data output types message(Command 0x17):

This message is used to retrieve the output configuration settings from the receiver.
Each bit indicates whether or not an output option is on or off.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	17	Command Type

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	17	Command Type
5	XX	1st bit – Control USB 2nd bit – Data Serial 3rd bit – Data Ethernet 4th bit – Control Ethernet

3.8 Set data output types message(Command 0x18):

This message is used to turn on or off output options on the receiver.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	18	Command Type
5	XX	1st bit – Control USB 2nd bit – Data Serial 3rd bit – Data Ethernet 4th bit – Control Ethernet

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	01	
4	18	Command Type

3.9 Signal status message (Message 0x1B):

When connected to a control output port, this message is sent continuously from the receiver to the PC and contains signal status information:

- Signal Flags
  - Freq – Indicates the receiver is locked onto the frequency
  - Viterbi – Indicates the Viterbi is locked and processing
  - Frame – Indicates receiving Frame information
  - Mode – Indicates whether operating in Normal Mode or Alignment Mode
- Level – Indicates the current signal level
- Data Quality – Indicates the current average data quality
- Gain – Indicates the current gain level
- Signal Quality – Indicates the current average signal quality
- Loss Frame – Indicates the current number of lost data frames
- Freq Error – Indicates the current average frequency error.

Answer only:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	09	
4	1B	Command Type
5	XX	Signal Flags & Mode 1st bit – Freq 2nd bit – Viterbi 3rd bit – Frame 4th bit – Mode (Normal = 1, Align – 0)
6	XX	Level
7-8	XX	Data Quality
9	XX	Gain
10	XX	Signal Quality
11	XX	Loss frame
12	XX	Freq Error

3.10 Reset message(Command 0x1F):

This messages commands a software reset of the receiver.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	1F	Command Type
5	XX	0x55 for reset

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	1F	Command Type
5	XX	0 if reset was successful

3.11 Set FrontEnd mode message(Command 0x21):

This message is used to instruct the receiver to used the current gain and frequency settings as the default settings. In the event of a power reset or software reset, these values would be used as the initial starting values for tuning.

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	21	Command Type
5	XX	0x55

Answer:

#	Value	Description
0	BB	Header
1	D2	
2	00	Length (N+1)
3	02	
4	21	Command Type
5	XX	0xAA for success, 0x00 for error