Emergency Managers Weather Information Network

Protocol and Specifications

EMWIN Data Stream for Clients

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EMWIN Protocol
Version 1.0

The protocol used by EMWIN is called the Quick Block Transfer (QBT) Protocol. It is used across all of the EMWIN dissemination methods; Radio, Satellite, and Internet.

The EMWIN data stream consists of National Weather Service text weather products, graphics and other data files. Each file is divided into 1116 byte packets.

Each file is sent as one or more packets, which are numbered 1 to N within the given file. Because the data is packetized, a particular file can be easily interrupted by a high priority warning product and then resumed. The broadcast is receive-only therefore; the receiver has no means of notifying the transmitter of any block errors or requesting retransmission of individual blocks. Instead each high priority product is transmitted at least twice, to "fill in" any blocks received in error.

The satellite and Internet EMWIN data streams are transmitted at an effective baud rate of 9600. This is schedule to be upgraded to 19,200 baud in the near future.

Protocol Overview

Each packet of data contains 1116 bytes. The packet is composed of the following fields:

Prefix
- 6 bytes of ASCII 0 (null)

Header
- 80 bytes consisting of the following elements
  - Position 1, literal "/PF" followed by an 8-character filename, a period, and a three character file extension.
  - Position 18, literal "/PN" followed by the block number; the number of this block, 1 to N, within this file.
  - Position 25, literal "/PT" followed by the total number of blocks N being sent for this file.
  - Position 34, literal "/CS" followed by a checksum number; the sum of all bytes in the 1024-byte data portion of this packet.
  - Position 44, literal "/FD" followed by the date/time stamp of this file; in the format of: MM/DD/YY HH:MM:SS AM in universal coordinated time (UTC).
  - Pad ASCII 32 (SP) to fill the total bytes in the header to 78 bytes.
  - Position 79-80 ASCII 13 (CR) and ASCII 10 (LF) .

Data
- 1024-byte block; if the remaining data of the product is less than 1024 bytes, this block is null-filled so that each packet's data block is always 1024 bytes long.

Suffix
- 6 bytes of ASCII 0 (null)

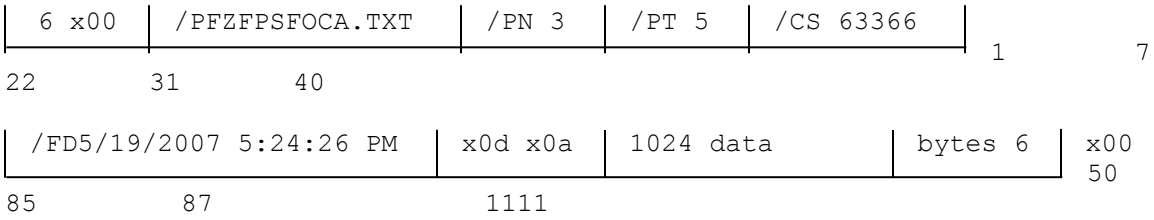
An example of a typical packet header is:

/PFZFPSFOCA.TXT/PN 3 /PT 5 /CS 63366 /FD5/19/2007 5:24:26 PM

The content of the NWS weather products (in the 1024-byte blocks) may be plain ASCII text, graphic, or compressed data. The products are not encrypted, but will often be compressed. Interpretation of the content of the products is up to the receiver's software. Compressed products have a file name that ends with .ZIS and use standard ZIP file compression.

The satellite data stream is sent as plain ASCII characters without any encryption.

Protocol Detail



Changes for ByteBlaster Support

The EMWIN data stream is distributed on the Internet using the EMWIN Quick Block Transfer protocol with the addition of supporting packets. The ByteBlaster network is composed of multiple computers running ByteBlaster Server software. The network is designed to be fault tolerant.

The ByteBlaster Servers send a list of the active server addresses to each client (see the server list description below). In the event that a client cannot reach one server, it can try another one from the list.

The server address list is set every 10 minutes to each client. The address list is sorted by server load. This places the server with the least connections at the beginning of the list. When a new list is received, the client should attempt to connect to the first server in the list when it looses its connection.

There are two types of server lists, a public server list and a direct connect satellite server list. The public server list should be used by most clients. This list will contain the largest number of servers. The direct connect satellite servers list is reserved for use by clients that feed data to a byteblaster server. This list is small and designed to feed byteblaster servers directly from satellite connections.

The Internet data stream is sent using simple XOR encryption. Each byte in the data stream is XOR'd with hex FF. To decode the received packets, each byte should be XOR'd with hex FF to recover the original data packet for processing.

The following packets may be encountered along with the EMWIN QBT packets.

Public Server List

The Server List packet begins with the prefix /ServerList/. It is followed by a list of one or more servers. An individual server's information includes the server's domain name or IP address and associated port. Each server entry ends with a pipe symbol. The Server List ends with the suffix \ServerList\.

/ServerList/address1:port|address2:port|address3:port|\ServerList\

The Server List should be used by normal ingest clients.

Direct Connect Satellite Server List

The Direct Connect Satellite Server List packet begins with the prefix /SatServers/. It is followed by a list of one or more servers. An individual server's information includes the server's domain name or IP address and associated port. Each server entry ends with the plus symbol. The Direct Connect Satellite Server List ends with the suffix \ SatServers \.

/SatServers/address1:port+address2:port+address3:port+\SatServers\

The Satellite Server List should be used by clients that will be providing data to a byteblaster server. The servers in this list receive their data directly from a satellite system.

File List

The File List packet contains a delimited list of new file names. This packet is not currently implemented.

/FileList/\FileList\

System Message

The System Message packet contains a NWS EMWIN message. This packet is not currently implemented.

/SystemMessage/\SystemMessage\

Client Identification

Each client must identify itself with the ByteBlaster server after a connection is established. The format is: ByteBlast Client|NM-emailaddress|V1

Example: "ByteBlast Client|NM-danny@wxmesg.com|V1"

The original ByteBlaster Servers required clients to send an identity packet once every 4 minutes. Failure to reidentify with the server would cause the clients to be disconnected. This requirement has been removed with the version 3 servers. Clients should still continue to follow the original requirement until all server software has been modified to remove this requirement.

Default Internet Server Lists

The default server list should be populated with these servers.

140.90.6.245:1000
140.90.128.132:1000
140.90.128.133:1000

The default satellite server list should be populated with these servers.

140.90.6.240:1000
140.90.6.245:1000
140.90.128.132:1000
140.90.128.133:1000

These defaults should be replaced with their respective list when received.

Note: If your server list reaches only one server, should should reload the list with the defaults.

EMWIN Protocol
Version 2.0
Internet ByteBlaster Data Stream

Version 2, of the EMWIN Quick Block Transfer Protocol, allows the data block to be variable in length. This protocol is only available with the Internet data stream. Clients that want to use this protocol can inform the byte blaster server that they want to receive data using the version 2 protocol.

The Version 2 protocol adds an additional field to the header and replaces the data block with a compressed version that varies in length. This approach was taken to minimize changes to the base EMWIN Quick Block Transfer Protocol.

This section describes the changes to the version 1.0 protocol. See the previous discussion for Version 1.0.

Protocol Overview

Each packet of data contains a variable amount of data ranging from 92 to 1116 bytes. The packet is composed of the following fields:

Prefix
- 6 bytes of ASCII 0 (null)

Header
- 80 bytes consisting of the following elements
  - Position 1, literal "/PF" followed by an 8-character filename, a period, and a three character file extension.
  - Position 18, literal "/PN" followed by the block number; the number of this block (1 to N) within this file.
  - Position 25, literal "/PT" followed by the total number of blocks N being sent for this file.
  - Position 34, literal "/CS" followed by a checksum number; the sum of all bytes in the 1024-byte data portion of this packet.
  - Position 44, literal "/FD" followed by the date/time stamp of this file; in the format of: MM/DD/YY HH:MM:SS AM in universal coordinated time (UTC).
  - Position 70, literal “/DL” followed by the number of bytes in the data block. This ranges from 0 to 1024 bytes. If this field is not present, the packet is version 1.0.
  - Pad ASCII 32 (SP) to fill the total bytes in the header to 78 bytes.
  - Position 79-80 ASCII 13 (CR) and ASCII 10 (LF).

Data
- 0 to 1024-byte block that contains the original 1024 byte block in compressed format. The block is compressed using zlib.

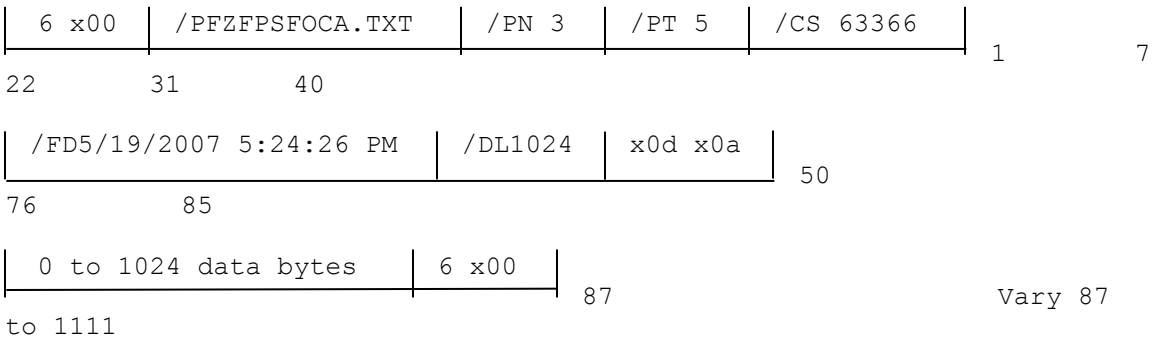
Suffix
- 6 bytes of ASCII 0 (null)

An example of a typical packet header is:

/PFZFPSFOCA.TXT/PN 3 /PT 5 /CS 63366 /FD5/19/2007 5:24:26 PM /DL1024

This data stream is sent using simple XOR encryption. Each byte in the data stream is XOR'd with hex FF. To decode the received packets, each byte should be XOR'd with hex FF to recover the original data packet for processing.

Protocol Detail



Client Identification
In order to receive version 2 packets, the client must send an identification packet to the byteblaster server. The format is: ByteBlast Client|NM-emailaddress|V2

Here is an example "ByteBlast Client|NM-danny@wxmesg.com|V2"

Notes
Some data blocks do not compress because they already contain compressed data. In the event that a data block cannot be compressed, the /DL field will not be present in the header.

The data block is compressed using the open source Zlib library. This library can be downloaded from http://www.zlib.net.