

EMWIN QBT Satellite Broadcast Protocol

Draft Version 1.0.1

WARNING

THIS IS A DRAFT SPECIFICATION DOCUMENT UNDER DEVELOPMENT BY THE US NATIONAL WEATHER SERVICE. IT HAS NOT BEEN VERIFIED FOR ACCURACY OR FOR COMPATIBILITY WITH ANY EXISTING SYSTEMS OR SERVICES. THE USE OF THIS INFORMATION BY ANY PARTY FOR ANY PURPOSE IS AT THEIR OWN RISK. THE GOVERNMENT MAY NOT BE HELD LIABLE FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES ARISING FROM INFORMATION CONTAINED IN THIS DOCUMENT.

Document Control

Version Number	Version Description	Author(s)	Date Completed
V 1.0.1	Initial Version of Draft Document *	Robert Gillespie	05/12/2015

* A portion of the content of this document was provided by Danny Lloyd, Weather Message Software, LLC

WARNING

THIS IS A DRAFT SPECIFICATION DOCUMENT UNDER DEVELOPMENT BY THE US NATIONAL WEATHER SERVICE. IT HAS NOT BEEN VERIFIED FOR ACCURACY OR FOR COMPATIBILITY WITH ANY EXISTING SYSTEMS OR SERVICES. THE USE OF THIS INFORMATION BY ANY PARTY FOR ANY PURPOSE IS AT THEIR OWN RISK. THE GOVERNMENT MAY NOT BE HELD LIABLE FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES ARISING FROM INFORMATION CONTAINED IN THIS DOCUMENT.

EMWIN QBT Satellite Broadcast Protocol

Draft Version 1.0.1

1. **Introduction.**

a. This document describes the Quick Block Transfer (QBT) protocol used by the U.S. National Weather Service (NWS) for the transmission of files over the National Environmental Satellite, Data, and Information Service (NESDIS) Geostationary Operational Environmental Satellites (GOES) 13, 14 and 15 [the GOES N/O/P satellite series]. This protocol is unique to the NWS Emergency Managers Weather Information Network (EMWIN).

b. The EMWIN satellite broadcast data stream consists of both text and binary files. Prior to broadcast, each file is divided into a sequence of 1024 byte segments which are encapsulated in 1116 byte QBT packets for transmission. The individual or series of QBT packets for a specific file are numbered sequentially from 1 to N. Upon receipt of the packets from the satellite broadcast, the receiving system software will reconstitute the files from the QBT packets.

c. Dividing files into smaller packets allows EMWIN to expedite the transmission of higher priority files ahead of lower priority files. This is accomplished by interrupting the transmission of lower priority file packets, and allowing the higher priority file packets to be transmitted. After the higher priority file packets have been transmitted, the transmission of the lower priority file packets resumes.

d. The EMWIN data stream on the GOES-13/14/15 satellites is transmitted at 19,200 kbps, and is not encrypted.

2. **EMWIN Transmission Performance.**

a. All EMWIN files are assigned a numeric priority. The priority helps determine the order in which files are sent according to the following guidelines:

(1) Higher priority (file) packets are transmitted ahead of lower priority (file) packets.

(2) The file's packets are transmitted in ascending packet number order, beginning with packet number 1.

(3) At any given priority level, packets in a queue will be transmitted in "First In, First Out" (FIFO) order.

b. If the receiving systems software detects missing, incomplete, or mal-formed packets or files, the file is considered "bad" or "corrupt".

c. The EMWIN satellite broadcast is receive-only, therefore the receiver has no means of notifying the transmitter of any packet loss or errors, nor may it request retransmission of individual packets.

d. To minimize the likelihood of receiving bad or corrupt files, each high priority file is transmitted twice, to "fill in" any erroneous or missing packets. The retransmission of a high priority file is scheduled to commence no sooner than 5 seconds after the file is first transmitted, but may take longer, depending on the number of existing packets ahead of it in the transmission queue.

3. **QBT Protocol** - Each QBT packet is 1116 bytes in length. The QBT packet is composed of the following fields:

a. Prefix – 6 bytes. Position 1-6, 6 bytes of [ASCII 0 (null)]

b. Header - 80 bytes consisting of the following elements

(1) Position 7-21, literal "/PF" followed by an 8-character filename, a period, and a three character file extension. Valid file extensions are:

- (a) gif Graphics Interchange Format
- (b) jpg shorter extension for JPEG which stands for Joint Photographic Experts Group.
- (c) png Portable Network Graphics file format
- (d) txt alpha numeric text format
- (e) zis ZIP compressed file format

(2) Position 22-30, literal "/PN" followed by a left justified number, 1 to 6-bytes in length, identifying the packet's sequence number in the range of 1 to N. Right pad with [ASCII 32 (SP)] to fill out to byte position 30.

(3) Position 31-39, literal "/PT" followed by a left justified number, 1 to 6-bytes in length, identifying the total number of packets N being sent for this file. Right pad with [ASCII 32 (SP)] to fill out to byte position 39.

(4) Position 40-49, literal "/CS" followed by a 7-byte, left justified number identifying the sum of all byte decimal values in the 1024-byte data portion of the packet. Right pad with [ASCII 32 (SP)] to fill out to byte position 49.

Text Example: if the 1024 byte data block portion = AcB(null)....

A = 65 (decimal)
 c = 99
 B = 66
 (null) = 0 x 1021 bytes = 0
 Sum = 230

(5) Position 50-84, literal "/FD" followed by the date/time stamp of the file from which the data was received; in the left justified format of: MM/DD/YYYY[ASCII 32

(SP)]HH:MM:SS[ASCII 32 (SP)]AM or PM in universal coordinated time (UTC).

(i) Sequential Fields and Values: MM=01-12; DD=01-31; YYYY=20##; HH=01-12; MM=00-59; SS=00-59.

(ii) Padding - append [ASCII 32 (SP)] to fill the “/FD” field to byte position 84.

(7) Position 85-86 [ASCII 13 (CR)] and [ASCII 10 (LF)] .

c. Data

(1) Position 87-1110, 1024-byte block; if the product or message data is less than 1024 bytes, the [ASCII 0 (null)] byte is appended to fill, so that each packet's data block is always 1024 bytes long.

d. Suffix - Position 1111-1116, 6 bytes of [ASCII 0 (null)]

4. Example.

a. Header - an example of the typical 80-byte packet header:

```
/PFZFPSFOCA.TXT/PN3(sp)(sp)(sp)(sp)(sp)/PT5(sp)(sp)(sp)(sp)(sp)/CS63366(sp)(sp)
/FD05/19/2016(sp)05:24:26(sp)PM(null) (null) (null) (null) (null) (null) (null) (null) (null)
(null)(cr)(lf)
```

b. The content of the NWS weather products (in the 1024-byte data blocks) may be plain ASCII text, binary, or compressed data. The products are not encrypted, but will be compressed if their size exceeds 5kB. 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 uses standard ZIP file compression.

5. QBT Protocol Position Reference Diagram

