

GOES-East EMWIN Broadcast Service Transition

(NWS/DST - rev 171101-1600)

1. GOES-East Satellite Transition Overview

a. On December 14, 2017, the GOES-East EMWIN satellite broadcast signal format will change. This change is the result of the NESDIS GOES-16 satellite replacing the GOES-13 satellite at 75° W longitude. The new GOES-16 satellite provides the EMWIN data stream on a new HRIT/EMWIN broadcast transmission.

(1) EMWIN users receiving the broadcast from GOES-East (GOES-13) will need to install a new satellite receiver -- HRIT/EMWIN receiver -- and new antenna system, to receive and decode the new HRIT/EMWIN broadcast signal format.

(2) Software modifications on local computers or workstations may be necessary to properly process the modified file format and naming convention.

(a) All EMWIN products on the HRIT/EMWIN broadcast will be received as full, contiguous files – the products will no longer be received in [Quick Block Transfer \(QBT\)](#) multi-packet transmission format.

(b) The EMWIN products on HRIT/EMWIN broadcast have a new file naming convention described in the [EMWIN GOES-R Filename Convention Document \(Draft\)](#).

GOES-West (135° W) and GOES-East (75° W) Satellite Coverage (Footprint)



b. No Impact to GOES-West. These changes to the EMWIN signal from the GOES-East satellite (GOES-16) do not apply to the GOES-West (135° W) satellite. GOES-West satellite

users may continue use their existing receivers, antennas and software to receive and decode the EMWIN broadcast from the GOES-West (GOES-15) satellite.

c. **Using GOES-West.** Users impacted by the GOES-East EMWIN changes and within the GOES-West satellite footprint may reorient their antennas to point at the GOES-West satellite in order to continue to use their existing EMWIN receiving equipment. Users should verify they have a continuous, unobstructed antenna view to the GOES-West satellite, and are able to receive adequate signal strength for the broadcast to be received and decoded.

2. **NESDIS GOES-East Satellite Transition Schedule (GOES-13 to GOES-16):**

11/30/2017	GOES-13 : Drift satellite from 75° W to 74.5° W GOES-16 : Begins drift from 89.3° W to 75.2° W at 1800 UTC. During drift, GRB, DCS, HRIT/EMWIN, and SARSAT will be disabled
12/11/2017	GOES-16 : Stop drift at 75.2° W
12/14/2017	GOES-13 : Disable EMWIN transponder. GOES-16 : Activate HRIT/EMWIN transponder.
1/2/2018	GOES-13 : Begin drift from 74.5° W to 60.0° W
1/22/2018	GOES-13 : Stop drift at 60.0° W

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3. **GOES-16 HRIT/EMWIN Satellite Broadcast and Equipment Information:**

a. **HRIT/EMWIN Satellite Broadcast Receiving Equipment.** The following manufacturers / vendors sell HRIT/EMWIN compatible receivers. The listing below does not imply any particular product or service endorsement or recommendation by the NWS. Each of the receiver manufacturers has acknowledged the functions to process and store the EMWIN files are still in development as of 11/1/2017. Customers should consult the vendors to determine product suitability for the customers' specific purpose and environment:

Global –LG

(Dartcom USA sales)
426 Jolina Way, Encinitas, CA 92024
POC: Michael Guberek
Phone: (619) 301- 0421

Microcom Design, Inc.

10948 Beaver Dam Road
Hunt Valley, MD, USA 21030
POC: Perry West, Brett Betsill
Tel: (410) 771-1070

Quorum Communications, Inc.

3807 Carbon Rd. Irving, TX 75038-3415
POC: Allan Bundens
Phone: (800) 982-9614
(972-915-0256 x111)

b. HRIT/EMWIN Broadcast Signal Characteristics:

- Frequency: 1694.1 MHz
- Coding – BPSK
 - Convolutional rate ½ code with constraint length 7 concatenated with Reed Solomon (255,223) with Interleave = 4
 - Square Root Raised Cosine filtering using an Alpha factor of 0.3
- Data Rate: 400 Kbps
- Line Coding Format: NRZ-M
- Pseudo-randomization polynomial: $h(x) = x^8 + x^7 + x^5 + x^3 + 1[4]$
- Modem Required: predicted C/No is in the range of 63-67 dB
- Maximum Demodulator Required is -
 - Eb/No is 4.6 dB for a BER of 1×10^{-8} after decoding
- Minimum Antenna System
 - At 5 degree elevation, the minimum antenna is 1.2 meter.
 - At 10 degrees or more elevation the minimum size is 1.0 meter
 - Using a LNA or LNB with a system noise temperature of about 200 K will provide a G/T of 1.0 dB/K or -0.3 dB/K respectively

c. HRIT/EMWIN Broadcast Virtual Channels. The HRIT/EMWIN broadcast utilizes virtual channels for the transmission of several simultaneous data streams. The table below identifies the current virtual channels assignments. The EMWIN and DCS virtual channels are permanent assignments; the remaining channel assignment may be modified in the future.

HRIT/EMWIN Virtual Channel ID	Group	Product Name
0	Imagery	Admin Text Messages
1	Imagery	Mesoscale 1km (ch. 2, 7, 13)
2	Imagery	Band 2 - Red
3	Imagery	GOES-13 IR
6	Imagery	GOES-15 IR
7	Imagery	Band 7 - Shortwave Window
8	Imagery	Band 8
9	Imagery	Band 9 - Mid-Level Trop
13	Imagery	band 13
14	Imagery	Band 14 - IR
15	Imagery	Band 15
20	EMWIN	Priority
21	EMWIN	Graphics
22	EMWIN	Other

HRIT/EMWIN Virtual Channel ID	Group	Product Name
23	Imagery	NWS Products
24	Imagery	NHC Graphics Products
25	Imagery	GOES-R JPG Products
26	Imagery	International Graphics Products
30	DCS	DCS Admin
31	DCS	DCS Data
60	Imagery	Himawari

(1) **VCID 20 EMWIN Priority - Text Products.** Virtual channel 20 contains EMWIN Priority 1 and 2 text formatted products. Products which are less than 5kb in size prior to transmission are disseminated in text format with a “.TXT” file extension. Products which are greater than 5 kb in size prior to transmission are compressed and disseminated in ZIP file format, with a “.ZIP” file extension. See Section 4 for information on specific products carried on this channel.

Note: The HRIT/EMWIN broadcast is currently configured to transmit EMWIN priority 1 and 2 products twice on VCID 20, with the second product transmission occurring approximately 5 seconds after the first. The retransmission is intended to help ensure these products are received during marginal and adverse electromagnetic environmental conditions (such as local lightning events).

(2) **VCID 21: EMWIN Graphics.** Virtual channel 21 contains all picture (binary) files, also known as graphics files. See Section 4 for information on specific products carried on this channel.

(3) **VCID 22: EMWIN Other.** Virtual channel 22 contains all EMWIN Priority 3 and 4 text formatted products. Products which are less than 5kb in size prior to transmission are disseminated in text format with a “.TXT” file extension. Products which are greater than 5 kb in size prior to transmission are compressed and disseminated in ZIP file format, with a “.ZIP” file extension. See Section 4 for information on specific products carried on this channel.

4. **Products on the EMWIN Broadcast**

EMWIN carries three general groups of product: text-formatted US NWS products, text-formatted International products, and graphic or picture products (binary files). On previous GOES satellites, the EMWIN broadcast placed all products on a single channel. The GOES-16 broadcast allocates these products to three separate virtual channels (see Section 3).

A list of all text products, both US NWS and International products, authorized for broadcast on the EMWIN satellite transmission is published in the “EMWIN Broadcast Product Baseline” and available on the public Internet for reference here: [Broadcast Product Baseline](#). This list will be updated to include the GOES-16 virtual channel assignments in the future. Additional information on text products and graphic products VCID assignments is addressed in the following sections.

a. **US NWS Text Products**. The US NWS issues text product in WMO format but includes an AWIPS Identification (AWIPS ID) code between the WMO Header and bulletin body. The first three characters of the AWIPS ID are known as the Category Code (nnn) and identify a particular type of product (e.g., nnn of TOR = TORnado warning). A listing of the product AWIPS Category Codes, their description and priority, and the HRIT/EMWIN virtual channel on which the products are found, is provided in Section 6, Table 1.

b. **International Text Products**. The International text products available on the broadcast are included in the EMWIN Product Baseline list (link located under “4.” above). The EMWIN Product Baseline list will be updated to include the VCID of each of the International products.

All International products issued as Warning bulletins (WMO Header character T1 = “W”) are assigned priority 1, and are found on VCID 20. For further information on the WMO Header alpha-numeric characters, refer to:

http://www.wmo.int/pages/prog/www/ois/Operational_Information/Publications/WMO_386/AH_Lsymbols/TableDefinitions.html

c. **Graphic Products**. EMWIN carries several graphic or picture products including satellite and radar imagery and hurricane tracks. All graphic products are carried on HRIT/EMWIN Virtual Channel 21. A listing of the products, their assigned files names, and their place of origin on the public internet is found in the [EMWIN Image and Text Data Capture Catalog Document v1.1](#)

5. **Additional Information and References:**

a. [EMWIN Home page](#)

b. [NESDIS GOES-16 Satellite Information Page](#)

6. Tables.

Table 1. US NWS Text Products

(Ref: CATLST_160819.txt)

AWIPS Cat Code	Priority	Description
EMWIN Priority 1 and 2 Text Products -- HRIT/EMWIN Virtual Channel 20		
LSH	1	LAKESHORE WARNING OR STATEMENT
MWW	1	MARINE WEATHER WARNING
NOW	1	SHORT TERM FORECAST
NPW	1	NON-PRECIPITATION WARNINGS, WATCHES, ADVISORIES
NUW	1	NUCLEAR POWER PLANT WARNING
RFW	1	RED FLAG WARNING
SEL	1	SEVERE LOCAL STORM WATCH AND WATCH CANCELLATION MSG
SLS	1	SEVERE LOCAL STORM WATCH AND AREAL OUTLINE
SVR	1	SEVERE THUNDERSTORM WARNING
SVS	1	SEVERE WEATHER STATEMENT
TCD	1	TROPICAL CYCLONE DISCUSSION
TCM	1	MARINE/AVIATION TROPICAL CYCLONE ADVISORY
TCP	1	PUBLIC TROPICAL CYCLONE ADVISORY
TCU	1	TROPICAL CYCLONE UPDATE
TIB	1	TSUNAMI INFORMATION BULLETIN
TOR	1	TORNADO WARNING
TSU	1	TSUNAMI WATCH/WARNING
VOW	1	VOLCANO WARNING
WAT	1	SPACE ENVIRONMENT WATCH
WOU	1	TROPICAL CYCLONE SIGMET - XML FORMAT
WSW	1	WINTER WEATHER WARNINGS, WATCHES, ADVISORIES
ADA	2	ALARM/ALERT ADMINISTRATIVE MSG (URGENT NOTIFICATION)
ADM	2	ALERT ADMINISTRATIVE MESSAGE
ADR	2	NWS ADMINISTRATIVE MESSAGE (EXTERNAL)
ADV	2	GENERIC SPACE ENVIRONMENT ADVISORY
AFD	2	AREA FORECAST DISCUSSION
AVA	2	AVALANCHE WATCH
CWF	2	COASTAL WATERS FORECAST
DAY	2	170 QPE ONE HOUR DIGITAL ACCUMULATION ARRAY ID 170/DAA DS.170aa
DMO	2	DIGITAL HYBRID REFLECTIVITY 32/DHR
EQR	2	EARTHQUAKE REPORT
ESF	2	FLOOD POTENTIAL OUTLOOK
FAA	2	AVIATION AREA FORECAST (FAIRBANKS, ALASKA)

AWIPS Cat Code	Priority	Description
FFA	2	FLASH FLOOD WATCH
FFC	2	FLASH FLOOD WATCH
FFG	2	FLASH FLOOD GUIDANCE
FFH	2	HEADWATER GUIDANCE
FFS	2	FLASH FLOOD STATEMENT
FLS	2	FLOOD STATEMENT
FTM	2	WSR-88D RADAR OUTAGE NOTIFICATION / FREE TEXT MESSAGE
FWS	2	SUPPRESSION FORECAST
HYD	2	DAILY HYDROMETEOROLOGICAL PRODUCTS
LEW	2	LAW ENFORCEMENT WARNING
LSR	2	LOCAL STORM REPORT
MIS	2	MISCELLANEOUS LOCAL PRODUCT
MWS	2	MARINE WEATHER STATEMENT
OBS	2	OTHER AVIATION PRODUCTS
OFF	2	OFFSHORE FORECAST
OMR	2	OTHER MARINE PRODUCTS
PMD	2	PROGNOSTIC METEOROLOGICAL DISCUSSION
PNS	2	PUBLIC INFORMATION STATEMENT
RDF	2	REVISED DIGITAL FORECAST
RER	2	RECORD REPORT
RHW	2	RADIOLOGICAL HAZARD WARNING
SMF	2	SMOKE MANAGEMENT WEATHER FORECAST
SMW	2	SPECIAL MARINE WARNING
SPS	2	SPECIAL WEATHER STATEMENT
SPW	2	SHELTER IN PLACE WARNING
SRF	2	SURF FORECAST
SUM	2	CANADIAN STORM WARNING
SWX	2	STATE WEATHER SUMMARY
TWD	2	TROPICAL WEATHER DISCUSSION
TWO	2	TROPICAL WEATHER OUTLOOK AND SUMMARY
WCN	2	WEATHER WATCH CLEARANCE NOTIFICATION
EMWIN Priority 3 and 4 Text Bulletins -- HRIT/EMWIN Virtual Channel 22		
CLI	3	CLIMATOLOGICAL REPORT (DAILY)
ESS	3	WATER SUPPLY OUTLOOK
FLN	3	NATIONAL FLOOD SUMMARY
HMW	3	HAZARDOUS MATERIALS WARNING
HSF	3	HIGH SEAS FORECAST
LFP	3	LOCAL FORECAST
PWO	3	PUBLIC SEVERE WEATHER OUTLOOK

AWIPS Cat Code	Priority	Description
QPS	3	QUANTITATIVE PRECIPITATION STATEMENT
RFD	3	RANGELAND FIRE DANGER FORECAST
RWR	3	REGIONAL WEATHER ROUNDUP
TCE	3	TROPICAL CYCLONE POSITION ESTIMATE
TCV	3	TROPICAL CYCLONE VTEC
TMA	3	TSUNAMI TIDE/SEISMIC MESSAGE ACKNOWLEDGMENT
AFM	4	AREA FORECAST MATRICES
AFP	4	AREA FORECAST PRODUCT
AGO	4	AGRICULTURAL OBSERVATIONS
AQA	4	AIR QUALITY ADVISORY
AQI	4	AIR QUALITY INDEX STATEMENT
ASA	4	AIR STAGNATION ADVISORY
AWS	4	AREA WEATHER SUMMARY
AWU	4	AREA WEATHER UPDATE
CGR	4	COAST GUARD SURFACE REPORT
CLA	4	CLIMATOLOGICAL REPORT (ANNUAL)
CLM	4	CLIMATOLOGICAL REPORT (MISC, INC MONTHLY REPORTS)
CLQ	4	CLIMATOLOGICAL REPORT (MISC, INC MONTHLY REPORTS)
CLS	4	SEASONAL CLIMATE SUMMARY PRODUCTS
FWF	4	ROUTINE FIRE WX FCST(WITH/WITHOUT 6-10 DAY OUTLOOK)
FWL	4	LAND MANAGEMENT FORECASTS
FWM	4	MISCELLANEOUS FIRE WEATHER PRODUCT
FWN	4	FIRE WEATHER NOTIFICATION
FWO	4	FIRE WEATHER OBSERVATION
FZL	4	FREEZING LEVEL DATA (RADAT)
HAA	4	GENERAL STATUS MESSAGE
HAD	4	GENERAL STATUS MESSAGE
HAF	4	GENERAL STATUS MESSAGE
HAM	4	GENERAL STATUS MESSAGE
HAP	4	GENERAL STATUS MESSAGE
HAS	4	GENERAL STATUS MESSAGE
HAT	4	GENERAL STATUS MESSAGE
HAW	4	GENERAL STATUS MESSAGE
HLS	4	HURRICANE LOCAL STATEMENT
HMD	4	HYDROMETEOROLOGICAL DISCUSSION
HYM	4	MONTHLY HYDROMETEOROLOGICAL PLAIN LANGUAGE PRODUCT
HYW	4	WEEKLY HYDROMETEOROLOGICAL PLAIN LANGUAGE PRODUCT
NWX	4	SEVERE WEATHER PROBABILITY 47/SWP
OPU	4	OTHER PUBLIC PRODUCTS
PFM	4	POINT FORECAST MATRICES

AWIPS Cat Code	Priority	Description
PLS	4	PLAIN LANGUAGE SHIP REPORT
PRB	4	PROBABILITY OF EXCEED
PSH	4	POST STORM HURRICANE REPORT
RBG	4	RED BOOK GRAPHIC **
REC	4	RECREATIONAL REPORT
RRM	4	MISCELLANEOUS HYDROLOGIC DATA
RTP	4	REGIONAL MAX/MIN TEMP AND PRECIPITATION TABLE
RVA	4	RIVER SUMMARY
RVD	4	DAILY RIVER FORECASTS
RVF	4	RIVER FORECAST
RVM	4	MISCELLANEOUS RIVER PRODUCT
RVR	4	RIVER RECREATION STATEMENT
RVS	4	RIVER STATEMENT
RWS	4	REGIONAL WEATHER SUMMARY
SAB	4	SNOW AVALANCHE BULLETIN
SAW	4	PRELIM NOTICE OF WATCH & CANCELLATION MSG AVIATION)
SCD	4	SUPPLEMENTARY CLIMATOLOGICAL DATA (ASOS)
SCS	4	SELECTED CITIES SUMMARY
SEV	4	SPC WATCH POINT INFORMATION MESSAGE
SFD	4	STATE FORECAST DISCUSSION
SFP	4	STATE FORECAST
SFT	4	TABULAR STATE FORECAST
STO	4	ROAD CONDITION REPORTS (STATE AGENCIES)
STP	4	STATE MAX/MIN TEMPERATURE AND PRECIPITATION TABLE
SWR	4	SEVERE STORM OUTLOOK NARRATIVE (AC)
SWS	4	STATE WEATHER SUMMARY
TID	4	TIDE REPORT
TOE	4	911 TELEPHONE OUTAGE EMERGENCY
TVL	4	TRAVELERS FORECAST
URN	4	UPPER AIR SITE PERFORMANCE & LOGISTICS MESSAGE
UVI	4	ULTRAVIOLET INDEX
WWA	4	WATCH STATUS REPORT
ZFP	4	ZONE FORECAST PRODUCT