



LRIT/HRIT/EMWIN

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GOES Data Collection System

Technical Working Group (TWG) Training

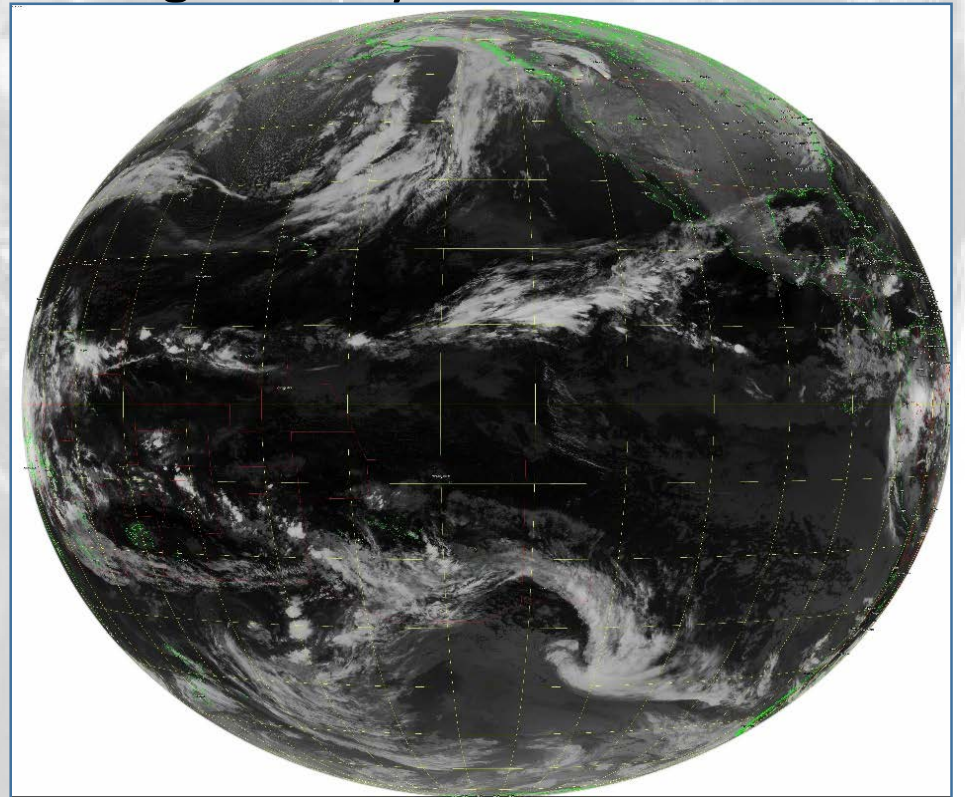
Miami, FL

March 2018

Low Rate Information Transmission

What is LRIT?

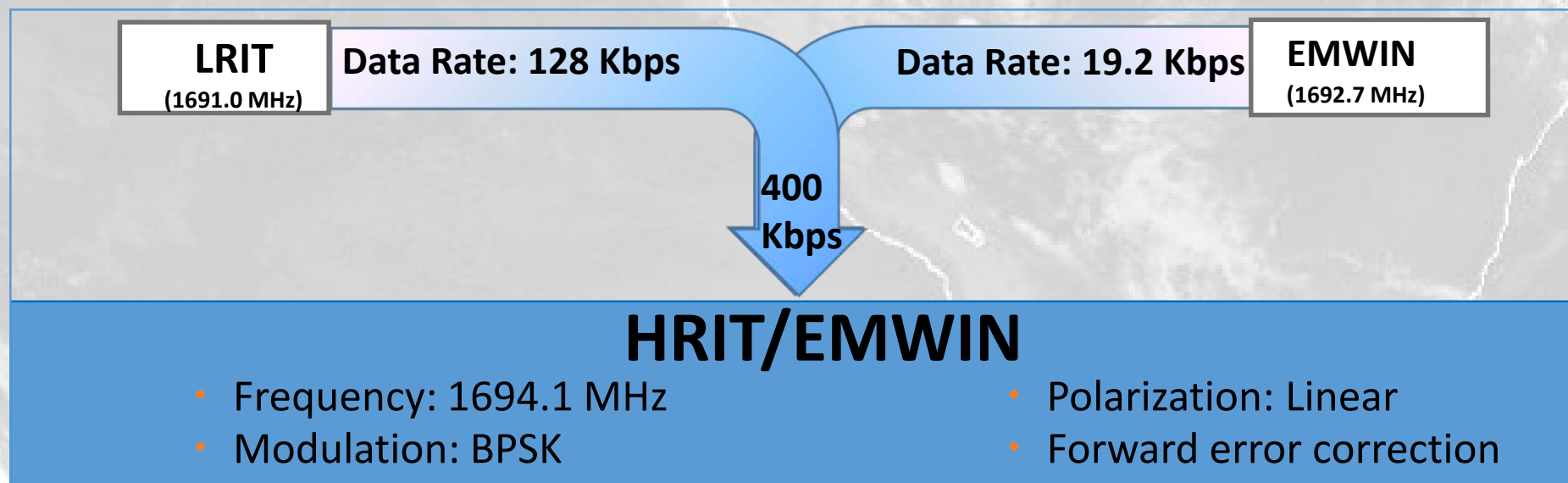
- ▶ LRIT is a collection of reduced resolution NOAA data and products, packaged into a single stream, and rebroadcast over NOAA geostationary (GOES) NOP series satellites. Currently only available to GOES West users.
- ▶ Users can obtain this information with relatively low cost ground systems
- ▶ No subscription fee necessary
- ▶ Available from Eastern North/South America to the Pacific islands
- ▶ L-Band LRIT Downlink Specifications
 - GOES-13/14/15 spacecraft only
 - Frequency: 1691.0 MHz
 - Data Rate: 128 kbps
 - Modulation: BPSK
 - Polarization: Linear
 - More Information available on www.NOAASIS.NOAA.GOV/LRIT



High Rate Information Transmission

What is HRIT/EMWIN?

- The High Rate Information Transmission/Emergency Manager Weather Information Network's (HRIT/EMWIN) is available only on GOES-R series satellites and is the follow up to both the LRIT and EMWIN broadcasts on NOP satellites.
- HRIT/EMWIN's objective is to continue the current broadcast services of LRIT and EMWIN at a significantly higher data capacity. This will be accomplished by combining the two services into a single service with a data relay capacity of 400Kbps
- HRIT/EMWIN will provide more imagery channel selection with greater resolution at a more frequent rate than previous LRIT broadcasts.





Current Status of LRIT/HRIT/EMWIN

- GOES (15) West (135°W) operating from Legacy LRIT system
- GOES East (75.2°W) operating from the PDA driven HRIT/EMWIN system.
- GOES-S (89.5°W) future broadcast will be operating from the HRIT/EMWIN system (transition TBD).
 - Legacy LRIT (domains 2 through 5) system will be decommissioned during transition of GOES West.
- HRIT/EMWIN Product List
 - EMWIN products including watches, warnings, forecasts and graphics
 - Copy of the GOES-DCS observations provided from DADDS
 - Environmental products from NHC, such as tropical weather and forecasted maritime surface charts
 - GOES-15 Full Disk IR every 3 hours and N. Hemisphere every 30 minutes
 - Will not be on GOES West broadcast, but will some imagery from GOES East
 - Himawari-8 – Full Disk VIS, IR and WV every 60 minutes
 - Will be discontinued on GOES East broadcast and carried over to GOES West before transition
 - GOES-16 products –ABI Cloud and Moisture Imagery (CMI)
 - Full Disk imagery on bands 2, 7, 8, 9, 13, 14, 15 every 30 minutes at 2km resolution
 - Mesoscale imagery on bands 2 (1km), 7 and 13 every 15 minutes at 2km resolution

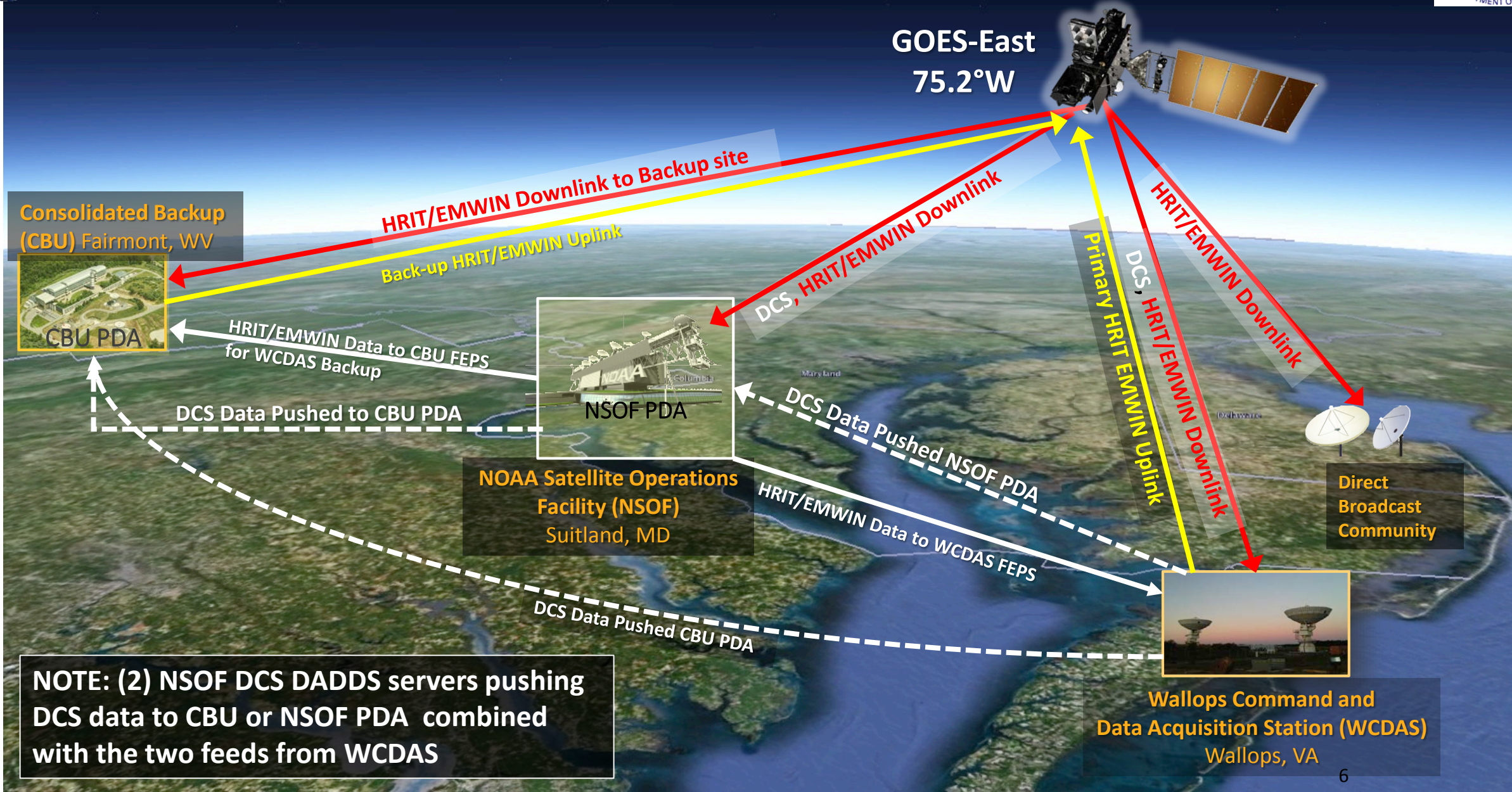


Production and Uplink Systems

Characteristic	HRIT/EMWIN System Configuration
Input Streams All Go Through the Product Dissemination & Access (PDA) Systems	Imagery – PDA NSOF, Suitland, MD or WBU Fairmont, WV EMWIN – NWS “Gateway” College Park, MD or Boulder, CO DCS – DADDS NSOF, Suitland, MD or DADDS Wallops, VA NHC Products – Acquired over the internet at this time
PDA / HRIT-EMWIN Broadcast Stream Production	Primary – Satellite Operations Facility (NSOF) in Suitland, MD Backup – Consolidated Backup Facility (CBU) in Fairmont, WV Both can feed uplink antenna systems at Wallops, WV and the CBU
Uplink Antenna Systems	Primary – Command & Data Acquisition Station (WCDAS) Wallops Island, VA Backup – Consolidated Backup Facility (CBU) in Fairmont, WV Both can uplink HRIT/EMWIN to GOES-R Series Satellites
Downlink and Data Monitoring	Front End Processors linked to GOES-R antennas at WCDAS/CBU have both transmit and receive capability. Received files are relayed back to PDA’s for transmit-receipt & checksum validation Anomaly warning messages are generated to help desk & operators VSAT stations are online at the NSOF for troubleshooting
User Input on Broadcast Quality	Input from users/manufacturers in the field is highly desired



GOES East DCS to HRIT/EMWIN Operations





HRIT/EMWIN Virtual Channel ID & Product Listing

VCID #	Product Name	Period -Minutes	Format	Source Link
0	Admin Text	60	Text Messages	N/A
1	Mesoscale 1 Km box (Bands. 2, 7, 13)	15	NetCDF4	https://www.goes-r.gov/spacesegment/abi.html
2	CMI Band 2	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
6	GOES-15 IR FD and NH	30	LRIT	http://www.goes.noaa.gov/goesfull.html
7	CMI Band 7	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
8	CMI Band 8	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
9	CMI Band 9	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
13	CMI Band 13	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
14	CMI Band 14	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
15	CMI Band 15	30	NetCDF4	https://www.goes-r.gov/education/ABI-bands-quick-info.html
20	EMWIN - Priority	Variable	Text	http://www.nws.noaa.gov/emwin/EMWIN_Image_and_Text_Data_Capture_Catalog_table_v1.1_r171002_1350.pdf
21	EMWIN - Graphics	Variable	Graphic (e.g. GIF, JPEG)	http://www.nws.noaa.gov/emwin/EMWIN_Image_and_Text_Data_Capture_Catalog_table_v1.1_r171002_1350.pdf
22	EMWIN - Other	Variable	Text and Graphic	http://www.nws.noaa.gov/emwin/EMWIN_Image_and_Text_Data_Capture_Catalog_table_v1.1_r171002_1350.pdf
23	NWS Products	60	Graphic	http://www.nhc.noaa.gov/tafb_latest/
24	NHC Graphics Products	60	Graphic (e.g. GIF, JPEG)	http://www.nhc.noaa.gov/tafb_latest/
25	GOES-R JPEG Products	None At This Time	JPEG	http://www.ospo.noaa.gov/Products/imagery/index.html
26	Int'l Graphics Products	60	Graphic (e.g. GIF, JPEG)	http://www.ospo.noaa.gov/Products/imagery/index.html
30	DCS Admin	Continual	Text	https://dcs1.noaa.gov/Account/Login
31	DCS Data	Continual	Formatted Text	https://dcs1.noaa.gov/Account/Login
60	Himawari	60	LRIT	http://www.data.jma.go.jp/mscweb/data/himawari/index.html



Description of the Broadcast

- Combines Legacy N-P LRIT & EMWIN broadcasts
- Also carries a copy of the GOES-DCS broadcast

Characteristic	HRIT/EMWIN Broadcast Specifications
Platform	Operational East and West GOES-R Series Satellites
Operating Frequency Range	L-band
Center Frequency	1694.1 MHz
Data Rate	400 Kbps
Symbol Rate	927 Ksps
Modulation	BPSK
Polarization	Linear – Vertical offset
Antenna System	At 5 degree elevation, the minimum antenna is 1.2 meter. At 10 degrees or more, the minimum size is 1.0 meter



Receive System Components - General

Component	HRIT/EMWIN Broadcast Specifications	Additional Information
Platform	Operational East and West GOES-R Series Satellites	<ul style="list-style-type: none">• GOES-16 at 75.2 West• GOES-17 at 137.0 West (TBD)<ul style="list-style-type: none">○ Launched March 1, 2018○ Predicted Operational West Fall of 2018
Broadcast	Operating Frequency Range	L-band
	Center Frequency	1694.1 MHz
	Data Rate	400 Kbps
	Symbol Rate	927 ksps
	Modulation - BPSK	<ul style="list-style-type: none">• Convolutional rate $\frac{1}{2}$ 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• The resulting “Necessary Bandwidth” for this signal will be 1.205 MHz
	Polarization - Linear	Vertical Offset
Antenna System	VSAT	<ul style="list-style-type: none">• At 5 degree elevation, the minimum antenna is 1.2 meter.• At 10 degrees or more elevation the minimum size is 1.0 meter
Low-Noise Block-Down Converter	L-band	Example: <ul style="list-style-type: none">• Input 1691 MHz• Output 137.5 Mhz
Satellite Receiver	L-band	<ul style="list-style-type: none">• BPSK 1691MHz to 137.5MHz
Software	N/A	<ul style="list-style-type: none">• De-encapsulates HRIT/LRIT files• Visualization and Manipulation of Files• Optional Applications (examples)<ul style="list-style-type: none">○ EMWIN visualization application○ GOES-DCS database software or application



Contact Information

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EMWIN

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