High Rate Information Transmission Emergency Managers Weather Information Network (HRIT/EMWIN) User Group

Quarterly Meeting

26 April 2018

HRIT/EMWIN User Group

-Meeting Agenda

-Purpose of the Working Group

Seth Clevenstine

Agenda Items & Schedule

- 3:00 pm (EST) – Roll Call/ Introduction to User Group--- Seth Clevenstine – 5 mins
- GOES-S Post Launch Schedule/GOES-West Transition---Seth Clevenstine – 5 mins
- Description of the Broadcast (Ground System Segment)---Seth Clevenstine – 10 mins
- Status of the Products (Imagery, Formats, Periodicity)---- Seth Clevenstine – 5 mins
- Current Broadcast Configurations---------- Seth Clevenstine – 5 mins
- Broadcast Issues----------Seth Clevenstine – 5 mins
- GLM Inclusion (Do HRIT Users Want GLM?)---------- Seth Clevenstine – 5 mins
- GOES-R Baseline Level II Products (Which Ones?)------- Seth Clevenstine – 5 mins
- EMWIN update----------Bob Gillespie – 5 mins
- Frequency update----------Dave Lubar – 5 mins
- Open Discussion Items – Ideas for the Permanent Agenda Seth Clevenstine – 15 mins
- Action items and summary----------Paul Seymour – 5 mins
- Total – 75 mins

Purpose of the User Group

- Form a User Community for HRIT/EMWIN
- Provide the latest news on the HRIT/EMWIN broadcast
- Provide the latest status on the GOES-S Schedule
- Information Exchange on Broadcast Content
- Updates on User / Manufacturer Readiness
- Spectrum Issues
- Other Topics As They Arise

HRIT/EMWIN User Group

-Status of GOES-16 and GOES-S

-Description of the HRIT Broadcast and Systems

-Status of the Broadcast

-Status of the Products

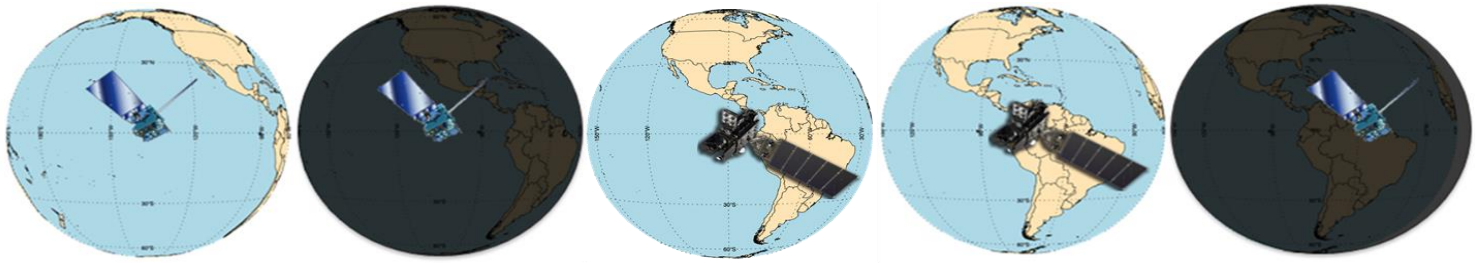
-Stream Configurations

-Broadcast Stream Monthly Statistics

Seth Clevenstine

Status of GOES-16 and GOES-S

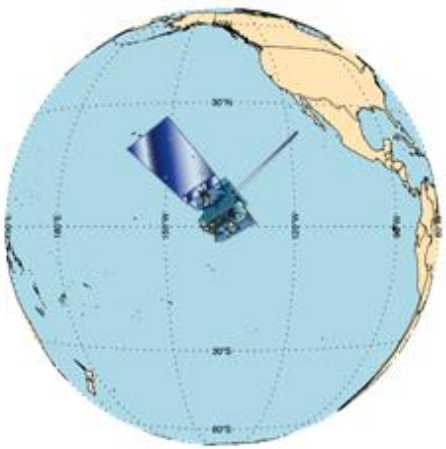
- GOES-16 is GOES-East at 75.2° West as of 12/18/2017
  - HRIT/EMWIN is operational on GOES-East
  - A 1692.7 MHz EMWIN broadcast is active on GOES-14 at 105° West until June 13th (possible extension exists).
  - LRIT & EMWIN are still operational on GOES-15 (West) until GOES West transition.



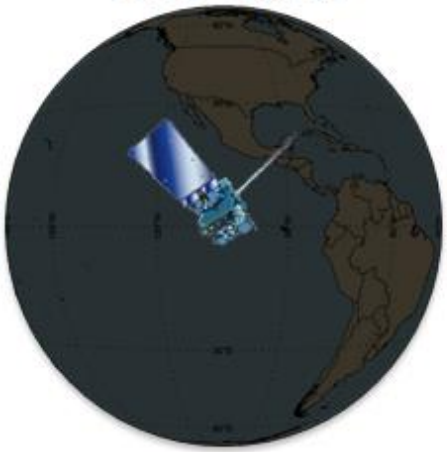
- GOES-S was launched on 03/01/18 and is effectively GOES-17 as of 3/12/18
  - Is located at 89.5° West for Post-Launch Testing (PLT)
    - After May 1st HRIT/EMWIN transponder planned to remain on constant
  - Transition from LRIT on GOES-15 to HRIT on GOES-17
    - It is planned to become GOES-West Fall of 2018

Future GOES Constellation (West Transition)

GOES-West
GOES-15
135° West

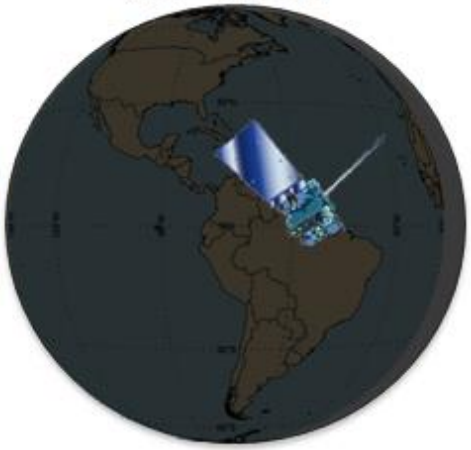


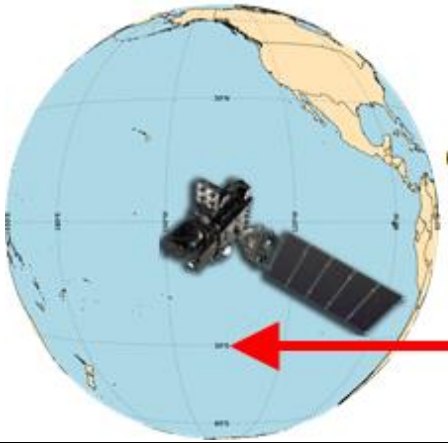
Standby
GOES-14
105° West



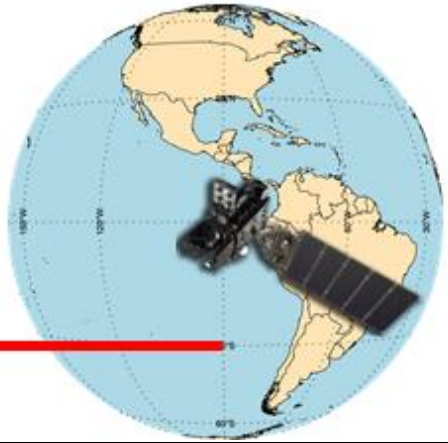
GOES-East
GOES-16
75.2° West

Storage
GOES-13
60° West



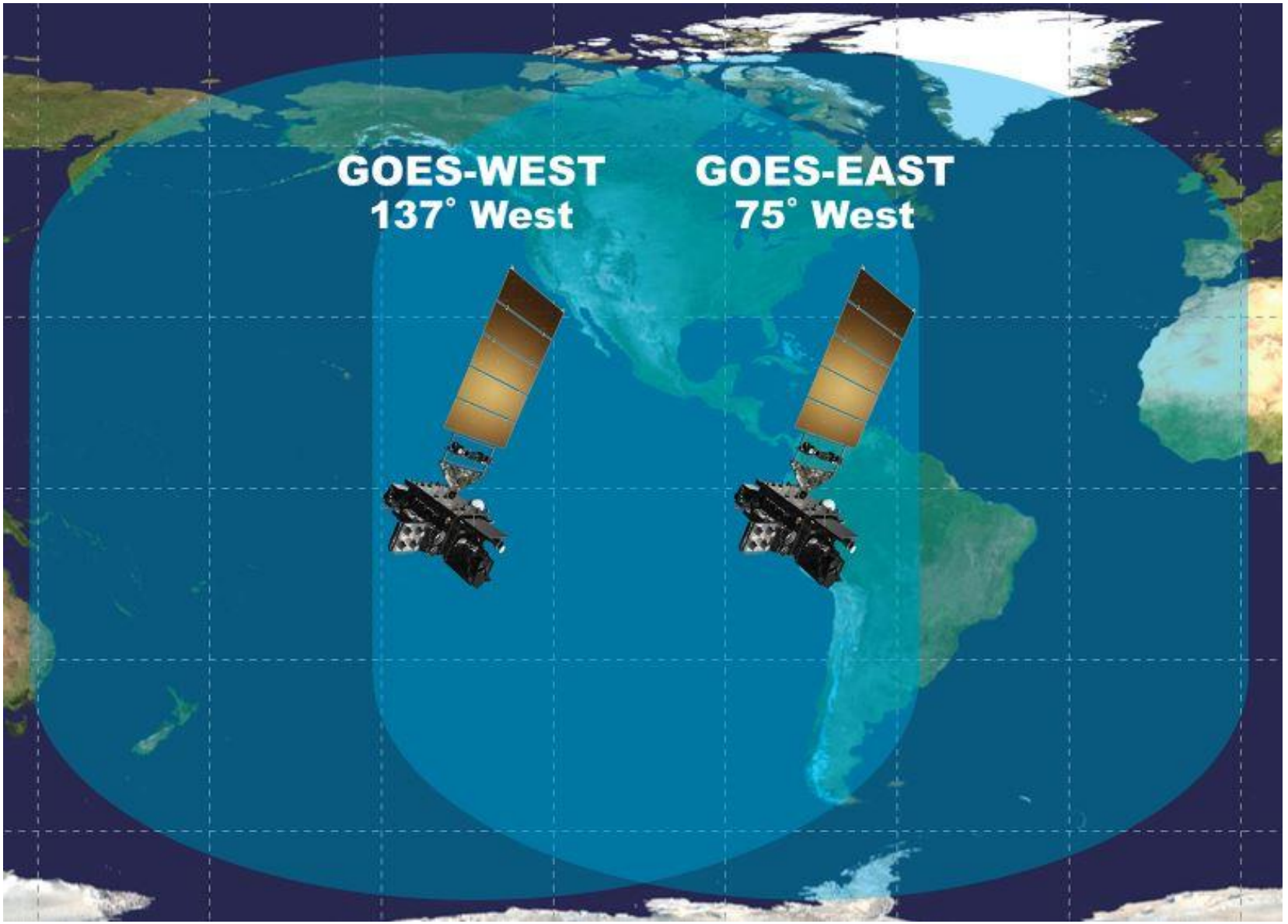


GOES-West
GOES-S
137° West

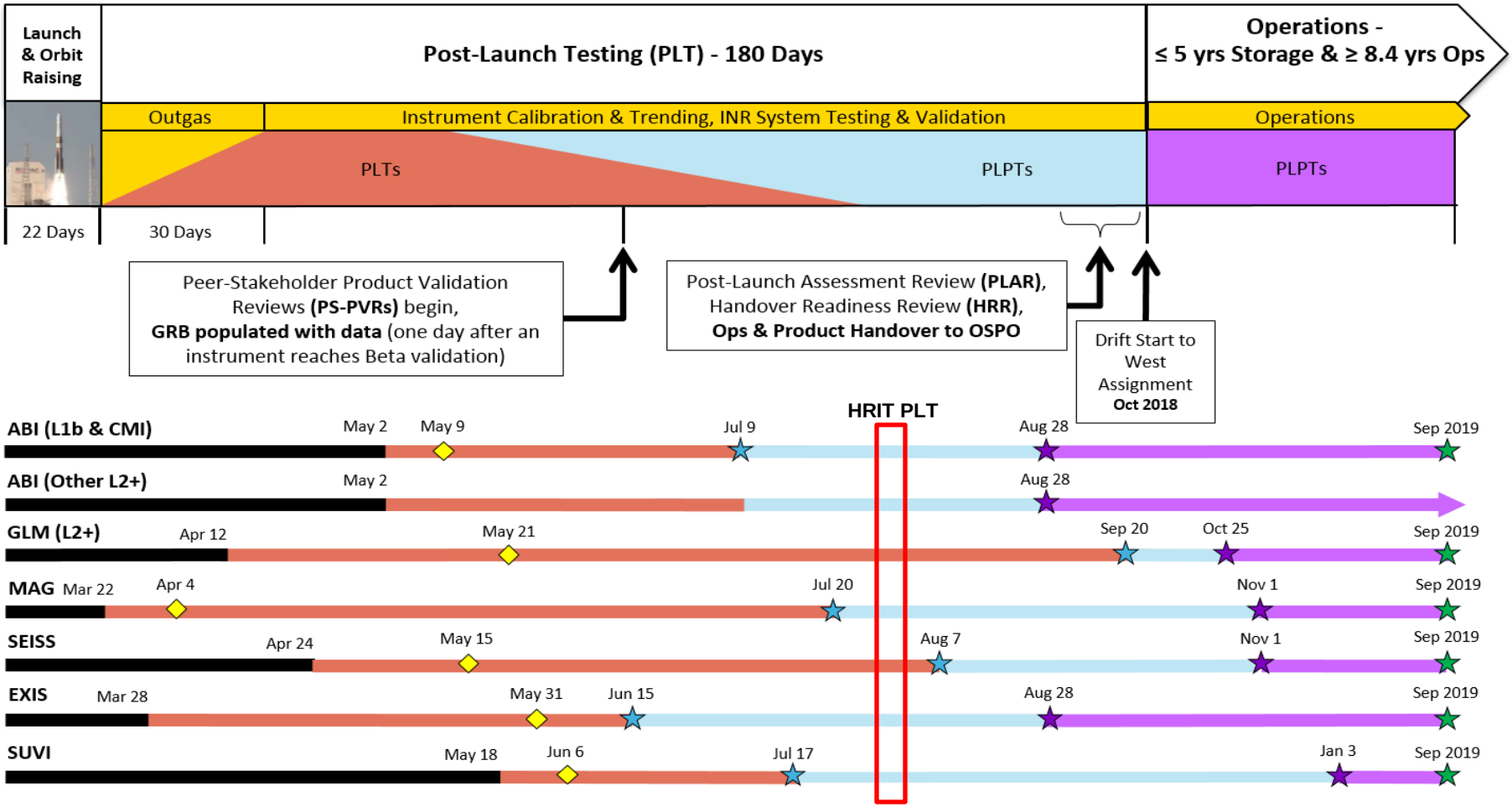


Checkout
GOES-S
89.5° West

HRIT/EMWIN Footprint Past GOES West Transition



GOES-17 Post-Launch Science Product Validation Schedule



LEGEND

Current as of April 23, 2018
elizabeth.kline@noaa.gov

- Science Products Not Flowing
- Internal product flow begins
- Post-Launch Testing (PLT) / Beta testing
- Beta Validated Products
- External product flow begins
- Post-Launch Product Testing (PLPT) / Provisional testing
- Provisionally Validated Products
- Post-Launch Product Testing (PLPT) / Full validation testing
- Fully Validated Products

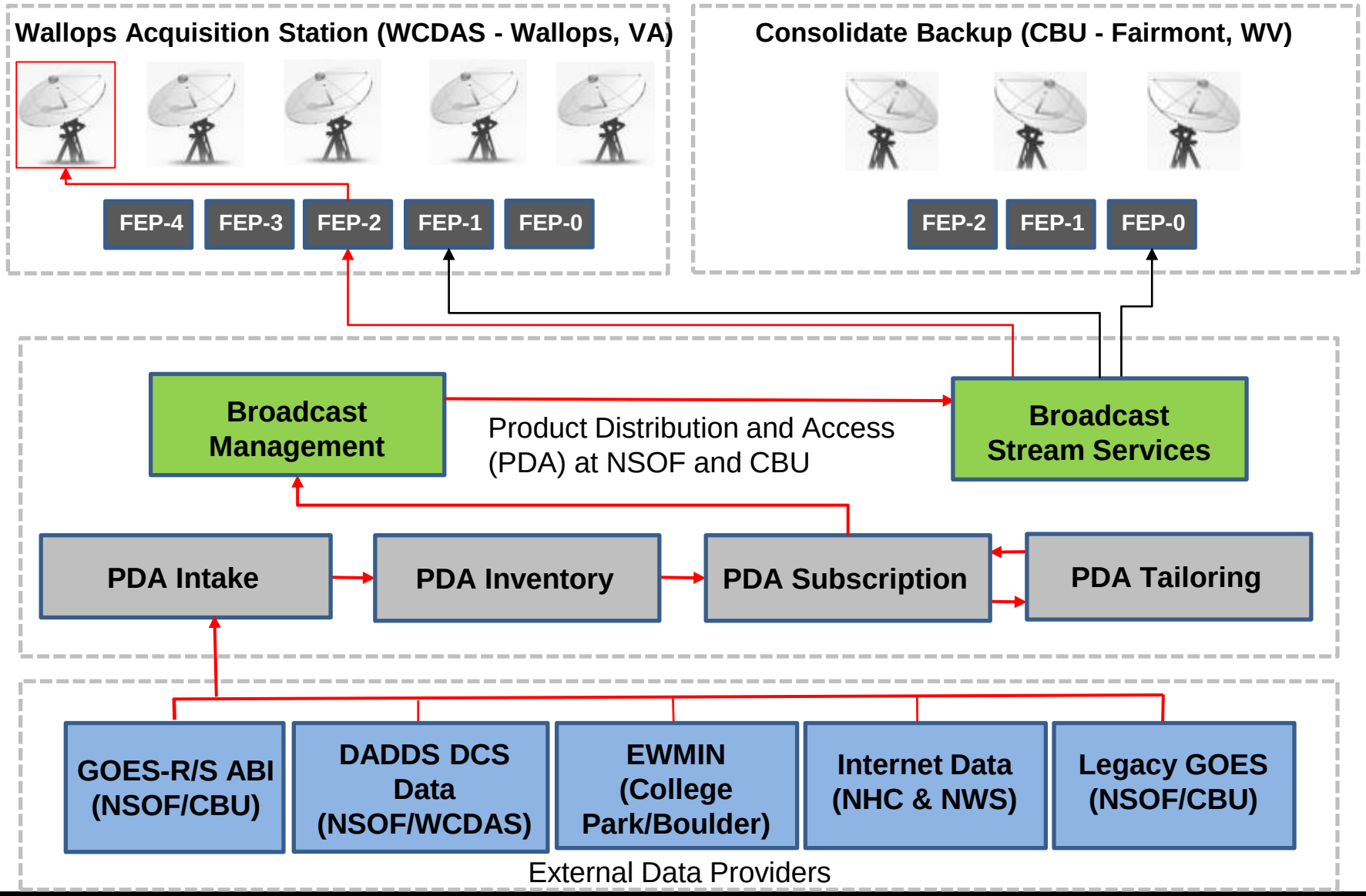
- First public imagery media outreach
- Beta PS-PVR
- Provisional PS-PVR
- Full Validation PS-PVR

Note: All dates are coordinated with Flight/MOST PLT SOE group and are subject to change.

Production and Uplink Systems

Characteristic	HRIT/EMWIN System Configuration
Input Streams All Go Through the Product Dissemination & Access (PDA) Systems	**1. Imagery – PDA NSOF, Suitland, MD or CBU Fairmont, WV** **2. EMWIN – NWS "Gateway" College Park, MD or Boulder, CO** **3. DCS – DADDS NSOF, Suitland, MD or DADDS Wallops, VA** **4. NHC Products – Acquired over the internet at this time**
PDA / HRIT-EMWIN Broadcast Stream Production	**<u>Primary</u> – 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	**<u>Primary</u> – 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 (FEPS) 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	**<u>Input from users/manufacturers in the field is highly desired</u>**

PDA to HRIT to Acquisition Site Data Flow



Organization of the Broadcast Stream

- Three "Broadcast Groups": Imagery, EMWIN, DCS
  - Prioritized:
    - **#1** - EMWIN: All EMWIN products on VCID 20, 21 and 22
    - **#2** – DCS: All DCS products on VCID 30 & 31
    - **#3** – Imagery: Includes all GOES East, West and H-8 on VCID's 1-15 and 60.
  - Each Group has a guaranteed and maximum bandwidth allocated

Group Name	Guaranteed Bandwidth	Maximum Bandwidth	Group Order Rank
EMWIN	13%	20%	1
DCS	5%	10%	2
Imagery	67%	100%	3

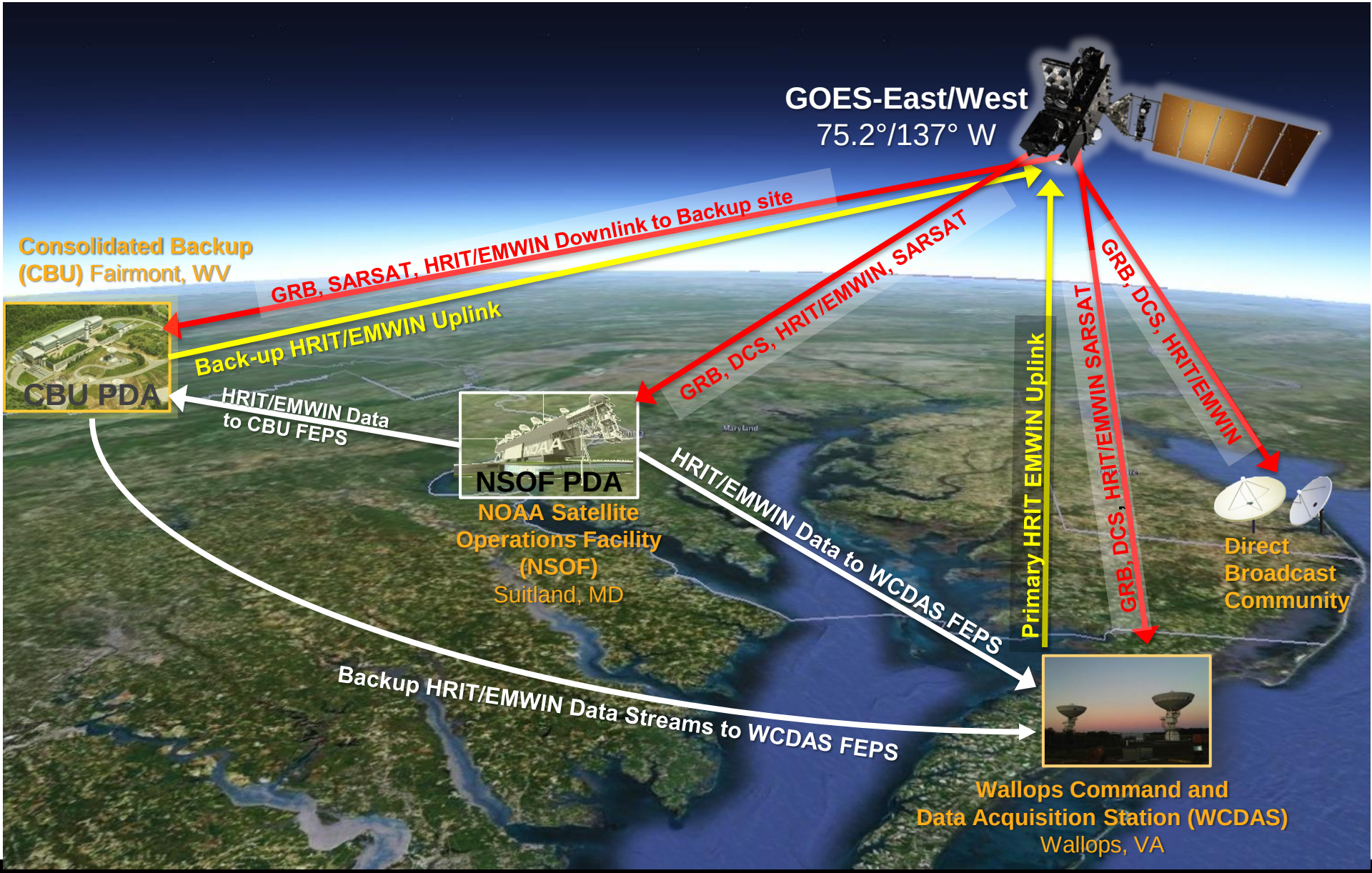
Broadcast Stream Configurations

- Users of the PDA and HRIT/EMWIN use "Subscriptions"
  - As data arrives in the PDA, it is made available to HRIT / EMWIN "subscriptions" then becoming available for the "broadcast streams"
- There can be multiple broadcast streams with different product combinations
- Nominal East and West Streams will be the baseline
  - Full disk of 7 ABI bands and Mesoscale images in 3 bands
  - Full disk of Himawari in 3 bands on GOES-West
  - EMWIN, DCS observations, NHC information
- Other streams could be available; e.g. Super Tropical Storm
  - After they are set up, broadcast streams can be changed "on the fly"

Products Mapped to VCID's

VCID #	Product Name	Period -Min	Format	Source Link
0	Admin Text	60	Text Messages	N/A
1	Mesoscale 1 Km box (Bands 2, 7, 13)	15	HRIT/LRIT	https://www.goes-r.gov/spacesegment/abi.html
2	CMI Band 2	30	HRIT/LRIT	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	HRIT/LRIT	https://www.goes-r.gov/education/ABI-bands-quick-info.html
8	CMI Band 8	30	HRIT/LRIT	https://www.goes-r.gov/education/ABI-bands-quick-info.html
9	CMI Band 9	30	HRIT/LRIT	https://www.goes-r.gov/education/ABI-bands-quick-info.html
13	CMI Band 13	30	HRIT/LRIT	https://www.goes-r.gov/education/ABI-bands-quick-info.html
14	CMI Band 14	30	HRIT/LRIT	https://www.goes-r.gov/education/ABI-bands-quick-info.html
15	CMI Band 15	30	HRIT/LRIT	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	Formated Text	https://dcs1.noaa.gov/Account/Login
60	Himawari	60	LRIT	http://www.data.jma.go.jp/mscweb/data/himawari/index.html

GOES HRIT/EMWIN Operations



Receive System Components - General

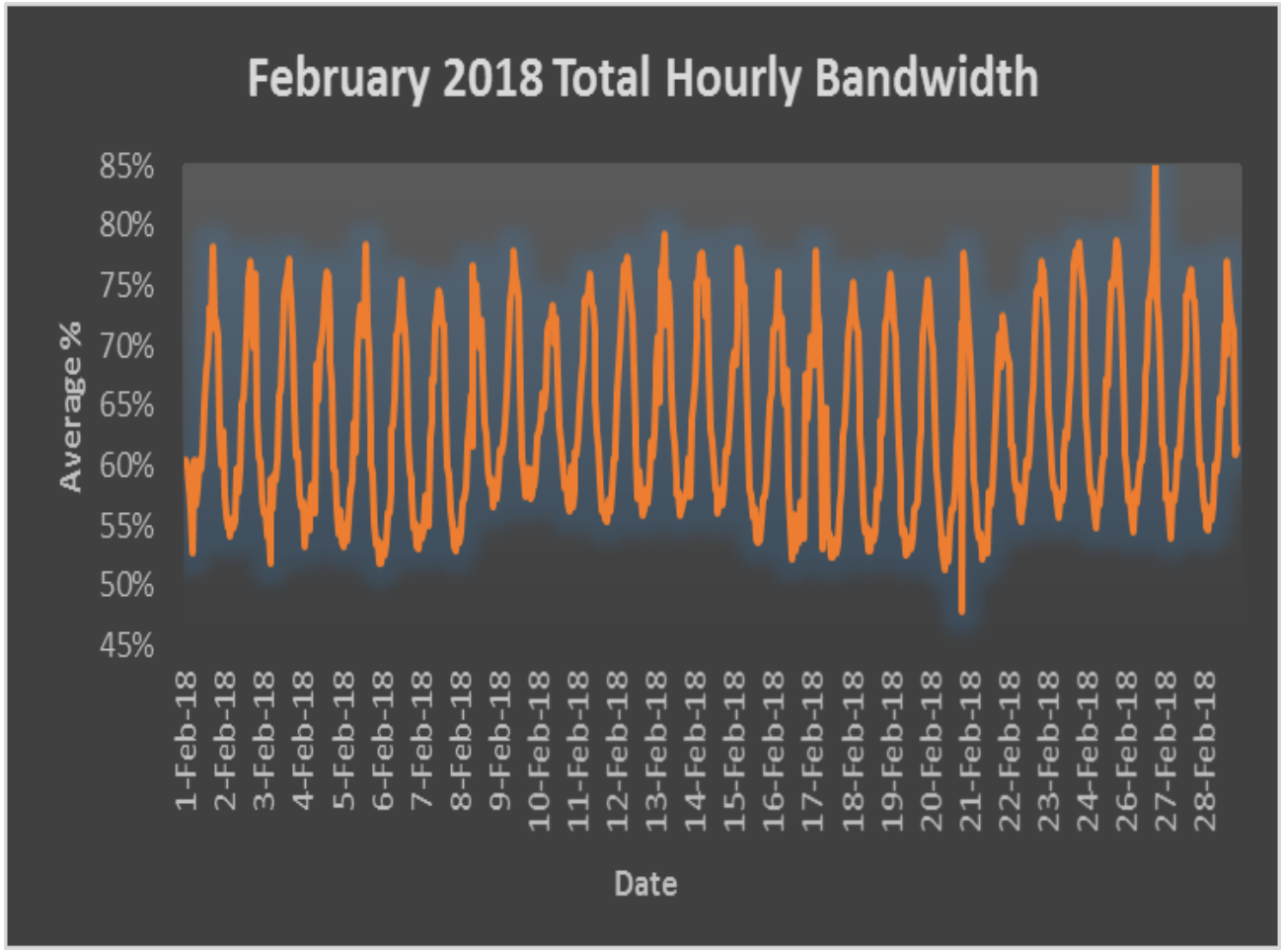
Component	HRIT/EMWIN Broadcast Specifications	Additional Information

Platform	Operational East and West GOES-R Series Satellites	• GOES-16 at 75.2 West
		• GOES-17 at 137.0 West
		  ○ Launched March 1, 2018
		  ○ Predicted Operational West Fall 2018

Broadcast	Operating Frequency Range	L-band
	Center Frequency	1694.1 MHz
	Data Rate	400 Kbps
	Symbol Rate	927 ksps
	Modulation - 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 • The resulting "Necessary Bandwidth" for this signal will be 1.205 MHz
	Polarization - Linear	Vertical Offset
Antenna System	VSAT	• 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: • Input 1691 MHz • Output 137.5 Mhz
Satellite Receiver	L-band	• BPSK 1691MHz to 137.5MHz

Software	N/A	• De-encapsulates HRIT/LRIT files
		• Visualization and Manipulation of Files
		• Optional Applications (examples)
		  ○ EMWIN visualization application
		  ○ GOES-DCS database software or application

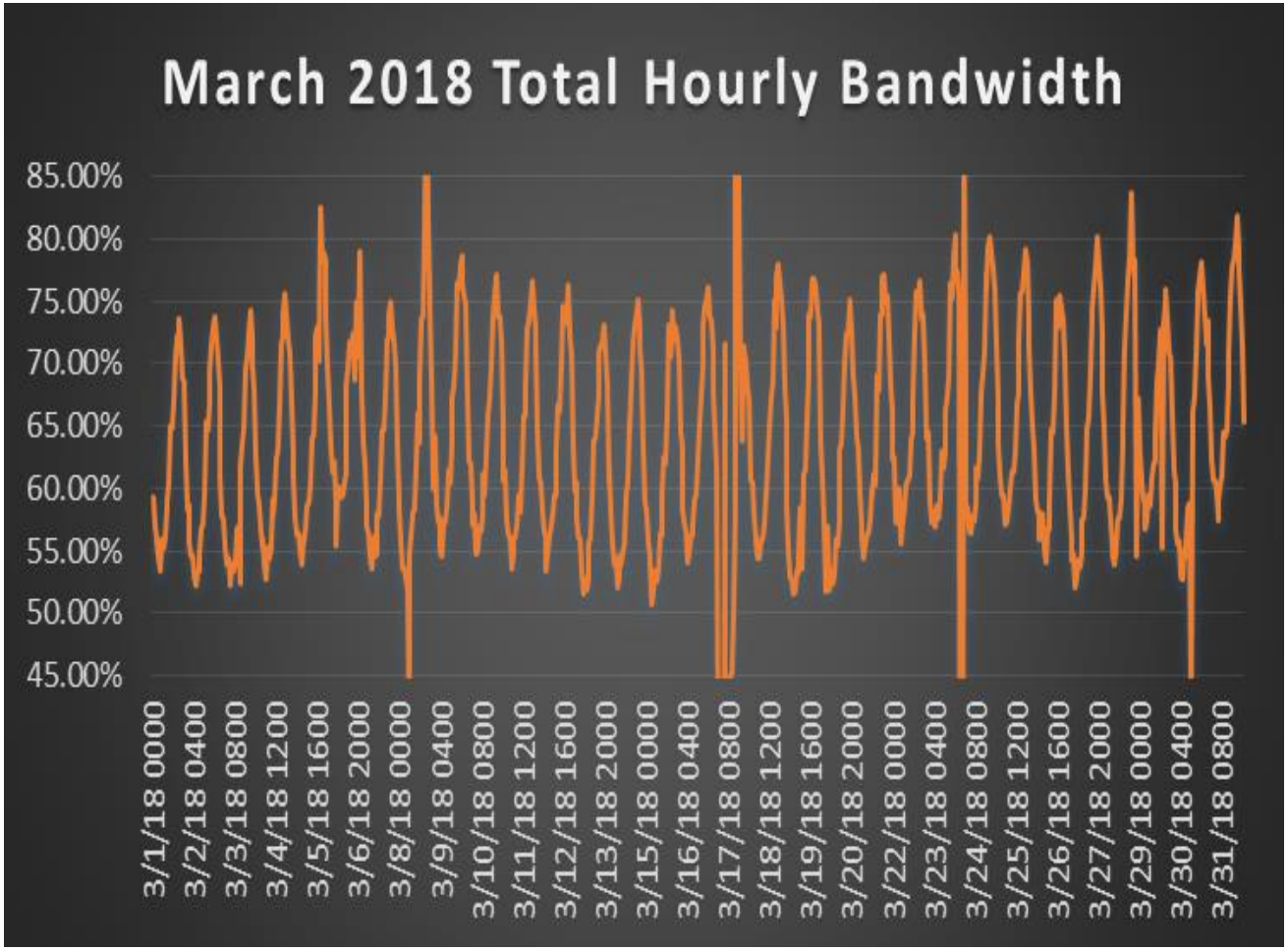
February 2018 GOES East HRIT Statistics



Monthly Averages

18Z Daytime Peak %	76.3%
Imagery Group	70.0%
DCS	3.7%
EMWIN	2.5%
04Z Night time Lull %	55.6%
Imagery Group	49.3%
DCS	3.7%
EMWIN	2.6%
Daily Total Data Size	23.2Gb

March 2018 GOES East HRIT Statistics



Monthly Averages

18Z Daytime Peak %	77.0%
Imagery Group	71.0%
DCS	3.7%
EMWIN	2.3%
04Z Night time Lull%	54.0%
Imagery Group	47.8%
DCS	3.7%
EMWIN	2.5%
Daily Total Data Size	22.1 Gb

GOES-16 Imagery Schedule

GOES-East ABI Flex Mode (Routine) Schedule - Abridged

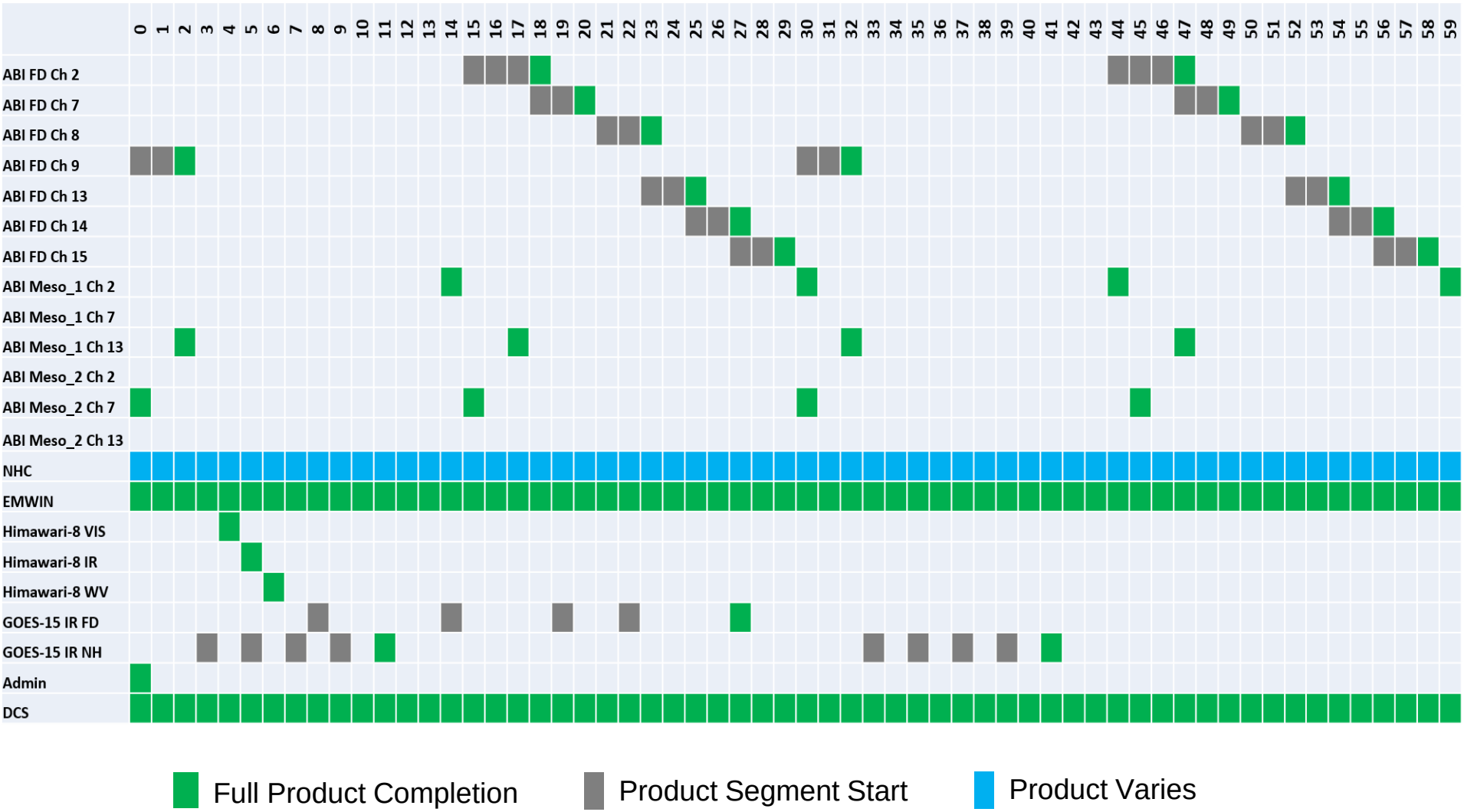
MESO 1 and MESO 2 frames will each be imaged once every minute at the following times:

MESO 1 - XX:XX:24.4 - 5.6 sec dur
MESO 2 - XX:XX:54.4 - 5.6 sec dur

Full Disk on HRIT/EMWIN every 30 min in 7 ABI bands. The table below shows a 15 minute schedule with HRIT product pulls in bold. XX = Hour.

TIME (UTC)	SCAN SECTOR	DURATION (MM:SS)
XX:00:24	**MESO 1**	**5.6 sec**
XX:00:35	**Full Disk**	**10:37**
XX:00:54	**MESO 2**	**5.6 sec**
XX:01:24	MESO 1	5.6 sec
XX:01:54	MESO 2	5.6 sec
XX:02:16	CONUS	02:37
XX:02:24	MESO 1	5.6 sec
XX:02:54	MESO 2	5.6 sec
XX:03:24	MESO 1	5.6 sec
XX:03:54	MESO 2	5.6 sec
XX:04:24	MESO 1	5.6 sec
XX:04:54	MESO 2	5.6 sec
XX:05:24	MESO 1	5.6 sec
XX:05:54	MESO 2	5.6 sec
XX:06:24	MESO 1	5.6 sec
XX:06:54	MESO 2	5.6 sec
XX:07:16	CONUS	02:37
XX:07:24	MESO 1	5.6 sec
XX:07:54	MESO 2	5.6 sec
XX:08:24	MESO 1	5.6 sec
XX:08:54	MESO 2	5.6 sec
XX:09:24	MESO 1	5.6 sec
XX:09:54	MESO 2	5.6 sec
XX:10:24	MESO 1	5.6 sec
XX:10:54	MESO 2	5.6 sec
XX:11:24	MESO 1	5.6 sec
XX:11:54	MESO 2	5.6 sec
XX:12:16	CONUS	02:37
XX:12:24	MESO 1	5.6 sec
XX:12:54	MESO 2	5.6 sec
XX:13:24	MESO 1	5.6 sec
XX:13:54	MESO 2	5.6 sec
XX:14:24	MESO 1	5.6 sec
XX:14:54	MESO 2	5.6 sec
XX:15:24	**MESO 1**	**5.6 sec**
XX:15:35	Full Disk	10:37
XX:15:54	**MESO 2**	**5.6 sec**

Products Received During the Hour



HRIT/EMWIN User Group Broadcast Issues

-DCS Latencies and Outages

-NHC and Meteosat Outages

-GOES-16 Imagery and Bandwidth

-Time Triggered Subscriptions

Seth Clevenstine

Broadcast Issues

- DCS High Latencies, Duplications and Outages
  - Experienced high latency values due to shared resources within PDA (resolved 2/8/18)
  - Experienced numerous outages on the DCS DADDS servers due to SFTP connection errors between DADDS and PDA (resolved 2/8/18).
  - Still experiencing duplicated datasets.
- National Hurricane Center (NHC) Outage
  - Experienced a month long outage (1/18 through 2/14) due to NHC website platform outsourced to Amazon AWS Cloudfront, with PDA having issues pulling from website due to invalid certificates.
- Meteosat JPEG images Missing on GOES-16
  - Source was changed, expected to be back before Hurricane season.

Broadcast Issues

Known Time Triggered Subscription Issues

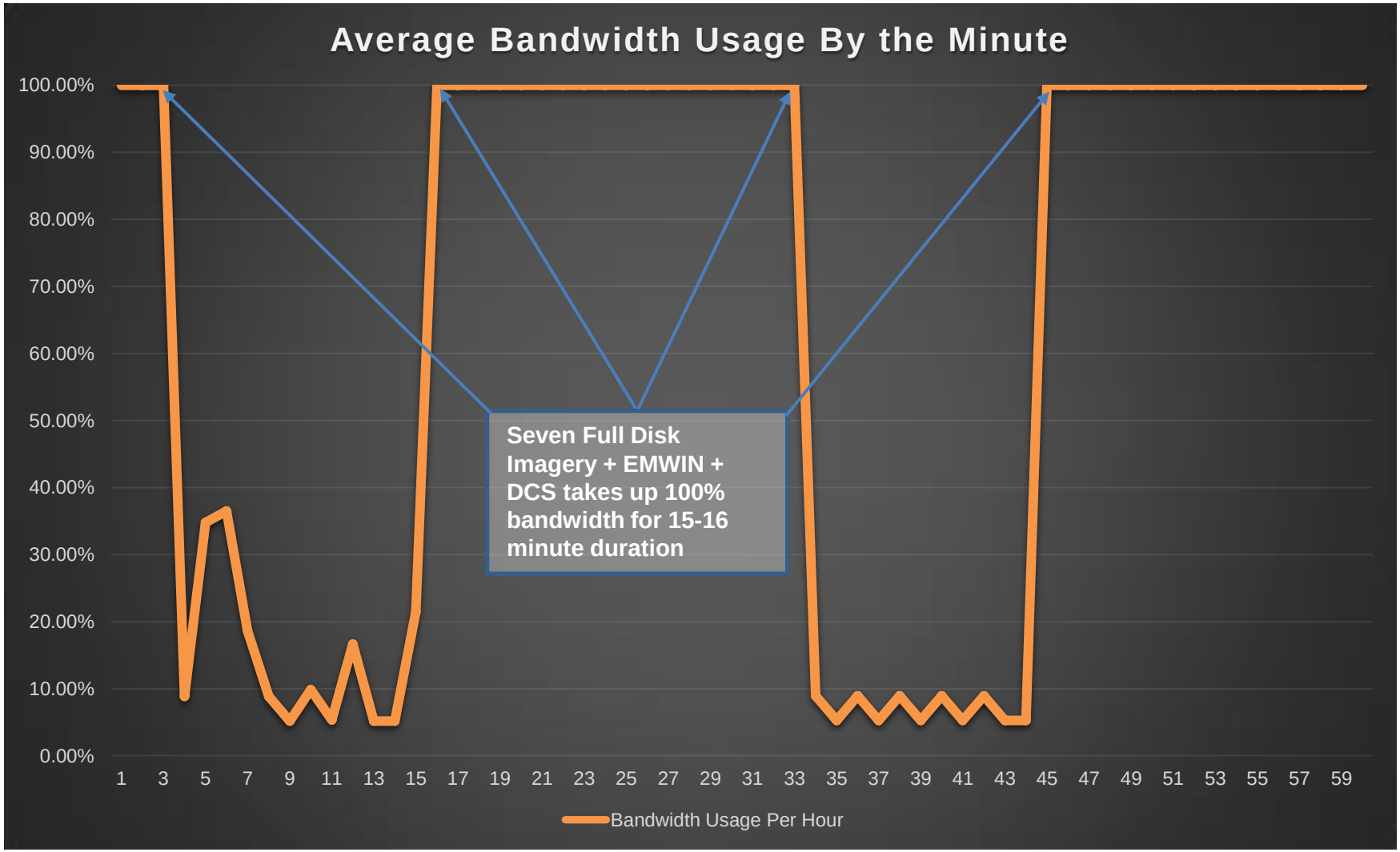
- What does it affect?
  - Affects 3 Mesoscale Imagery products each 15 minutes from distributing
    1. Mesoscale sector 1, band 7 missing
    2. Mesoscale sector 2, band 2 missing
    3. Mesoscale sector 2, band 13 missing
- When is the plan to fix this issue?
  - A workaround that's apart of PDA Release 3.1, which is expected to be delivered to operations in late May 2018.

Broadcast Issues

Seven GOES-16 Full Disk Images

- What's the problem?
  - Due to file time arrival, the seventh full disk image (band 9) scan time is :15 and :45 and not the same as the other 6 full disk images, which are :00 and :30.
  - Each band takes ~140+ seconds to broadcast, by the time the seventh image file comes up, a new scan has came in and PDA distributes it instead of the older one.
- When is the plan to fix this issue?
  - Lose one image band
    - A GOES West IR (GOES-17) image will be added to GOES East broadcast and vice versa in the fall.

Averaged Minute-By-Minute Bandwidth %



HRIT/EMWIN User Group
Future Work

-GLM Inclusion and Timeline

-GOES-R Baseline Level II Products

-GOES R Series Imagery to CBU

-DCS File Format Proposal

Seth Clevenstine

Global Lightning Mapper (GLM) Issue

- GLM files arrive every 20 seconds w/ variable size
- They are not CDF compliant. They are vector point data.
- Each file is on the order of Mb's which is far too much data to include on the broadcast.
- There is work underway to build a composite file
  - Gridded; 5 minute; 8 Km Product's; provided by the NWS
  - Is this data sufficiently important to the User Community to justify the bandwidth?
    - At the expense of what other product?

Level II Baseline Products Issue

- There are 25 Baseline Level II ABI Products
  - See the list at: https://www.goes-r.gov/products/baseline.html
- We have a selection of ABI and no plans to add Radiances
- Derived winds are actually 5 products and quite large
  - NOT CDF compliant, thus would go out NetCDF4 vice HRIT format
- Leaves 22 products to choose from
  - Need to translate to HRIT format; or transmit in NetCDF4 via .zip
- Also need to determine what would fit in the broadcast
  - With or without GLM
- A prioritized list would be a great starting point

WMO SDR Level II Products Selection

WMO Regional Associations 3-4-Satellite Data Requirements Working Group Recommendations for GOES-R Level II Products for Hydro-Met Services

Volcanic Ash: Detection and Height
Cloud Optical Depth
Cloud Particle Size Distribution
Cloud Top Phase
Cloud Top Pressure
Cloud Top Temperature
Hurricane Intensity Estimation
Rainfall Rate / QPE
Fire/Hot Spot Characterization
Land Surface Temperature (Skin)
Snow Cover
Sea Surface Temperature (Skin)
Total Precipitable Water
Derived Stability Indices
Legacy Vertical Moisture Profile (Quite large)
Legacy Vertical Temperature Profile (Quite large)

<u>Products Not Selected by this WMO SDR Group:</u>

Aerosol Detection (Including Smoke and Dust)
Aerosol Optical Depth (AOD)
Clear Sky Masks
Cloud Top Height
Derived Stability Indices
Downward Shortwave Radiation: Surface
Reflected Shortwave Radiation

WMO SDR Level II Products Sizes

Level II Product Description	Total Files per Day	File Availability	Average Size per file (kb)
Cloud Optical Depth Full Disk	96	15 minutes	48849.66
Cloud Optical Depth CONUS	288	5 minutes	21999.10
Cloud Particle Size Full Disk	96	15 minutes	144869.58
Cloud Top Phase CONUS	288	5 minutes	1952.79
Cloud Top Phase Full Disk	96	15 minutes	10820.45
Derived Motion Winds Full Disk	144	10 minutes	109014.45
Derived Stability Indices CONUS	288	5 minutes	7153.45
Derived Stability Indices Full Disk	96	15 minutes	34030.37
Downward Shortwave Radiation CONUS	24	60 minutes	816.60
Downward Shortwave Radiation Full Disk	24	60 minutes	1014.97
Fire/Hot Spot Characterization CONUS	288	5 minutes	5125.72
Fire/Hot Spot Characterization Full Disk	96	15 minutes	24895.30
Hurricane Intensity Estimation Full Disk	0		0.00
Land Surface Temp CONUS	24	60 minutes	12745.38
Land Surface Temp Full Disk	24	60 minutes	3007.18
Legacy Vertical Moisture Profile CONUS	288	5 minutes	235209.83
Legacy Vertical Moisture Profile Full Disk	96	15 minutes	1845232.38
Legacy Vertical Temp Profile CONUS	288	5 minutes	235209.23
Legacy Vertical Temp Profile Full Disk	96	15 minutes	1845231.78
Rain Rate / QPE Full Disk	96	15 minutes	11861.88
Reflected Shortwave Radiation CONUS	24	60 minutes	807.11
Reflected Shortwave Radiation Full Disk	25	60 minutes	2410.25
Sea Surface Temp Full Disk	24	60 minutes	230911.72
Total Precip Water CONUS	288	5 minutes	2228.38
Total Precip Water Full Disk	96	15 minutes	9878.09
Volcanic Ash Detection/Height Full Disk	96	15 minutes	225628.29
CMI Full Disk	1536	15 minutes	360933.24

Future HRIT/EMWIN Work

- GOES-R imagery provided to CBU's PDA
  - Make's both NSOF and CBU equal in product dissemination
    - Data will be provided by a VM from NSOF which will push imagery to CBU PDA.
  - Allows up to six broadcast streams configurable to any acquisition site
  - Work to be completed before GOES West transition
- HRIT/EMWIN File Latency (mid/late summer)
  - Separates HRIT/EMWIN "tailoring" from other PDA products to reduce high intermittent observed latency values
- HRIT/EMWIN Duplication Issue (mid/late summer)
  - Reduces multiple threads of same product to the broadcast streams

Post Launch GOES-17 HRIT/EMWIN Test

- Scheduled for late July to early August timeframe
- Will simulate various configurations between acquisition and PDA sites.
- Will compliment the full data flow similar to how GOES-16's PLT was performed
- Would like to get end users participation to provide feedback on product receipt

Proposed Future HRIT/EMWIN Work

- DCS File Format Proposal by Microcom
  - Proposal is to change the header information on each message within DADDS, nothing changed on the .lrit file. Current protocol is outdated and inefficient
  - Affects the HRIT software reception that parses DCS data messages
    - Would need HRIT/EMWIN manufacturers input on this specific DCS change and what it means to their clients reception
  - Proposal is to have a transition period (~6 months) over the GOES East broadcast where DCS bandwidth would double in size by streaming both the old and new version simultaneously.
    - DCS bandwidth % is currently ~3.7, this would increase it to 8% of the broadcast.
    - No defined timeframe yet and still subject to NOAA approval

EMWIN Update

Emergency Managers Weather Information Network (EMWIN)

EMWIN Program Manger: Bob Gillespie robert.gillespie@noaa.gov (301) 427-9693

Chief Dissemination Systems: Craig Hodan craig.hodan@noaa.gov (301) 427-9678

EMWIN Support …… nws.emwin.support@noaa.gov

EMWIN Update

NWS HRIT/EMWIN Deployment Status:

1. NWS Data Center Build Out - **COMPLETE**

   College Park, MD Boulder, CO

2. Network Infrastructure and NESDIS PDA Interface – **COMPLETE**

   NSOF, Suitland, MD CBU, Fairmont, WV

3. EMWIN Processing Software : **IN PROGRESS**

   - software in rework to correct deficiencies is in progress
   - planned operational date: July 2018

4. NWS/NESDIS 24x7 Operational Support Services – **READY**

   … to start with 30-day Software Acceptance Test (June 2018); and available thereafter.

EMWIN Update

EMWIN Broadcast / GOES Satellite Constellation

1. GOES-East (GOES-16) @ 75.2° W
   a) HRIT/EMWIN Transmitter active (Dec 2018 - ???)
   b) EMWIN sub-channels (20,21,22) for testing only – NWS will announce "operational use".
2. GOES-14 @ 105° W
   a) EMWIN Transmitter active (Nov 2018 – June 2018); NWS requesting service extension.
   b) EMWIN receivers remain in use; awaiting NWS clearance of GOES-16 EMWIN channels .
3. GOES-West (GOES-15) @ 135° W
   a) EMWIN Transmitter active (Dec 2011 - ???) – may terminate Nov/Dec 2018 (+/-)
4. GOES-17 @ 89.5° W (temporary checkout position)
   a) HRIT/EMWIN Transmitter active - without content.
   b) Satellite to drift to 137° W; may become operational Nov/Dec 2018 (+/-)

EMWIN Update

EMWIN Sub-Channels:

1. Channel 20 - "Priority"
   a) Text (.txt / .zip)
   b) EMWIN priority 1 & 2 text products, including Warnings and Alerts
2. Channel 21 – "Graphics"
   a) Binary (.gif .png .jpg / .zip)
   b) http://www.nws.noaa.gov/emwin/EMWIN_Image_and_Text_Data_Capture_Catalog_table_v1.2_180222_1313.pdf
3. Channel 22 – "Other"
   a) Text (.txt / .zip)
   b) EMWIN priority 3 and 4 text products, Observations, Forecasts and Climate

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
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

EMWIN Update

EMWIN Product Characteristics on HRIT/EMWIN Broadcast:

1. Product sources:
   a) US NOAA Weather Wire Service (NWWS) – subset
   b) RTH/GISC Washington GTS Switch (International Products)
   c) Internet/Web (Hurricane, Radar, Satellite Images)
2. File format
   a) Full contiguous file
   b) Longer file names
      ref: http://www.nws.noaa.gov/emwin/EMWIN_GOES-R_filename_convention.pdf
3. Additional information available on NWS EMWIN Web Page:
   http://www.nws.noaa.gov/emwin/index.html#issues

EMWIN Update

HRIT/EMWIN Compatible Receiver Manufacturers:

1. Global Imaging, Inc., 3228 N. Twin Oaks Valley Road Unit A, San Marcos, CA 92069, POC: Steven Borders sborders@globalimaging.com Ph: (858) 481-5750
2. Global – LG (Dartcom USA sales), 426 Jolina Way, Encinitas, CA 92024, POC - Michael Guberek michael.guberek@global-lg.com Ph: (619) 301- 0421
3. Microcom Design, Inc., 10948 Beaver Dam Road, Hunt Valley, MD, USA 21030, POC - Brett Betsill, Perry West, bbetsill@microcomdesign.com pwest@microcomdesign.com Tel: (410) 771-1070
4. Quorum Communications, Inc., 3807 Carbon Rd. Irving, TX 75038-3415, POC - Allan Bundens, allan.b@qcom.com Ph: (800) 982-9614

This listing does not imply any particular product or service endorsement or recommendation by the NWS. Customers should consult the vendors to determine product suitability for the customers' specific need and environment.

HRIT/EMWIN User Group

HRIT Spectrum Considerations

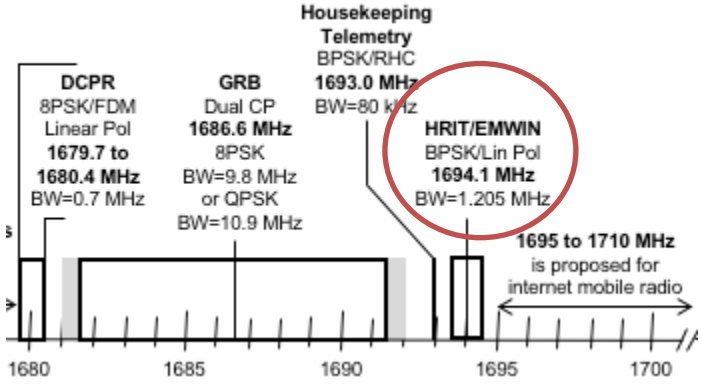
David G. Lubar

GOES-R Program Office / PSE – Spectrum Management

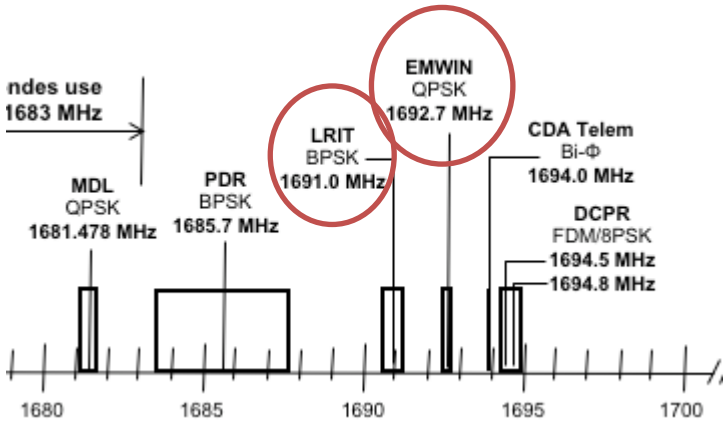
April 26, 2018

HRIT/EMWIN Spectrum

- HRIT/EMWIN downlink services on the GOES-R Series are different than on the existing GOES 13, 14, 15 satellites



GOES 16, 17 and Up Downlink Frequencies



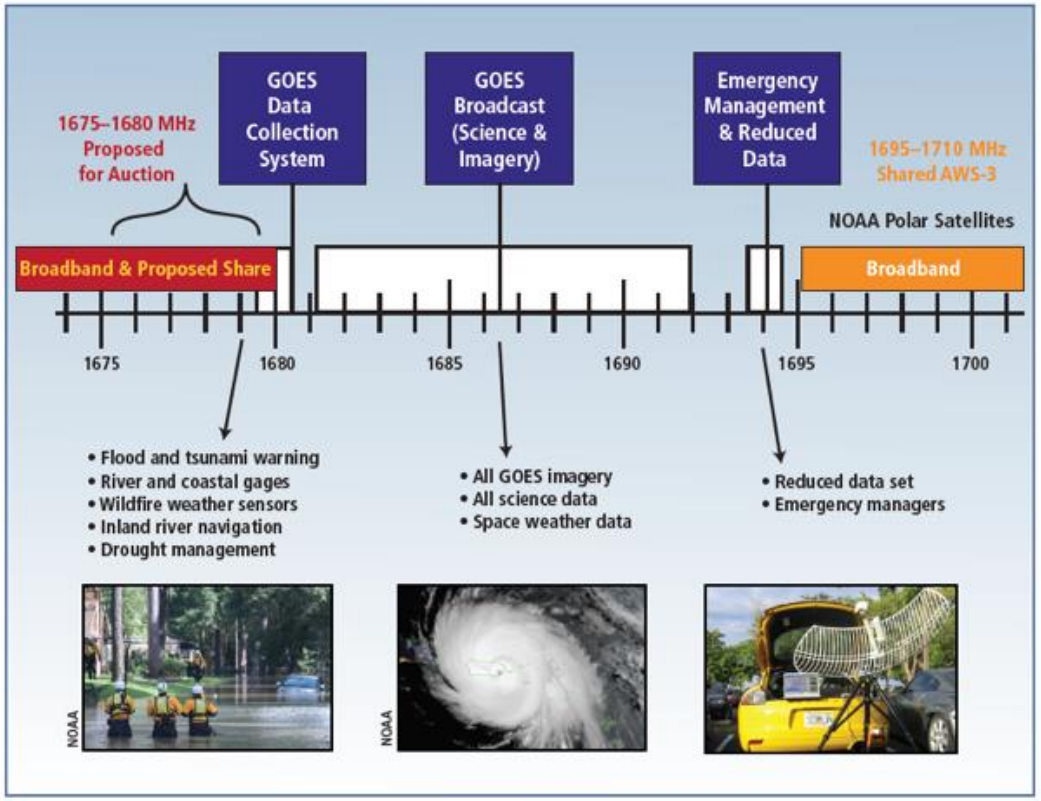
GOES 13, 14 and 15 Downlink Frequencies

Frequency Spectrum & Services for GOES-16

HRIT/EMWIN is now adjacent to future LTE handset transmissions above 1695 MHz

- ***Data Collection Systems***
- ***ReBroadcast (Science Data & Imagery)***
- ***Emergency Managers Weather Information Network/ HRIT***

all use 1675-1695 MHz Band



Adjacent Users

- 1675-1710 MHz, the band directly above HRIT / EMWIN was sold at auction in 2015
- Commercial cellular handsets (LTE) will share this band with existing NOAA polar satellite downlinks and Fixed terrestrial services.
- Cellular handset transmitters are weaker in power than their associated cell tower transmitters (on a different frequency), however, by virtue they could be anywhere – they can cause interference to a sensitive Earth station.

More on Adjacent Band Users

- These new users are part of the “LTE Band 70” for which I do not yet believe any equipment has been certified for use.
- Select Federal sites are surrounded by a “protection zone” region – a radius surrounding a small number of sites where these nationally-licensed commercial users must avoid or prove that their operation will not impact the existing Federal user

List of “Protection Zones” for LTE Licensees in the Adjacent Band

- These tables contain the location and size of “protection zones” contained in US 88 footnote in the US regulations that apply to the Federal Communications Commission licensees
- The 47 Federal stations within these sites operate on a co-equal basis with the cellular users, All others must accept interference from the terrestrial licensees which have yet to operate in this band.

State	Location	Latitude	Longitude	Radius (km)
AK	Barrow	71° 19' 22"	156° 36' 41"	 35
AK	Elmendorf AFB	61° 14' 08"	149° 55' 31"	 98
AK	Fairbanks	64° 58' 22"	147° 30' 02"	 20
AZ	Yuma	32° 39' 24"	114° 36' 22"	 95
CA	Monterey	36° 35' 34"	121° 51' 20"	 76
CA	Twenty-Nine Palms...	34° 17' 46"	116° 09' 44"	 80
FL	Miami	25° 44' 05"	080° 09' 45"	 51
HI	Hickam AFB	21° 19' 18"	157° 57' 30"	 28
MD	Suitland	38° 51' 07"	076° 56' 12"	 98
MS	Stennis Space Center	30° 21' 23"	089° 36' 41"	 57
SD	Sioux Falls	43° 44' 09"	096° 37' 33"	 42
VA	Wallops Island	37° 56' 45"	075° 27' 45"	 30
GU	Andersen AFB	13° 34' 52"	144° 55' 28"	 42

State	Location	Latitude	Longitude	Radius (km)
CA	Sacramento	38° 35' 50"	121° 32' 34"	 55
CO	Boulder	39° 59' 26"	105° 15' 51"	 02
ID	Boise	43° 35' 42"	116° 13' 49"	 39
IL	Rock Island	41° 31' 04"	090° 33' 46"	 19
MO	Kansas City	39° 16' 40"	094° 39' 44"	 40
MO	St. Louis	38° 35' 26"	090° 12' 25"	 34
MS	Columbus Lake	33° 32' 04"	088° 30' 06"	 03
MS	Vicksburg	32° 20' 47"	090° 50' 10"	 16
NE	Omaha	41° 20' 56"	095° 57' 34"	 30
OH	Cincinnati	39° 06' 10"	084° 30' 35"	 32
OK	Norman	35° 10' 52"	097° 26' 21"	 03
TN	Knoxville	35° 57' 58"	083° 55' 13"	 50
WV	Fairmont	39° 26' 02"	080° 11' 33"	 04
PR	Guaynabo	18° 25' 26"	066° 06' 50"	 48

Are There Technical Mitigations to Adjacent Band Interference into HRIT / EMWIN?

- Perhaps.
- Band limiting filters can often reduce the interfering signal levels of adjacent band transmitters, if
  - –There is some separation in frequency and the power differences aren't excessive between the undesired signal and the one you wish to receive
  - – If your HRIT / EMWIN receiving systems has adequate signal margin to accommodate a bit of signal loss, contributed by inserting a filter between your antenna and the electronics of the device.

Receiver Information & Link Margin

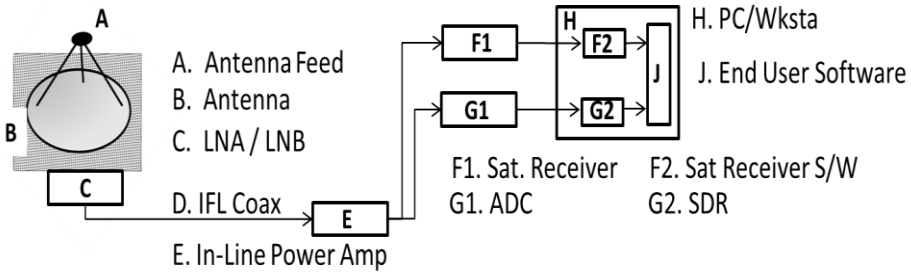
- Collecting Link Margin and RF / IF passband information on HRIT receivers and front end electronics would be helpful in determining the potential effectiveness of mitigations.
- I solicit any relevant vendor technical information.
  - David.Lubar@noaa.gov
  - cc: to Seth.Clevenstine@noaa.gov

ESPC Notifications, Status, and Contacts

Subscribe to ESPC for notifications. This is the primary way for you to receive notifications and information on GOES status and schedules!

24/7 Help Desk	ESPCOperations@noaa.gov
ESPC Messages	http://www.ssd.noaa.gov/PS/SATS/messages.html
User Services	SPSD.UserServices@noaa.gov
Data Access	NESDIS.Data.Access@noaa.gov
Facebook	www.facebook.com/NOAANESDIS
Twitter	www.twitter.com/noaasatellites
Press releases	http://www.nesdis.noaa.gov/news_archives/
GOES Status	http://www.ospo.noaa.gov/Operations/GOES/status.html
GOES User Information and Documents	http://www.ospo.noaa.gov/Operations/GOES/documents.html
POES Schedules	http://www.ospo.noaa.gov/Operations/GOES/schedules.html

HRIT/EMWIN User Configuration Info



- NOAA is looking for end user feedback on the many different configurations that's being used for current HRIT/EMWIN broadcast receipt.
- Strictly voluntarily to help support other users
- Configurations will be posted on EMWIN and NOAASIS webpages for public view
  - –Personal identifiable information will not be obtained, just the configuration information.

A. Antenna Feed: Mfg – Model – P/N –	F1. Satellite Receiver: Mfg – Model – P/N –
B. Antenna: Mfg – Model – P/N –	F2. Satellite Receiver Software: Mfg – Name – Release –
C. LNA / LNB: Mfg – Model – P/N –	G1. SDR Analog/Digital Converter: Mfg – Model – P/N –
D. IFL Coax Cable: Mfg – Item No – Length –	G2. Software Defined Radio: Mfg – Name – Release –
E. In-Line Power Amp: Mfg – Model – P/N –	H. PC/Workstation Mfg – Model – P/N – O/S Mfg – O/S Name – O/S Release –

HRIT/EMWIN Broadcast Contact Information

Seth Clevenstine

HRIT/EMWIN Program Manager

Direct Services Branch

Satellite Products and Services Division

Office of Satellite and Product Operations

NOAA NESDIS

NOAA Satellite Operations Facility (NSOF) Suitland, MD

Cubicle #1653

Email: seth.clevenstine@noaa.gov

Tel: 301-817-4558

NWS EMWIN Product Contact Information

Robert Gillespie

EMWIN Program Manager

National Weather Service Office of Dissemination

NOAA NWS

1325 East West Highway

Silver Spring, MD 20910

Email: Robert.Gillespie@noaa.gov

Tel: 301-427-9693

HRIT/EMWIN User Group

Next meeting will most likely be in mid-July 2018 before HRIT/EMWIN Post Launch Testing

Thanks for your participation!

HRIT/EMWIN User Group

Open Discussion

Seth Clevenstine

HRIT/EMWIN User Group

Wrap-Up/Summary

Paul Seymour