GOES Data Collection System (GOES DCS)

Report of the 121st GOES DCS Technical Working Group Meeting: Wednesday, September 13, 2017

at the

NOAA Center for Weather & Climate Prediction (NCWCP)
5830 University Research Court, College Park, MD 20740
Large Conference Room 4552-4553 and via Webex

Scott Rogerson – Acting GOES DCS Program Manager - NOAA/NESDIS/OSPO/SPSD/DSB
Letecia Reeves – GOES DCS Customer Liaison - NOAA/NESDIS/OSPO/SPSD/DSB
Valerie Randall - Science Systems and Applications, Inc. (SSAI) - NOAA/NESDIS/OSPO/SPSD/DSB
Jason Dong - Science Systems and Applications, Inc. (SSAI) - NOAA/NESDIS/OSPO/SPSD/DSB
Paul Seymour - Systems Integration & Development, Inc (SID) - NOAA/NESDIS/OSPO/SPSD/DSB

Table of Contents

Session 1:
I. Introductory Remarks (Scott Rogerson)---------- Page 04
II. USACE User Report (LySanias Broyles)---------- Page 04
III. BLM User Report (Robert Swofford)---------- Page 05
IV. HADS User Report (Brian Jackson)---------- Page 06
V. Alberta Environment User Report – Mike Coffill---------- Page 06
VI. DCS Program Report (Letecia Reeves, Valerie Randall)---------- Page 07
VII. DCS Operations Report (Phillip Whaley)---------- Page 08
VIII. STIWG Report (LySanias Broyles)---------- Page 14
IX. DOMSAT Discussion (Scott Rogerson and all)---------- Page 15
X. GOES-16 Report (Jim McNitt)---------- Page 17
XI. GOES-16 HRIT/EMWIN Report (Seth Clevenstine)---------- Page 19

Session 2:
XII. Manufacturer Remarks (Chris Buchner, Brett Betsill)---------- Page 20
XIII. Spectrum Report / Discussion (David Lubar)---------- Page 21
XIV. Two-Way Prototype Update Report (Brett Betsill)---------- Page 24
XV. Thoughts Towards a New File Format Report (Brett Betsill)---------- Page 25
XVI. DADDS Training (Letecia Reeves & Matt Ceanfaglione)---------- Page 27
XVII. Other Business, Future Plans, Closing Remarks,
Adjourn (Scott Rogerson and all)----------Page 32

Appendices:
Appendix I: Action Items and Recommendations---------- Page 33
Appendix II: Appendix II – U.S. Army Corps of Engineers (USACE) Data
Collection Platforms (DCPs)---------- Page 34
Appendix III: Bureau of Land Management (BLM) Data Collection
Platforms (DCP's) & Direct Readout Ground Station (DRGS's)---------- Page 39
Appendix IV: Alberta Environment and Parks (AEP)
Data Collection Platforms (DCPs)---------- Page 41
Appendix V: List of Acronyms---------- Page 42
Appendix VI: Participants---------- Page 43
Appendix VII: Agenda---------- Page 46

Table of Figures

Figure 1: LRGS Summary Status Page---------- Page 10
Figure 2: The LRGS Monitor Page----------Page 11
Figure 3: GOES-R Frequency Plan – Downlinks and Uplinks---------- Page 13
Figure 4: GOES-R System Architecture----------Page 19
Figure 5: Comparison Between the LRIT and HRIT/EMWIN
Downlink Specifications----------Page 20
Figure 6: GOES NOP Series and GOES-R Series Services and Spectrum Plan----- Page 21
Figure 7: Commercial Stations and The Associated Protection Zones---------- Page 22
Figure 8: Field Test Output Example---------- Page 28
Figure 9: Create a Netlist Filter Dialog Graphic Interface (GUI)---------- Page 29

I. Introductory Remarks – Scott Rogerson – NESDIS/OSPO/SPSD/Direct Services Branch

Scott Rogerson, Acting GOES DCS Program Manager, provided introductory remarks including an update on how Kay Metcalf's recovery from her recent illness is proceeding. Scott also presented an example of Kay's legacy with a short history of the GOES Data Collection System (DCS) tracing its roots to the 1960's Application Technology Satellite (ATS) that celebrated its 50th anniversary on December 7, 2016. Scott noted that the ATS was the forerunner of the GOES program which began operating in the early 1970's. He noted that many of the people involved in the evolution are retired or planning to retire, so thus a project was begun recently to document DCS history and to document the progress we've made. "GOES DCS History / Evolutionary Development" can be found at http://www.noaasis.noaa.gov/DCS/history.html. The goal is to provide a roadmap for future development efforts. While nearing completion any additions to the historical record that the participants can provide are welcome.
Scott also highlighted some of the challenges to the GOES DCS program for the upcoming year including staffing (new DCS Program Manager), transition to GOES-R Series of satellites, management & operations of various distribution mechanisms (e.g. DOMSAT, LRIT, HRIT, DADDS, LRGS etc), hardware and software refreshes (e.g. DADDS servers), frequency management; program and system management, channel assignments, system use agreements, user education and assistance, enhanced capabilities and other advances (e.g. 2-way platforms, file formats), and telling the GOES-DCS Story (e.g., articles, web posts, social media, internal).

Note: See the presentation "GOES DCS TWG Introductory Remarks" at: http://www.noaasis.noaa.gov/DCS/twg.html.

II. USACE User Report – LySanias Broyles - U.S. Army Corps of Engineers

LySanias Broyles presented the 2017 USACE GOES DCS User Report. He presented a map of the USACE Divisions and a graphic showing GOES Data Collection Platform (DCP) locations. See Appendix II on Page 34. A summary of the report was that there are approximately 2936 USACE owned GOES DCP's of which 2527 are active. They transmit on channels 17, 25, 31, 41, 49, 58, 73, 88, 161, 162, and 177. All the 100 Baud DCP's have been removed from their system. He noted that there is "still a desire for more frequent transmissions at critical locations" ("300 series" channels). Additionally, they are continuing to replace CS1 transmitters with CS2 versions and will continue updating their Group Id's in DADDS. He also mentioned that they are pretty much changed over to LRIT and that once the DOMSAT equipment they have goes down, it will not be replaced or repaired.

Note: See the presentation "2017 USACE GOES DCS User Report" at: http://www.noaasis.noaa.gov/DCS/twg.html.

III. BLM User Report - Robert Swofford - Bureau of Land Management

Robert Swofford from the Boise, Idaho office of the Bureau of Land Management presented a user report on their Remote Automatic Weather Stations (RAWS) network. They collect data from 1200 stations with about 550 from GOES. There are 545 full time transmissions; the rest are seasonal. He remarked that DOMSAT receptions is secondary and LRIT is primary. They have one HRIT station and a second is being upgraded.

He reported that they have 2136 Permanent Weather Stations in the network. The stations are located in the 50 United States, Puerto Rico, and Guam. All of the stations are 300 baud hourly transmissions. Most of for fire weather and resource applications. The stations are manufactured by
Campbell Scientific, FTS, Sutron Corporation, and Vaisala. Fire Weather Stations Must Meet National Fire Danger Rating Standards (NFDRS). There are required and optional standards.

Robert also reported there are 563 Portable Weather Stations in the network. There are stations located in the 50 United States, Puerto Rico, and Guam. All of the portable stations are 300 baud with hourly transmissions. The stations are manufactured by Campbell Scientific, FTS, and Vaisala. Portable stations have NFDRS recommended or optional standards.

It was also briefed that there are 75 Incident Remote automatic weather stations (IRAWS) in the inventory that are used for risk incidents; normally on wildfires. They have been deployed to the Exon Valdez Oil Spill, 9-11 World Trade Center Disaster, Columbia Space Shuttle Disaster, and hurricanes Katrina and Rita. There have been 84 deployments as of September 9, 2017. They have radio voice transmitters and access GOES. The radio voice transmits weather data and alerts. The GOES transmissions are 5 second windows every 15 minutes.

He also highlighted that there are 85 smoke monitors in the network. These stations are deployed on wildfire incidents. They are all 300 baud transmitters manufactured by FTS and MetOne. The data is sent to the Western Regional Climate Center (WRCC) for further distribution. Robert stated that the EPA may want to use these stations.

There are also weather data instruments in the system. There is a DRGS and 2 LRIT receivers. They collect data from both the Wallops and EDDN LRGS's. They have a primary, backup and test LRGS. The data is converted in the Wildland Fire Management Information (WFMI) Software. Converted data is sent to WIMMS, GEOMAC, WRCC, MESOWEST, and the Alaska Fire Service.

Note: See the presentation "Remote Automatic Weather Stations" at: http://www.noaasis.noaa.gov/DCS/twg.html.

IV. HADS User Report – Brian Jackson – National Weather Service

Since the last TWG, the HADS system has been integrated into a larger data system called MADIS (Meteorological Assimilation Data Ingest System) which runs in NOAA NCEP Central Operations in College Park and Boulder. Because HADS is well known in the GOES DCS community, it is keeping its brand name despite the integration into MADIS. HADS has been running out of MADIS since December 14, 2016. Operational support has changed since the move. Previously the 3-person team of Lanning Penn, Paul Fajman, and Brian Jackson provided 100% of the operational support. With the move to MADIS, Paul Fajman and Brian Jackson are now considered Tier 3 support, meaning we are only involved with Tier 1 and Tier 2 support need assistance. Lanning Penn has shifted to the MADIS operational support.

HADS has nearly17,000 DCPs defined in the system, though not all currently active. We are secondary processors of the DCPs. We rely heavily upon good communication from the NWS field offices and owner/operators of DCPs to provide metadata details as well as decoding information. We have great data sharing established with the USGS and login access to the WFMI system that contains RAWS configurations. We are always looking to expand data sharing with other owner/operators.

We no longer use DOMSAT after the integration into MADIS. Our source of data is LRGS connections to the LRGS systems at Wallops and EDDN. We have a backup source of data which is the Wallops/NSOF direct circuit to the NWSTG. This is backup source of data due to issues with latency and occasion missing data. The occasional missing data is related to some DCPs not having WMO headers defined in DADDS.

As always, we need owners to update their PDTs as soon as possible. This is our first source of metadata and we want to ensure we have the data in HADS entered correctly.

V. Alberta Environment User Report – Mike Coffill – Alberta Environment and Parks (AEP)

Mike Coffill of Alberta Environment and Parks (AEP) give us a report on the DCPs in their system. AEP currently has approximately 555 stations that are acquired through GOES. They get data from 15 different agencies: AEMSD, AGRIC, BC HYDRO, MSC, RAMP Oilsands Monitoring Network, IMCIN Irrigation Management Climate Information Network, NRCS (SnoTel), TAU TransAlta Utilities, USBR / USGS, WSC.

He also gave a seasonal station breakdown and a breakdown by station type.

All the data can be found in Appendix IV: Alberta Environment and Parks (AEP) Data Collection Platforms (DCPs).

VI. DCS Program Report – Letecia Reeves – NESDIS/OSPO/SPSD/Direct Services Branch:

Letecia Reeves briefed that there is a total of 38,144 GOES DCS platform transmitters in the database. Of those, 28,791 are active. 5,866 are inactive, also referred to as de-active, meaning that DADDS has not received a transmission in at least 3 days. Of course, some of these may be seasonal platforms. There are 3,487 DCPs that are shown as unused that means DCS has never received a transmission the DCP. There are still 16 active100 baud DCPs. The DCS Program is reclaiming time slots that have gone unused for more than 3 years, unless we have been given definite future plans. To avoid a lot of unused assignments, we have established a policy to only provide assignments for specific transmitters that will be deployed within a 6-month period.

In 2016, we began our 10 year transition from Version I to Version II transmitters. There has been tremendous progress. A total of 10,402 CS2 transmitters have been added. We recently created 2-1200 baud channels that can handle CS2 transmissions. These are channels 3 East and 301 West. The current CS1 1200 baud channels are not compatible with CS2 transmitters. The DCS Program is working to clear off channels 1-15 to make room for more CS2 1200 baud channels.

The current standard for a GOES DCS platform assignment is CS2 at 300 baud, with a 1 hour transmission period. There a few exceptions to this hourly standard. More frequent transmissions may be granted, pending availability, with a strong justification.

- Users with Tide Gages used for Tsunami Monitoring are transmitted every 5 minutes.
- Flash flood prone and burn scar areas are being granted every slots every 15 or 30 minutes.

The good news is as we continue to fill the channels with CS2 transmitters, more channels will become available, which mean there will be opportunities for more frequent transmissions.

The standard transmission window is 5 or 10 seconds. As we want to ensure the DCS system is being used efficiently, we ask that transmitters use data compression whenever possible. Also, please don’t send redundant messages and don’t send messages using straight ASCII. At this point, all 100 baud transmitters should be decommissioned, and all random transmissions should be reprogrammed to 300 baud. The transition to total CS2 transmitters will end on May 31, 2026. By this date, all CS1 transmitters should be replaced or upgraded if possible.

Letecia also gave the users in the meeting a couple of reminders.

- Please login to the DADDS regularly to update your PDTs so that we can have accurate location and contact information.
- It is important to ensure that all your random transmissions are reprogrammed to 300 instead of 100 baud.
- Please only request assignments for definite deployment.
- In-order-to receive our informational email notices, create a DADDS account, as we use this as our mailing lists.

Letecia then introduced Valerie Randall who oversees the renewal process for the GOES DCS System Use Agreements (SUA), who briefed the SUA statistics. There are a total of 645 Organizations both National and International that have approved agreements in place. She stated that there is a new process for submitting Initial and Renewal SUAs. Only the person listed as the 'Requester' on the SUA will be notified of renewal. Thus, it is important that this contact information is kept up to date. While the 'Requester' will be notified when it is time to renew the System Use Agreement, they may log into the DADDS at any time to update the agreement as necessary.

Everyone in an Organization involved with the GOES DCS transmitters are encouraged to create a DADDS account!

The following action was recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Action 121-1: Letecia Reeves to provide Warren Krug of NOS with a listing of the COOP users.**

Note: See the presentation "GOES DCS Program Report" at: http://www.noaasis.noaa.gov/DCS/twg.html.

VII. DCS Operations Report – Phillip Whaley – Wallops Command & Data Acquisition Station

Note: See the presentation "NOAA Wallops CDA Station GOES Data Collection System" at: http://www.noaasis.noaa.gov/DCS/twg.html.

Philip Whaley provided a brief on the GOES DCS Program from the viewpoint of NOAA's Wallops Virginia Command and Acquisition Station (WCDAS).

Philip brief that OSPO has ground system components and support at two facilities; Wallops, Virginia and the NSOF in Suitland, Maryland with Wallops being the primary and Suitland being the backup. The following dissemination services are supported by WCDAS:

- **DOMSAT:** CONUS rebroadcast from Wallops or NSOF
- **NWSTG:** WMO Header service from Wallops or NSOF DADDS
- **LRGS:** File sharing service from/with Wallops, EDDN & NSOF DAMS-NT
- **LRIT:** GOES 13-15 link, DCS data from NSOF DADDS or Wallops LRGS
- **HRIT:** GOES R Series link, DCS data from Wallops or NSOF DADDS

NOAA DCS DOMSAT is a commercial broadcast using a Domestic Satellite. This broadcast footprint is for CONUS only. The annual cost is approximately $15,000. It is currently being funded by OSPO where previously it was funded by the STIWG. The current platform is the SES-1 satellite. The broadcast characteristics are as follows:

- Circuit# 8819
- Located at 101° W
- Ku Transponder 16K
- 12033.80 MHz (effective April 11, 2017)
- Horizontal Linear Polarization

The NWSTG service is a terrestrial link from WCDAS or NSOF providing files with WMO Headers to the National Weather Service Telecommunications Gateway. It was noted that NOAA should work to identify the users of the NWSTG information.

Phillip also briefed the configuration of the WCDAS LRGS system. There are three LRGS instances controlled and maintained by WCDAS:

- NOAA Wallops CDAS hosts 3 LRGS
    - CDADATA:
        - LRGS Address; cdadata.wcda.noaa.gov
        - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
        - DDS Primary is CDABACKUP, DDS Backup is EDDN1 then NLRGS1
    - CDABACKUP:
        - LRGS Address; cdabackup.wcda.noaa.gov
        - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
        - DDS Primary is EDDN2, DDS Backup is EDDN 1 then NSOF LRGS 2
    - DROT:
        - LRGS Address; cdadrot.wcda.noaa.gov
        - DOMSAT receive input from the 1.8m antenna system, useful for DOMSAT troubleshooting

        - No Backup. DROT ingests so that DOMSAT data outages can be monitored by only using the 1.8 meter dish.
- NOAA Suitland NSOF hosts 2 LRGS,
    - NLRGS1:
        - LRGS Address; nlrgs1.noaa.gov
        - DRGS input from NSOF East & West DAMS NT demodulator applications, Primary & Backup
        - DDS Receive Primary is EDDN1, DDS Receive Backup is CDADATA
    - NLRGS2:
        - LRGS Address; nlrgs2.noaa.gov
        - DRGS input from NSOF East & West DAMS NT demodulator applications, Primary & Backup
        - DDS Receive Primary is CDABACKUP, DDS Receive Backup is EDDN2

The LRGS systems can ingest from each other and from the EDDN. To reinforce, The DCS DADDS www servers 1 and 2 are WCDAS and 3 and 4 are NSOF.

The support for the NOAA LRGS system includes the following:

- The Wallops CDAS monitors and maintains NOAA LRGS Network
    - The LRGSs can be monitored through "**LRGS Summary Status"** web page, available through the DADDS webservers 1-4 (See Figure 1 below on page 10):
        - https://dcsX.noaa.gov ►"LRGS Status" ► https://dcsX.noaa.gov/lrgs/LrgsSummaryStatus.html
        -
    - The Emergency Data Distribution Network's (EDDN) 3 LRGSs can also be monitored through the **LRGS Summary Status (See Figure 2 below on page 11):**
        - https://eddn.usgs.gov/lrgs/LrgsSummaryStatus.html
- CDADATA and CDABACKUP LRGSs provide GOES LRIT backup source.

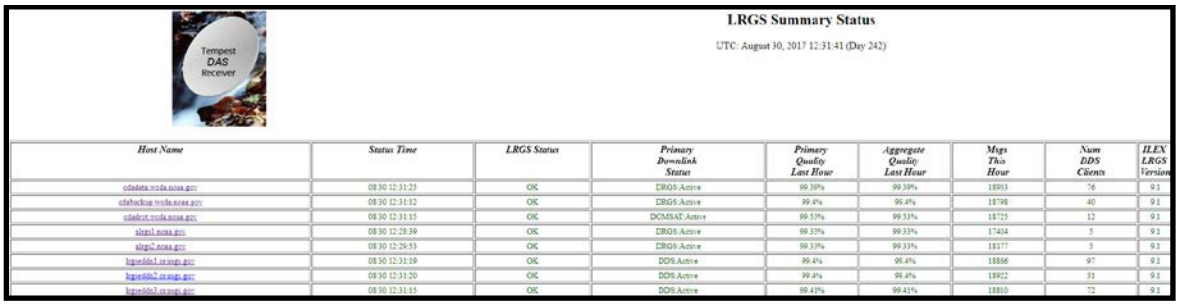
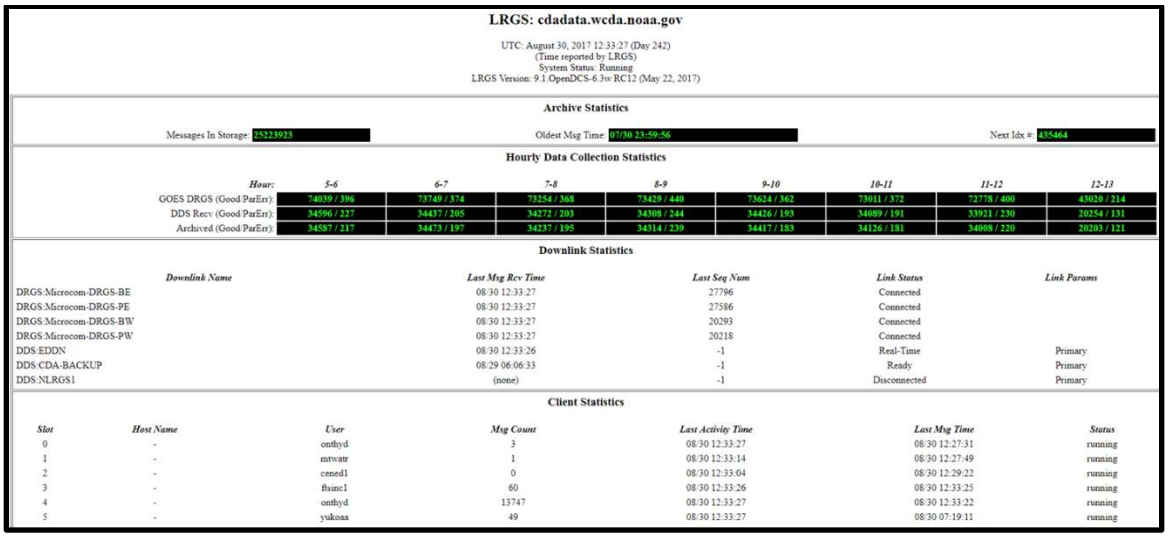


Figure 1: LRGS Summary Status Page



LRGS: cdadata.wcda.noaa.gov

UTC: August 30, 2017 12:33:27 (Day 242)
(Time reported by LRGS)
System Status: Running
LRGS Version: 9.1.OpenDCS-6.3w RC12 (May 22, 2017)

Archive Statistics

Messages In Storage: 25223923 | Oldest Msg Time: 07/30 23:59:56 | Next Idx #: 435464

Hourly Data Collection Statistics

Hour:	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13
GOES DRGS (Good/ParErr)	74039 / 396	73749 / 374	73254 / 368	73429 / 440	73624 / 362	73011 / 372	72778 / 400	43020 / 214
DDS Recv (Good/ParErr)	34596 / 227	34437 / 205	34272 / 203	34308 / 244	34426 / 193	34089 / 191	33921 / 230	20254 / 131
Archived (Good/ParErr)	34587 / 217	34473 / 197	34237 / 195	34314 / 239	34417 / 183	34126 / 181	34008 / 220	20203 / 121

Downlink Statistics

Downlink Name	Last Msg Rcv Time	Last Seq Num	Link Status	Link Params
DRGS:Microcom-DRGS-BE	08/30 12:33:27	27796	Connected	
DRGS:Microcom-DRGS-PE	08/30 12:33:27	27586	Connected	
DRGS:Microcom-DRGS-BW	08/30 12:33:27	20293	Connected	
DRGS:Microcom-DRGS-PW	08/30 12:33:27	20218	Connected	
DDS:EDDN	08/30 12:33:26	-1	Real-Time	Primary
DDS:CDA-BACKUP	08/29 06:06:33	-1	Ready	Primary
DDS:NLRGS1	(none)	-1	Disconnected	Primary

Client Statistics

Slot	Host Name	User	Msg Count	Last Activity Time	Last Msg Time	Status
0	-	onthyd	3	08/30 12:33:27	08/30 12:27:31	running
1	-	mtwatr	1	08/30 12:33:14	08/30 12:27:49	running
2	-	cened1	0	08/30 12:33:04	08/30 12:29:22	running
3	-	ftsinc1	60	08/30 12:33:26	08/30 12:33:25	running
4	-	onthyd	13747	08/30 12:33:27	08/30 12:33:22	running
5	-	yukoaa	49	08/30 12:33:27	08/30 07:19:11	running

Figure 2: The LRGS Monitor Page

Phillip also detailed the Wallops uplink antenna backup sites; both for GOES N-P and for GOES-R Series of satellites. This included the secondary DCS Pilot signal. (sic. All backup sites have either an LRIT or HRIT/EMWIN receiver.

- **Wallops CDAS Backups**
  - WBU, Goddard Space Flight Center, MD
    - GOES 13-15 series backup for GOES East
    - Secondary DCS Pilot 401.7MHz transmits 24/7
    - (editor) LRIT East Uplink
  - Fairbanks CDAS
    - GOES 13-15 series backup for GOES West
    - (editor) LRIT West Uplink
  - CBU, Fairmont, WV
    - GOES R series backup for GOES East & West
    - LRIT and HRIT/EMWIN broadcast steam preparation
      - (editor) HRIT/EMWIN uplink
- (editor) Backup DADDS at NSOF Suitland, MD feed both LRIT and PDA-HRIT/EMWIN at the NSOP

Phillip also provided a brief review of the GOES constellation and DCPR changes for GOES Series of satellites.

- **GOES Spacecraft Constellation**
  - GOES-13: Prime East S/C @ 75° W Longitude
  - GOES-15: Prime West S/C @ 135° W Longitude
  - GOES-14: Storage @ 105° W Longitude

- GOES-16: Scheduled to replace G13 Nov 2017
- GOES-S: Scheduled for launch Spring 2018

- **GOES 16**
  - NOAA's newest geostationary satellite will be positioned as GOES-East this fall, November 2017, as announced in a NOAA press release, dated 25 May, 2017 (http://www.noaa.gov/media-release/noaa-s-newest-geostationary-satellite-will-be-positioned-as-goes-east-fall).
  - **Reminder:** The GOES R satellite series frequency plan is different from the plan currently in use by the GOES 13, 14 and 15 satellites. GOES DRGSs currently support the GOES East (GOES 13) DCS downlink in the frequency range of 1694.30 to 1694.70 MHz. The GOES R series satellites will use 1679.70 to 1680.10 MHz to support the DCS downlink. GOES DCS users will need to modify their DRGSs to accommodate this change in downlink frequency, to be able to support GOES 16 this November.
  - Note that the GOES 16 frequency plan changes do NOT affect the Data Collection Platform (DCP) UHF-Band uplink transmissions, only the L-Band downlink to NOAA and the DRGSs. There will also be NO frequency changes in the DCS DOMSAT Ku-Band service. See Figure 3 below on page 13 or the GOES-R web site at h**ttp://www.goes-r.gov**.

- **DCPR Changes for GOES-R**
  - On the GOES-N/O/P satellites the DCPR downlink band is 1694.3 – 1694.7 MHz
    - The uplink Pilot at 401.85 MHz is translated to 1694.45 MHz in the existing downlink
  - For the GOES-R series satellites the DCPR downlink band will be 1679.7 – 1680.1 MHz
    - The uplink Pilot at 401.85 MHz will be translated to 1679.85 MHz in the new downlink
  - No uplink frequencies will change from the GOES-N to GOES-R satellites – only the downlinks.
  - See Figure 7 below.

Phillip also went over the NOAA GOES DCS Diagram showing the "wiring" connections within the system. It is not shown here due to the complexity of the graphic. Please refer to the presentation "NOAA Wallops CDA Station GOES Data Collection" at: http://www.noaasis.noaa.gov/DCS/twg.html.

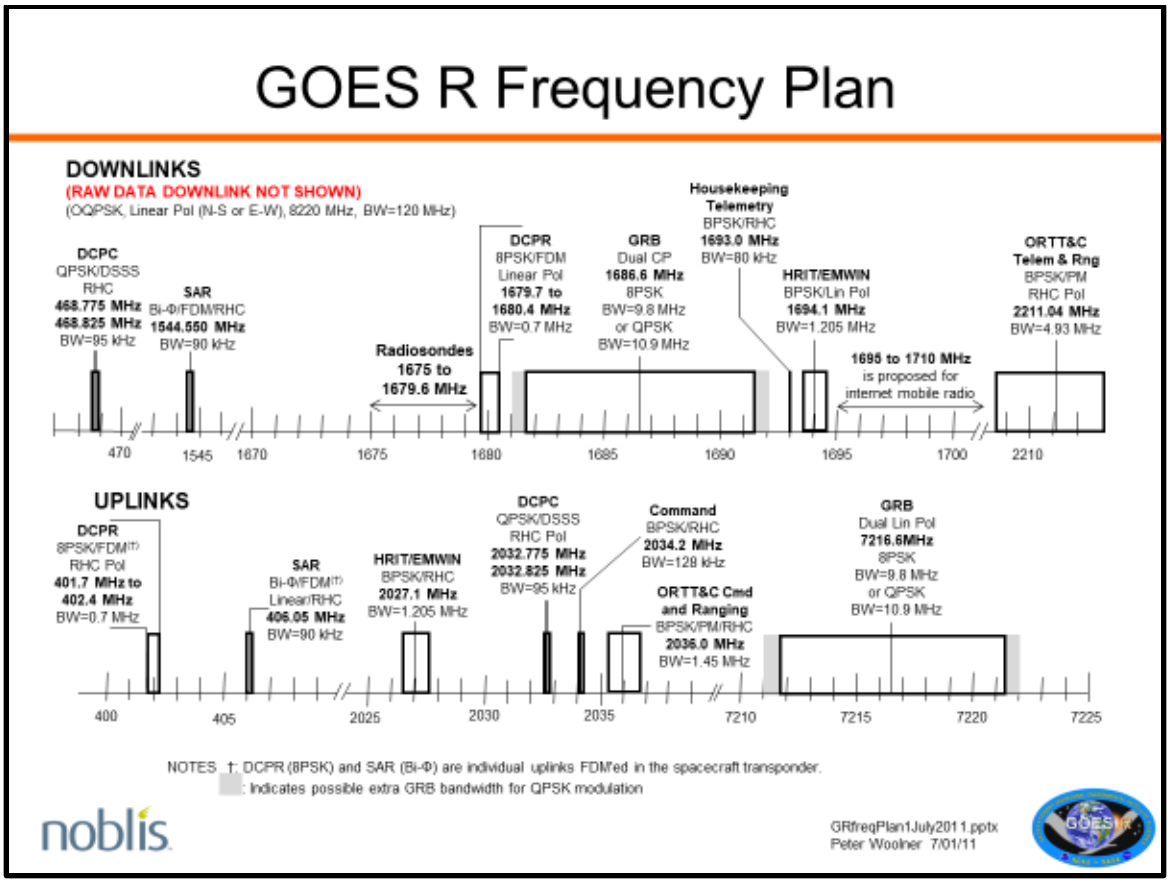


Figure 3: GOES-R Frequency Plan – Downlinks and Uplinks

He also mentioned the GOES DCS Test Channels for GOES East and West.

- DCP Test Channels
  - GOES East
    - 300bps
      - 195E for CS1 & CS2 (401.99200 MHz)
    - 1200bps
      - A99 for CS1, 497 for CS2 (401.99575 MHz)
        - Incompatible with CS2-needs to move
  - GOES West
    - 300bps
      - 196W for CS1 & CS2 (401.99350 MHz)
    - 1200bps
      - A100 for CS1, 499 for CS2 (401.99875 MHz)

After the briefing, Phillip posed two discussion topics for the attendees. One was to make a decision on whether to retire the GOES DCS DCS DOMSAT Service. Another is to move a

GOES DCS pilot frequency to a "frequency agile" system to alleviate the history of radio frequency interference at 401.7 MHz.

Phillip also provided working points of contact for GOES DCS assistance:

- DCS Help Desk at 757-824-7450 or 7451 for 24/7 Technical Support
- Letecia Reeves (Customer Service) 301 817-4563
- Travis Thornton (Team Lead) 757 824-7450
- Philip Whaley (RF/Engineering) 757 824-7331
- Al McMath (Operations Manager) 757 824-7316

Travis Thornton also mentioned that manning has been a challenge at WCDAS. They currently have 6 vacancies in operations with 2 of them is the DCS area. He reminded us that even so, there is DCS coverage on all shifts.

After the presentation, a question was asked of Letecia: Can we do a report on how many CS2 transmissions are coming in. The answer was that Jason Dong can run a database query to do a local report.

The following recommendation was recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Recommendation 121-1: NOAA should identify the users or customers for the NWSTG feed.**

Note: See the presentation "NOAA Wallops CDA Station GOES Data Collection" at: http://www.noaasis.noaa.gov/DCS/twg.html.

VIII. STIWG Report – LySanias Broyles - U.S. Army Corps of Engineers

LySanias Broyles presented report of the STIWG; stating they have been very busy over the last two years with two working groups: 1) DCS preservation and 2) OpenDCS Standardization.

The OpenDCS Standardization Working Group has selected the Cove OpenDCS software as the baseline for the unified OpenDCS platform. The consolidated software will provide an opportunity to coordinate enhancements into a single version available to all. Both Cove and Sutron have agreed to support the new STIWG OpenDCS software. The OpenDCS Standardization Working Group is also pursuing the establishment of Interagency Support Agreements to facilitate joint funding of future enhancement and support. The Corps of Engineers has several active MOU's and MOA's with the STIWG agencies and their parent

organizations that provide for establishing support agreements for efforts such as this. We endeavor for the agreements to be endorsed this calendar year.

The DCS Preservation Working Group has been actively engaged with agency IRAC members to inform them of the importance of DCS and providing information for conveyance to the FCC. In the brief LySanias stated that the IRAC (Independent Radio Advisory Committee) is the conduit to the FCC to present the federal perspective on spectrum issues There are monitoring systems being developed across the country to detect, quantify and provide feedback on any interfering signals that encroach on the DCS spectrum. It is important that users remain observant and report on any system performance degradation due to interference to provide verifiable information supporting our responses to the frequency sharing proposal.

STIWG agencies are encouraged to make known the various instances that GOES provides critical information during natural disasters (e.g. wild fires, floods, hurricanes, etc.) to emphasize the effectiveness of DCS's design and operation during events that would render terrestrial mechanisms ineffective. Making DCS less abstract and drawing the connection to the products and services people use every day and especially during these events to their GOES DCS source is imperative. Hurricanes Harvey and Irma are prime examples of events where DCS data played a crucial role in managing reservoirs, warning, providing data for models, etc. and the story needs be told.

LySanias also mentioned that the STIWG is planning a STIWG teleconference for October/November and plan to have a face to face TWG/STIWG meeting in Spring 2018.

After the presentation, Warren Dorsey asked: “Who will have configuration management responsibility for the single software.” LySanias answered that they are working on that now and also on the physical location where the software will reside. How it will be funded and supported is the concentration at this time.

Jim Heil also raised a question; “will GOES-16 process 100 baud DCPs.” Phillip Whaley stated that there is still an international DCS that has a 100-baud capability and that they (WCDAS) will continue and will not discriminate.

Note: See the presentation “2017 STIWG Report to the TWG” at: http://www.noaasis.noaa.gov/DCS/twg.html.

IX. DOMSAT Discussion - Scott Rogerson – NESDIS/OSPO/SPSD/Direct Services Branch

Scott Rogerson gave a short talk and then moderated a discussion on the current DOMSAT service for GOES DCS. He reminded everyone of these notes from the May 2016 TWG

(minutes): "It was mentioned that with the LRIT availability, a decision must be made about DOMSAT whether to keep system support and for how long. Kay said that she would like to keep a viable DOMSAT for at least 2 years as a testing period for LRIT."

Scott went on to say that NOAA/NESDIS is now proposing discontinuation of the DOMSAT dissemination as of May 2018. Cost of the service is a smaller factor than some larger maintenance & repairs issues.

It would be very helpful to know who is still using DOMSAT and more accurately who relies on DOMSAT alone (if anyone). Preliminary indications based on a small sample size do not indicate much DOMSAT use. Scott suggested an outreach email from Letecia with a Google Form to assess how all users obtain DCS data - with a goal of making a DOMSAT decision by early November, or 6+ months before (the proposed) discontinuation of the service.

Philip Whaley of WCDAS provided amplification on the maintenance and repair issues that will have to be addressed if DOMSAT service is continued and also reminded the group that DOMSAT is domestic only and LRIT (and HRIT/EMWIN) are available to all DCS users.

The discussion included comments from USGS (no longer using DOMSAT), NOAA/OAR (supports outreach idea), California Department of Natural Resources (depends on DOMSAT and has a facility move pending; but also uses LRGS), and USACE (an additional comment was that there are more products in LRIT & HRIT). Warren Krug mentioned the importance of data latency and Warren Dorsey asked if DOMSAT service could be extended if the users indicate a need for this. Scott answered that we'd have to balance user needs with what maintenance/repairs could be implemented to sustain operations for another year. Brett Betsill added that besides the external M&R issues there are also "internal" factors with the aging MPS-1000s and related IT security considerations.

In summary, it was agreed that user outreach should be conducted to include education on all other methods of obtaining DCS data.

The following action and recommendation for the GOES DCS community were recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Action 121-2: Letecia Reeves to do a survey or outreach email with a Google Form to assess how DCS users obtain their data with a goal of discovering who is using DOMSAT and what their transition issues are by early November this year.**
- **Recommendation: 121-2 NOAA should do an education campaign to let people know the various means to acquire or receive GOES DCS with an emphasis on helping DOMSAT users make a transition.**

X. GOES-16 Report – Jim McNitt - NESDIS/OSPO/SPSD/Direct Services Branch

A presentation on the GOES-R Series Satellites was presented by Jim McNitt, Direct Readout Program Manager, Direct Services Branch, Satellite Products and Services Division, Office of Satellite and Product Operations, National Environmental Satellite, Data, and Information Service (NESDIS). The first of the National Oceanic and Atmospheric Administration's (NOAA) Geostationary Operational Environmental Satellite-R Series (GOES-R) series of satellites was launched on November 19, 2016, as GOES-R and was designated GOES-16 when it reached its geostationary orbit. NOAA's NESDIS plans to locate GOES-16 in the GOES East position.

The GOES-R series, Unique Payload Services suite consists of transponder payloads providing communications relay services in addition to the primary GOES mission data. The UPS suite consists of the Data Collection System (DCS), the High Rate Information Transmission/Emergency Managers Weather Information Network (HRIT/EMWIN), GOES Rebroadcast (GRB), and the Search and Rescue Satellite-Aided Tracking (SARSAT) system. See Figure 4 below on page 19.

The GOES-R series satellites use 1679.70 to 1680.10 MHz to support the DCS downlink. Each Direct Readout Ground Systems (DRGS) must be modified to accommodate this change in downlink frequency. The GOES-16 frequency plan changes do not affect the Data Collection Platform (DCP) UHF-Band uplink transmissions, only the L-Band downlink to NOAA and the DRGSs.

The legacy LRIT service on the GOES-NOP Series is replaced with HRIT/EMWIN on the GOES-R Series. For GOES East the LRIT will be discontinued after GOES-16 becomes the operational GOES East satellite.

OSPO is updating the NOAA NESDIS webpages to provide more technical information on the GOES-16 Direct Broadcast services:

- http://www.noaasis.noaa.gov/NOAASIS/ml/satservices.html
- http://www.noaasis.noaa.gov/GRB/grb.html
- http://www.ospo.noaa.gov/Operations/GOES/documents.html

Users must subscribe to the NESDIS Environmental Satellite Processing Center (ESPC) to receive notifications, which include product outages. Request a subscription through the 24/7 ESPC Help Desk: ESPCOperations@noaa.gov.

The following information about the (sic. GOES East) transition was provided during the NOAA Satellite Conference in July 2017:

- GRB will not transmit on the X Band during the drift and for a number of days after GOES-16 reaches its GOES East position.
- Prior to activating the GOES-16 GRB, OSPO will stop the GOES-13 GVAR transmission.
    - However, OSPO plans to distribute the GOES-13 data through the GOES-14 GVAR.
    - GOES East GVAR users will have to point their antennas to GOES-14.
    - The overlap period (during which GOES-13 data is available on GOES-14 GVAR) will occur for about two weeks.
    - At the end of that time period the GOES-13 satellite will be out of service and moved to an orbital storage location.
    - The key message is that GOES-13 GVAR users who desire to receive GOES East when GOES-16 is operational must have their GRB receive stations ready for the transition.
    - Details will be provided in a ESPC Notification.
- Presentations from the 2017 NOAA Satellite Conference are now available at http://www.nsc2017.org/program/presentation/

GOES-S will launch in the Spring of 2018 and will be designated GOES-17. After the post-launch evaluation GOES-17, NESDIS will move GOES-17 to the GOES West position.

Feel free to contact Jim McNitt for additional information. Email: james.mcnitt@noaa.gov

A question was posed after the brief: Where can the GOES-16 imagery be viewed?

Jim answered that the imagery can be located at the NASA Marshall Short-term Prediction Research and Transition Center or SPORT web page at: https://weather.msfc.nasa.gov/sport/ under the Real-Time Data Tab and then under GOES-16. There are both Advanced Baseline Imager (ABI) and Geostationary Lightning Mapper products available.

It can also be viewed at the Cooperative Institute for Research in the Atmosphere (CIRA) pages at: http://rammb.cira.colostate.edu/ramsdis/online/goes-16.asp and the SLIDER page at http://rammb-slider.cira.colostate.edu/?sat=goes-16&sec=full_disk&x=10848&y=10848&z=0&im=12&ts=1&st=0&et=0&speed=130&motion=loop&map=1&lat=0&p%5B0%5D=16&opacity%5B0%5D=1&hidden%5B0%5D=0&pause=0&slider=-1&hide_controls=0&mouse_draw=0&s=rammb-slider.

Note: See the presentation "GOES-16 Update" at: http://www.noaasis.noaa.gov/DCS/twg.html.

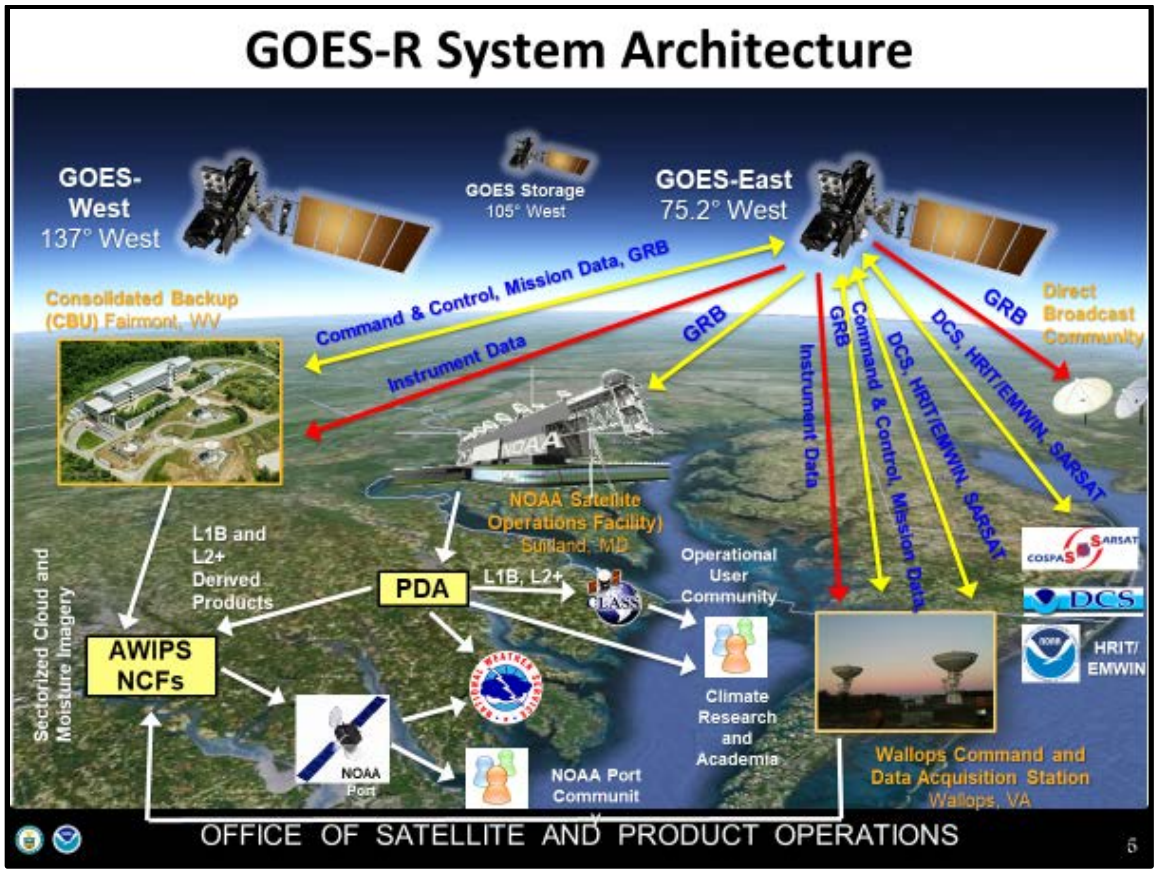


Figure 4: GOES-R System Architecture
Note: GOES DCS is indicated on the right-center of the graphic

XI. GOES-16 HRIT/EMWIN – Seth Clevenstine - NESDIS/OSPO/SPSD/Direct Services Branch

Seth Clevenstine, HRIT/EMWIN and LRIT Program Manager presented a brief on the HRIT/EMWIN broadcast that will be on the GOES-R Series of satellites which has a copy of the DOMSAT GOES DCS broadcast.

Currently, the legacy LRIT system is broadcasting to both GOES East (13) and West (15). At the same time and in parallel, the HRIT/EMWIN ground system is broadcasting a high rate data stream to GOES 16 and a low rate stream to GOES-14, which is the same as the current GOES-15 / GOES West broadcast.

GOES-16 will become GOES East in late November as it will replace GOES-13. When this happens, HRIT/EMWIN will go online and become the operational High Rate broadcast for East

users, including GOES DCS users, while GOES West will still maintain its LRIT broadcast from GOES-15. The user community will receive several notifications ahead of time to describe the actual dates/times of outages and transfer of service via ESPC help desk or from the Program itself.

During the presentation, users were shown the current HRIT product description, bandwidth utilization and PDA output from primary instance at the NSOF and the backup instance from the CBU in Fairmont, WV. Nominal, end-to-end DCS latency values recording by Microcom during the HRIT/EMWIN Post Launch Testing showed averages between 15-20 seconds.

Any DCS LRIT users that plan to use GOES-R series satellite HRIT rebroadcast, were notified that receiver and software updates are needed, while antenna and LNA/LNB's should be compatible from the legacy broadcast. A comparison of downlink specifications for LRIT and HRIT/EMWIN is shown in Figure 5 below.

Downlink Service Name	Spacecraft Series	Center Frequency (MHz)	Bandwidth	Data Rate	Modulation	Polarization
LRIT	GOES 13,14 & 15	1691	586 kHz	128 kbs	BPSK	Linear
HRIT/EMWIN	GOES-R	1694.1	1.205 MHz	400 kbs	BPSK	Linear

Figure 5: Comparison Between the LRIT and HRIT/EMWIN Downlink Specifications

Users were advised to make themselves known for future notifications from NESDIS and if they would like to learn more about HRIT/LRIT, were advised to contact SPSD via seth.clevenstine@noaa.gov or visit the NOAASIS website.

Note: See the presentation "LRIT, HRIT & EMWIN" at: http://www.noaasis.noaa.gov/DCS/twg.html.

XII. Manufacturer Remarks – Chris Buchner – Sutron Corporation

A presentation was given by Sutron Corporation highlighting that since Sutron was acquired by Danaher/OTT, they have expanded capabilities to offer complete solutions to customers now that they are teamed with companies like OTT, Hydrolab, Lufft, Adcon, Seabird as well as Hach. Leveraging the additional R&D resources allows Sutron an increased commitment to the current marketplace and to be better suited than ever to bring exciting new products to the market such as the recently introduced Satlink 3 product family. New products will appear in the near future.

XIII. Spectrum Report – David Lubar – The Aerospace Corporation / GOES-R Program Office

David Lubar, of Aerospace Corporation and the GOES-R Program Office, addressed several issues dealing with GOES N-P Series and GOES-R Series services and frequency plans and "potential radio frequency interference" to the NOAA GOES DCS service. He showed a summary graphic that illustrates the GOES downlink services and the "planned or proposed commercial spectrum uses across a range of frequencies." The graphic is shown in Figure 6 below. Dave's presentation went over the reasons why the frequencies for the services changed from the GOES N Series of satellites, including the fact that data volumes have increased greatly on the GOES-R Series instruments. He highlighted the fact that the GOES DCS uplink frequencies from the DCPs do not change. Examples of "planned or proposed commercial spectrum sharing were described:"

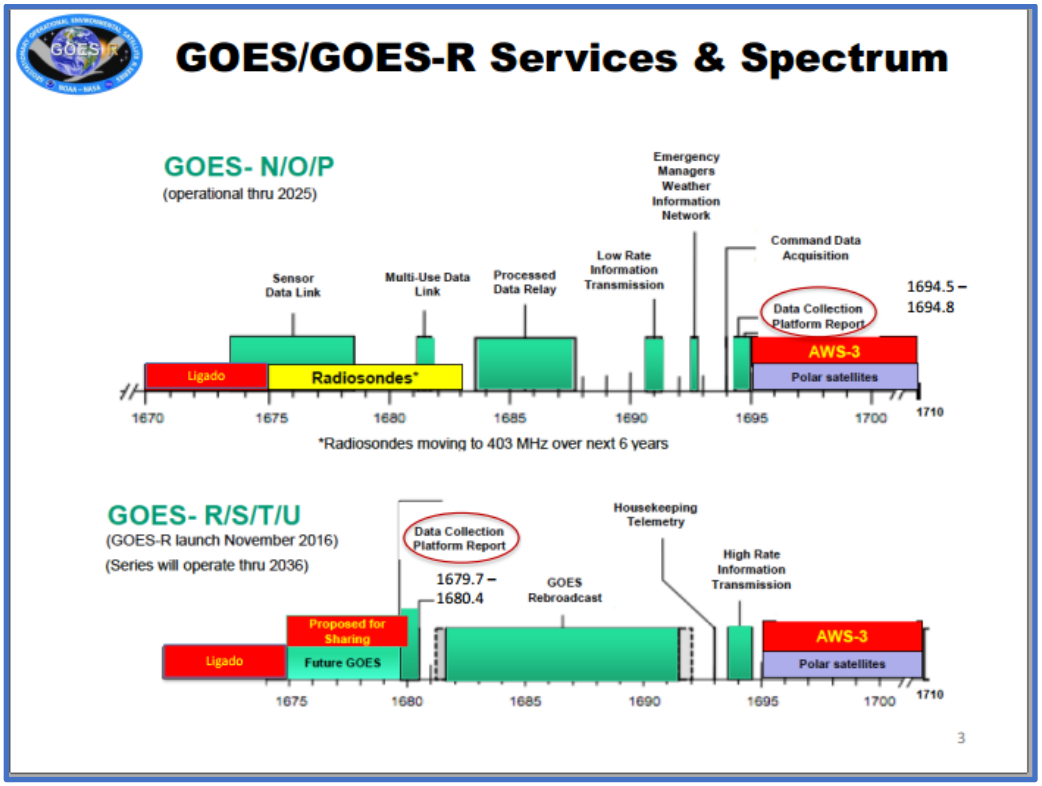


Figure 6: GOES NOP Series and GOES-R Series Services and Spectrum Plan

"Cellular licenses, sold at auction in 2015, are directly adjacent to GOES 13, 14 and 15 DCPR. These systems have not yet gone into operation. Selected Federal sites were granted protection zones of varying sizes, where operation of handsets in these frequencies will be prohibited. Some of those protection zones were incorporated around Federal DRGS locations. The effectiveness of the protection zones will not be proven until systems begin operation – which could happen

before 2020. Cellular systems must coordinate with affected Federal agencies and no coordination process for 1695-1710 MHz has yet begun." See Figure 7 below on page 22. It was noted that it is unclear how the NOAA HRIT/EMWIN services with a center frequency of 1694.1 MHz will be affected.

"Ligado Networks petitioned the (US commercial spectrum regulator) Federal Communications Commission to share 1675-1680 MHz with Federal satellite downlinks. This proposal would place higher powered terrestrial transmitters in the same band as GOES-16 DCPR, likely creating interference with few potential mitigations available. FCC has not made any decision on the petitioner's request. The next step in the FCC process would be to issue a Notice of Proposed Rulemaking (NPRM) which involved public comment. Federal agencies would provide comment via the National Telecommunications and Information Administration (NTIA) and their Interdepartment Radio Advisory Committee (IRAC) representative. There has been no recent action by the FCC in this proceeding. It was noted that the segment incorporating the GOES-16 DCPR downlink spectrum was only ¼ of the spectrum requested by Ligado for their proposed services. The only other spectrum which might impact the hydrological community was that near the downlink frequencies for the Iridium system, since some agencies utilize

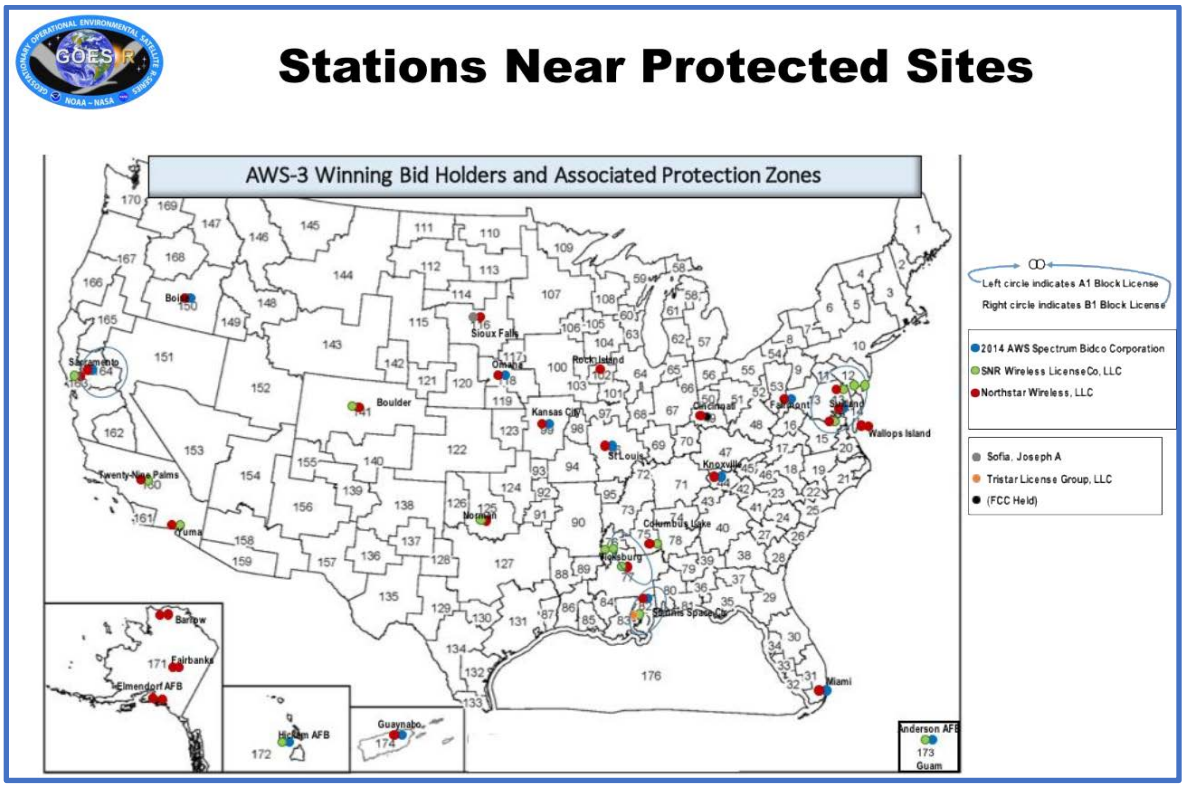


Figure 7: Commercial Stations and The Associated Protection Zones

Iridium instead of GOES DCS for their satellite telemetry." It was noted that the FCC has a request for information on using the 3.7 to 4.2 MHz band which could affect the NOAAPORT or SBN service.

"Gage data transmitted via GOES DCS played an important role during both Hurricane Harvey and Hurricane Irma, yet none of the reports ties GOES DCS into the receipt of flood data or environmental data needed by fire managers responding to wildfires. Florida bridge wind conditions in both the Florida Keys and in Jacksonville are monitored by GOES DCS – and closure decisions are made depending upon the wind speeds reported via DCS to the Florida Department of Transportation. Yet agencies rarely publicly describe how GOES DCS supports the timely receipt of gage or wildfire data." It was also noted that Harris County, Texas which contains Houston, has a number of gages that utilize the GOES system. There are approximately 45 funded through the flood control districts. This gage data was possibly the only insight they had on the levels of the water in the reservoirs near Houston.

"New satellite systems, which are looking for VHF downlink spectrum, may consider frequencies in the 401-403 MHz band, used for DCP uplinks. A surge in the development of small satellites, could drive more systems to use 401 – 403 MHz band (Space-to-Earth) for space operations. Although opposite in direction than the DCP uplinks to GOES, but in nearly the same spectrum, some percentage of the signals from small satellites may radiate upward in the direction of the GOES satellites."

After the presentation, it was highlighted that possible interference to the uplink transmissions is a new topic and is a cause for concern. While certainly disastrous for those affected by the two recent hurricane events, it may be prudent to draft a paper highlighting the importance of the river and reservoir instruments during hurricane and flood events. GOES DCS was still collecting data and reporting data when everything else had gone offline.

The following recommendations for the GOES DCS community were recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Recommendation 121-3: Do an outreach effort to educate or "tell the story" to spectrum and other regulators of the importance of the GOES DCS system; examples being river and reservoir level gauges during flood events and weather stations during fire events.**
- **Recommendation 121-4: The GOES DCS community should monitor the next step related to the 1675 to 1680 MHz bands which would be a "notice for proposed rule-making.**
- **Recommendation 121-5: Stay aware of what is happening in relation to the 401-403 MHz in relation to the very small satellite issue as these could interfere with the DCP uplink transmissions.**

- **Recommendation 121-6: Investigate performing a test to see whether GOES DCS users are seeing any interference on the uplink transmissions to GOES-16 now before we switch to it for operations by doing a test.**
- **Action 121-4: Dave Lubar to send a link to the community on the Iridium concerns on the interference from Ligado.**
- **Recommendation 121-8: Determine if GOES DCS could be used by small satellites (as DCS platforms) – to alleviate "competing" with them in the DCS uplink frequency band.**

Note: See the presentation "Spectrum Update" at: http://www.noaasis.noaa.gov/DCS/twg.html.

XIV. Two-Way Prototype Update Report – Brett Betsill – Microcom Design, Inc.

Brett Betsill of Microcom Design presented an update on the project to develop a GOES DCS two-way, bench prototype system. The presentation reviewed history background on the project including the original DCPI and the follow-on DCPC work by NOS/Sutron. Also, covered were two studies performed by Microcom; 1) the extensive study in 2015 on all aspects of a potential Two-Way link; the results of which were presented at the April 2015 TWG and 2) a follow-up study performed in 2016; the results of which were presented at the 2016 TWG in Sioux Falls, SD. The key recommendation of the first study was to use Frequency Hopping Spread Spectrum (FHSS) instead of Direct Sequence Spread Spectrum (DSSS). The follow-on study further confirmed the expected performance of this approach.

The bench prototype task began in the fall of 2016. Initial work confirmed the ability to maintain phase coherence as the carrier signals hops in frequency. Microcom essentially completed the development of the Modulator and produced a custom circuit board that could produce a variety of test signals to support the development of the demodulator. The modulator design was based on the Pilot/Test Transmitter designed by Microcom for NOAA in 2009. In addition to the test signals, the prototype modulator can produce a complete FHSS BPSK signal at 200 bps with pseudo-random data.

The development work on the demodulator was only partially completed prior to the task being put on hold. The demodulator is based on an ARM Cortex 4 processor. Functions that were completed include: 1) digital sampling of a 455 kHz IF carrier, 2) direct digital down conversion to a digital IF of 25 kHz, 3) digital generation of a 25 kHz LO, and 4) initial development of the software based carrier phase lock algorithms.

The Two-Way bench prototype work was put on hold in February 2017 due to budget constraints and other priorities. Resumption of the task has been delayed by NESDIS DCS management

changes resulting from the unexpected retirement of Kay Metcalf, the previous and long-tenured DCS Program Manager. Microcom has recently provided NOAA with a proposal to resume this work. Scott Rogerson stated that addressing this proposal will be one of his top priorities following this TWG. If the Two-Way work is re-authorized soon, Microcom's goals will be: 1) to complete the demodulator prototype by the end of 2017, 2) begin bench Bit Error Rate testing in early 2018, and 3) be able to present the results at the next TWG tentatively scheduled for March of 2018.

LySanias Broyles of the Rock Island District of the Army Corp of Engineers stated that they have been waiting for quite some time for a Two-Way link to be able to communicate with the remote DCPs. Other DCS users also stated their desire for a GOES Two-Way link. It was also stated that there is a risk that if this capability is not utilized, it could be dropped from further satellite designs.

Note: See the presentation "Two-Way Update" at: http://www.noaasis.noaa.gov/DCS/twg.html.

XV. Thoughts Towards A New File Format Report - Brett Betsill – Microcom Design, Inc.

Brett Betsill of Microcom Design also presented their recommendation to develop a new GOES DCS file format. This proposal coincides with the HRIT/EMWIN broadcast that will become operational on GOES-16 when it becomes the GOES East operational satellite.

The original file format was developed in the 2003-2005 timeframe and only provides the 1980's era DAPS DCS message statistics. A notable deficiency in these statistics is the 50 Hz resolution of frequency deviation from the channel center, which is insufficient based on the latest DCP specification that requires transmitters to maintain an overall frequency stability of ±125 Hz. Other suggested improvements included more use of binary fields instead of ASCII in the message headers and better resolution on the received signal strength and phase noise measurements.

Microcom provided a review of the 6-character DAPS fields as compared to the better message quality statistics currently available from the DAMS-NT and DADDS systems (e.g. frequency resolution to 0.1 Hz).

An initial recommendation of the revised format was provided and compared to the existing format. It was shown that the use of binary, instead of ASCII, would provide a significant reduction in the number of bytes required. It was noted by Warren Krug of the NOS that the 70 overhead bytes in the current format represents a significant amount since most DCS messages are typically only 50-200 bytes. Reducing the overhead bytes by using binary fields will improve the overall efficiency.

Microcom's initial proposal also includes a Block Identifier immediately followed by the Block Length. It was explained that this approach provides a mechanism for future enhancements (e.g. the sending of system messages) without impacting operational systems. Specifically, when systems are updated to support the new format, the new processing code should check the Block ID for "known" types of blocks. If the block type is not one the code is designed to process, the code can use the length field to simply skip over this block and proceed to the next block.

The current format already includes a length field, but it only applies to the actual DCS message data. The proposed new format does not add an additional length field, but instead simply combines the variable length of the messages with the fixed length of the header fields to achieve the same result.

The presentation also included recommendations for a transition plan. While the specifics of the transition plan would naturally need to be approved by NOAA/NESDIS along with support from the STIWG, Microcom proposed making use of the additional bandwidth afforded by the higher data rate of HRIT to send two streams of DCS data for a period time, one with the old format and another with the new format. Initially the old format would have priority, and the new format would have lower priority. The lower priority would increase the latency, but would provide a period for manufactures to develop and test the code changes required to support the new format.

Following this, DCS users could begin to update existing units in the field. At some point, NOAA would switch the priorities and the new format would take precedence. The old format could still be received by existing HRIT users, but the lower priority would yield increased latency.

It was pointed out that DCS presently accounts for 4-5% of the total HRIT feed from the standpoint of the number of frames utilized. Fill frames presently accounts for 15-20%, but there are extended periods (10-15 minutes) when no Fill is required. While these numbers indicate that HRIT could presently support dual DCS streams, it was pointed out by Seth Clevenstine that additional products may be added to HRIT in the future. As such, NOAA management will have to carefully consider this recommendation before giving it approval. However, it was noted that since the additional products would be future additions, the sooner the new format could be adopted, the better chance there would be of providing the dual streams.

It was also suggested that initially perhaps a reduced stream of the new format could be utilized to allow manufacturers to develop the software/firmware changes required. A complete DCS data stream is not required for development. This would lower the burden on the HRIT during this phase of the transition.

Microcom also suggested using a new DCS file type in the HRIT primary header to distinguish the new format from the old. Mike Maloney of Cove Software, LLC pointed out that there is also 4-byte "TYPE" in the file header portion of the existing DCS File Format, and that perhaps this could be used to delineate the formats of the actual DCS messages. This suggestion has merit and be considered by Microcom as it prepares its formal recommendation.

Philip Whaley suggested that an additional field that should be considered is a "Value Added Source" field. Both the old format and the proposed new format already include a 2-character "Source Code" which provides a DRGS code of where the DCS message was received. The "Value Added Source" would provide additional information on the route the DCS message data took before it made it into the HRIT file. Microcom will consult with Philip Whaley on this topic as it prepares its formal recommendation.

The next steps are for Microcom to finalize and document new format for NOAA's consideration. After review and approval by NOAA, it will be presented to the STIWG, and possibly others, for comment and feedback. Microcom hopes to have the formal proposal ready for NOAA by the end of September.

Mike Maloney stated he is interested in seeing the proposed format flowed through the DAMS NT protocol. Microcom stated they have already investigated this and is proposing an update to DAMS-NT.

LySanias Broyles asked for clarification on whether any changes would be at the download and not the upload. Brett stated there would be no changes to the DCPs but a firmware change but that the hardware would not have to be returned for an update. Bret stated, in response to a question that Microcom is recommending a 1-year user transition period.

Warren Krug stated that user ingest systems would also have to be changed due to the way the systems read and manipulate the messages. "There is a lot more work down the road before this can be accomplished."

The following recommendation for the GOES DCS community was recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Recommendation 121-7: The transition period needs to be coordinated with users so there can be an iterative process over a sufficient time-period. A partial set of the new data could be sent during these interactive periods**.

Note: See the presentation "Thoughts Towards a New File Format" at: http://www.noaasis.noaa.gov/DCS/twg.html.

XVI. DADDS Training – Letecia Reeves - NESDIS/OSPO/SPSD/Direct Services Branch & Matt Ceanfaglione – Microcom Design, Inc.

Matt Ceanfaglione and Letecia Reeves presented three new features that are on DADDS: 1) Field Test where the platform data is available outside of the user login; 2) Netlist Filters where the

user can create custom filters from existing netlist files or a filter; and 3) Forgotten Passwords which is additional way to reset an account password.

The first upgrade is the Field Test feature was created to help technicians in the field quickly check the status of a platform. It returns historical message data and platform information. It is accessible via a link located on the DCS website login page or by browsing directly to https://dcs1.noaa.gov/Account/FieldTest.
The Field Test form requires two inputs: 1) Platform DCS address and 2) Number of hours to "look back." Clicking the "retrieve button submits a query to the server. The query supports two outputs: 1) Platform and timing information and 2) a table based view of any message data found. An example is shown is Figure 8 below.

The second enhancement is the Netlist Filter. This is a type of message data filter created from a standard CSV file, an LRGS netlist file or a platform filter. They contain two query parameters: 1) One or more platform addresses to filter on and 2) How far back to look for the message data. The data is stored in the database for future use, and accessed using existing saved filter controls.

Netlist Files are LRGS '.nl' files which are used by a LRGS client to determine what platforms it needs to retrieve data for. Many users already have LRGS .nl files that define only the platforms for their organization. They can also be CSV Files which are comma separated value files. This represents an additional file format for users not familiar with LRGS netlist files. The files contain a comma separated string of platform addresses to be included in the website netlist filter. See figure 8 below for an example.

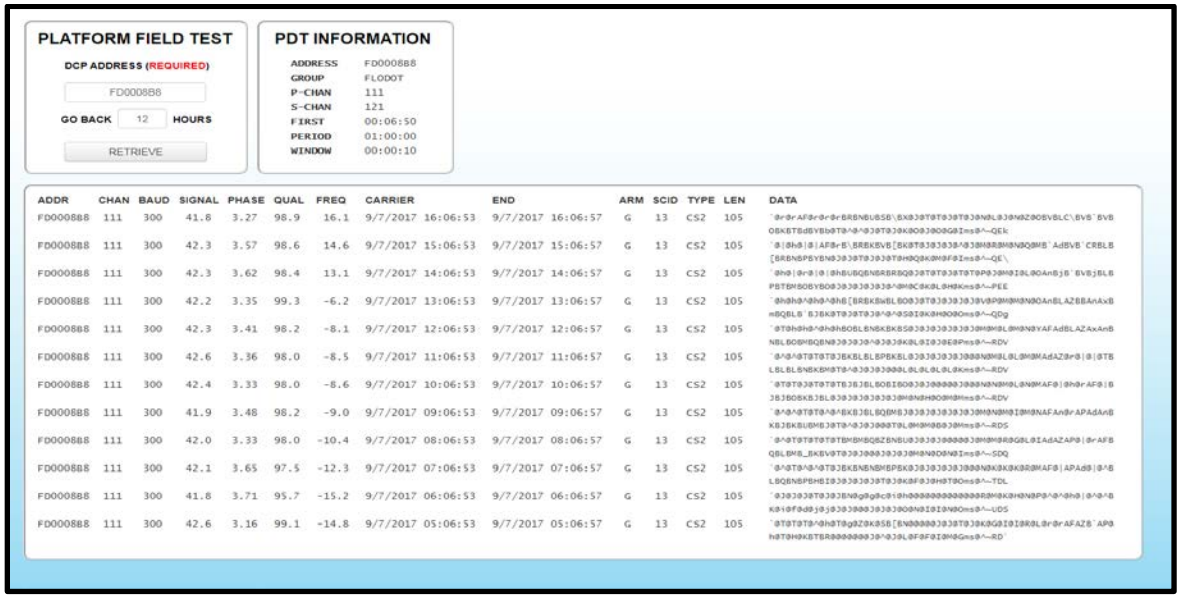


Figure 8: Field Test Output Example

The second enhancement is the Netlist Filter Dialog function. Netlist buttons are located to the left of the filter button on the ‘Messages’ and ‘Platforms’ website tabs. Clicking a netlist button opens a dialog window used to create a netlist filter from an uploaded file or an applied platform filter. See Figure 9 below:

Figure 9: Create a Netlist Filter Dialog Graphic Interface (GUI)

The Netlist Dialog GUI has 4 fields :

- Name for the netlist filter.
- Type of netlist filter being created; CSV, LRGS or an applied filter.
- Time range to determine how far the netlist filter looks back for data (from 1 hour to 30 days).
- File upload control to select a netlist file for the CSV and LRGS types.

The steps to create a Netlist Filter are:

- Create a filter with condition specifics such as group codes or individual platform addresses on the platforms tab.
- Open the netlist filter dialog window.
- Enter a friendly name in the ‘Name’ text box.
- Select the ‘Filter’ option in the ‘Type’ radio group.
- Select a look back period using the ‘Frame’ drop down list.
- Click the ‘Add’ button to submit and save the netlist filter.

You can also create a Netlist Filter from a CSV or LRGS netlist file using the following steps:

- Open the netlist filter dialog window by clicking the 'Netlist' button on the messages or platforms tabs.
- Enter a friendly name for the netlist filter.
- Select the 'CSV' or 'LRGS' option in the 'Type' radio group depending on what file type is being used.
- Select a look back period using the 'Frame' drop down list.
- Click the 'Select' button to open the file browser, and select the CSV or LRGS file to be uploaded.
- Click the 'Add' button to submit and save the netlist filter.

The next step is to load the Netlist Filter.

- They are loaded into the 'Netlists & Views' drop-down list located on the messages tab, and have the following text
    - Header text '[NETLIST]' before the friendly name.
    - Footer text specifying the range, for example '[3HOUR]'.
- To load a netlist filter, simply select the desired option from the drop down list.
- The website will submit a query to the database and apply the netlist filter to the message data.

The third enhancement was inspired by new information technology requirements on using Personal Identifiable Information (PPI) to use when resetting passwords. As a result of new, urgent, IT security directives from NOAA, two significant changes were made to the password reset mechanism: 1) Security questions containing personal identifying information, or PII, were replaced and 2) Security question answers are now stored in the database as encrypted text.

These changes to the forgotten password feature should prevent users with security questions containing PII from resetting their password. Many users had security questions containing PII that were no longer in the system and as a result, a new way of resetting an account password needed to be implemented to help these users. To mitigate any potential user issues an additional mechanism to reset an account password was put in place. Users can now initiate the password reset process by entering their last name plus their 4 digit pin code in both security answer fields. For example, 'Roberts1234' would be entered for a user whose last name is 'Roberts' and pin code is '1234'.

Another subject covered was the creation of batch files for PDT Updates. An example follows:

```
UPDATE PDT 1234ABCD &
OWNER_ID = TESTID &
COUNTRY_STATE_PROV = USMD &
```

LOC_NAME = "NEVERSHINE" &
LATITUDE = 352722 &
LONGITUDE = -1152326 &
CATEGORY = L &
SHEF_CODE1 = PC &
SHEF_CODE2 = US &
MANUFACTR_ID = FTS &
MODEL_NO = TX312 &
SEASON_ID = N &
DATE_DEPLOY = 20170831 &
PMAINT_EMAIL = "Letecia.Reeves@noaa.gov"
END

Batch files can contain as many updates as is needed. They should begin with UPD or UPDATE PDT 1234ABCD & and end with END. Then, delete any lines that are not needed. A batch can be as small as the following example:

UPD PDT 1234ABCD &
LOC_NAME = "NEVERSHINE" &
END

There were three questions asked after the presentation.

Question: Is there a limit on the number of platforms for netlist? The answer is Yes, due to the huge number of variables that requesting data from too many platforms would generate. There is a limit of 500 platforms.

Question: Are there time delimiters? The answer is that there is only one time-variable which is the lookback period that can be set up to 30 days.

Question: After a PDY is updated, how will the user be notified? The answer is that there is no message sent. The user can look at the platform update information that tells when the last update was made. It was also noted that batch file updates do generate an update.

These are not included in the user manual yet. This is to happen soon.

The following action was recorded. See the complete list of actions and recommendations in Appendix I: Actions and Recommendations.

- **Action 121-3: Include the 3 new DADDS features (Field Test, Netlist Filters and Forgotten Password) in the DADDS user manual.**

Note: See the presentation "DADDS Training" at: http://www.noaasis.noaa.gov/DCS/twg.html.

XVII. Other Business, Future Plans, Closing Remarks, Adjourn – Scott Rogerson (and all) - NESDIS/OSPO/SPSD/Direct Services Branch

Any Other Business

There was general discussion on the importance and performance of GOES DCS platforms during the recent hurricanes (Harvey and Irma). Duane Prebble of Microcom Design stated that there are two systems with multiple DCP's; one in the Florida Keys and one in the vicinity of Jacksonville.
There were some outages in the Florida Keys system due to power issues as they relied on utility power and do not have the solar batteries. There will be some good data sets from the system at Jacksonville. One data point was that an instrument at the St Johns Riverwalk in Jacksonville, Florida measured a river depth of 4.9 feet above flood stage. The historical maximum at that site is 5.26 feet. There was also a DCP at Everglades City using GOES that had solar powered batteries that operated during the entire event.

Future Plans

Scott Rogerson proposed that the next meeting be a STIWG in October or November using the same format as this meeting; in-person and webinar. Then, in the Spring of 2018 (dates to be determined in the future), a combined STIWG and TWG may be planned comprised of an international training day, a two-day Technical Working Group (TWG) and a day of STIWG (Satellite Telemetry Interagency Working Group).

Closing Remarks

Scott thanked everyone for a good meeting, reminded presenters to submit input for the minutes, asked for feedback to be emailed to Letecia (and/or Scott) anytime, and offered to relay any messages to Kay Metcalf.

Adjournment

The meeting was adjourned at 4:51 PM.

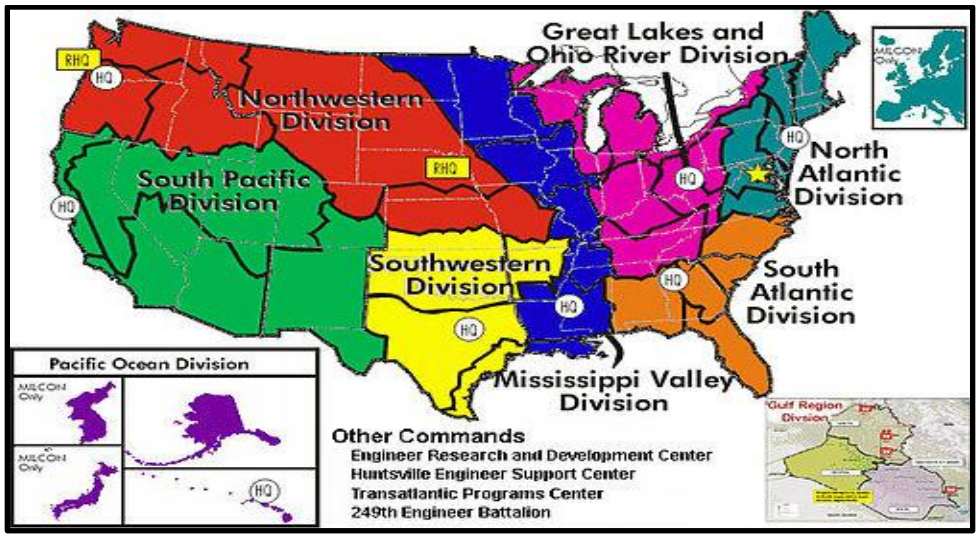
Appendix I – Action Items and Recommendations:

- **Action 121-1: Letecia Reeves to provide Warren Krug of NOS with a listing of the COOP users. See Page 8.**
- **Action 121-2: Letecia Reeves to do a survey or outreach email with a Google Form to assess how DCS users obtain their data with a goal of discovering who is using DOMSAT and what their transition issues are by early November this year. See Page 16.**
- **Action 121-3: Include the 3 new DADDS features (Field Test, Netlist Filters and Forgotten Password) in the DADDS user manual. See Page 31.**
- **Action 121-4: Dave Lubar to send a link to the community on the Iridium concerns on the interference from Ligado. See Page 24.**

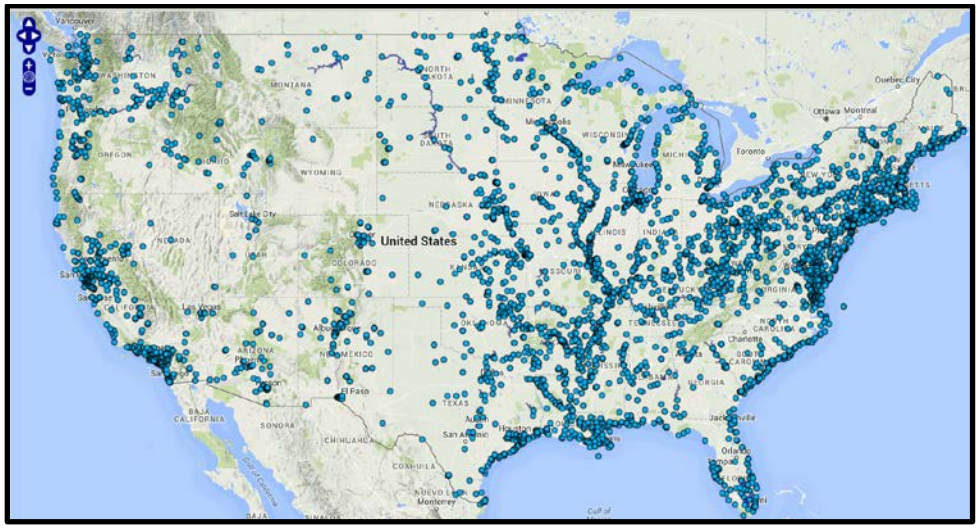
- Recommendation 121-1: NOAA should identify the users or customers for the NWSTG feed. See Page 14.
- Recommendation 121-2: NOAA should do an education campaign to let people know the various means to acquire or receive GOES DCS with an emphasis on helping DOMSAT users make a transition. See Page 16.
- Recommendation 121-3: Do an outreach effort to educate or "tell the story" to spectrum and other regulators of the importance of the GOES DCS system; examples being river and reservoir level gauges during flood events and weather stations during fire events. See Page 23.
- Recommendation 121-4: The GOES DCS community should monitor the next step related to the 1675 to 1680 MHz bands which would be a "notice for proposed rule-making." See Page 23.
- Recommendation 121-5: Stay aware of what is happening in relation to the 401-403 MHz in relation to the very small satellite issue as these could interfere with the DCP uplink transmissions. See Page 23.
- Recommendation 121-6: Investigate performing a test to see whether GOES DCS users are seeing any interference on the uplink transmissions to GOES-16 now before we switch to it for operations by doing a test. See Page 24.
- Recommendation 121-7: The transition period needs to be coordinated with users so there can be an iterative process over a sufficient time-period. A partial set of the new data could be sent during these interactive periods. See Page 27.
- Recommendation 121-8: Determine if GOES DCS could be used by small satellites (as DCS platforms) – to alleviate "competing" with them in the DCS uplink frequency band. See Page 24.

Appendix II – U.S. Army Corps of Engineers (USACE)
Data Collection Platforms (DCPs)
121st GOES DCS Technical Working Group Meeting:
Wednesday, September 13, 2016

The following maps detail the USACE Division and the general location of the USACE Data Collection Platforms.



U.S. Army Corps of Engineers (USACE) Division Map
121st GOES DCS Technical Working Group Meeting



Deployed CONUS GOES Data Collection Platforms (DCP's)
121st GOES DCS Technical Working Group Meeting

The following is a list of the number of DCP's in use by USACE broken down by USACE Division from his USACE User Brief at the 121st GOES DCS Technical Working Group Meeting, September 13, 2017.

1. USACE - North Atlantic Division
    a. New England, New York, Philadelphia, Baltimore and Norfolk Districts
        i. ~127 GOES PDT's
        ii. 104 are active (300 Baud)
        iii. Channels 161
        iv. 1-hour intervals
        v. 5, 10 and 15 second windows
    b. Baltimore District - NAB
        i. Transmits 15-minute data hourly
        ii. 17 of 83 are reservoir and remaining are stream gages
        iii. 20 collect precipitation, 12 collect air temperature, and 10 collect water quality data
        iv. No new gages in the foreseeable future
2. USACE - South Atlantic Division
    a. Charleston, Jacksonville, Mobile, Savannah, and Wilmington Districts
        v. ~230 GOES PDT's
        vi. 131 are active (300 Baud)
        vii. Channels 31, 41 and 161
        viii. SAM vacating channel 41 and moving platforms to 31
        ix. 1-hour intervals
        x. 5, 10 and 15 second windows
    b. Wilmington District – SAW
        i. 39 active GOES DCP's (300 Baud)
        ii. Channel 161
        iii. 10-minute samples
        iv. Hourly transmissions
        v. Decodes 74 USGS GOES DCP's throughout North Carolina and Virginia
    c. SAJ Jacksonville, FL
        vi. 46 active DCP's (89 PDT's)
        vii. Recently received a new block of NESDIS Id's
        viii. Plans to deploy 25-30 new platforms (some currently under construction)
            1. Culverts along Herbert Hoover Dike surrounding Lake Okeechobee
        ix. Sensors: Shaft encoders, wind sensors, barometers, pressure transducers, gate position indicators, temperature sensors, battery voltage and flow meters

x. Typical sites: locks and dams, spillways, culverts, stilling wells, etc.

3. USACE - Lakes and Rivers Division
    a. Huntington, Detroit, Nashville, Pittsburgh, Cincinnati, Buffalo and Louisville Districts
        i. ~739 GOES PDT's
            1. 675 are active (300 Baud)
        ii. Channels 17, 25, 88, 177
        iii. 1-hour intervals
        iv. 10 second windows
    b. Pittsburg District
        i. 313 Platforms (260 USGS)
    c. Huntington District
        i. 262 Platforms (176 USGS)
    d. Cincinnati District
        i. 24 Platforms (24 USGS)
    e. Buffalo District
        i. 20 Platforms (24 USGS)
    f. Louisville District
        i. 124 Platforms (124 USGS)
    g. Nashville District
        i. 90 Platforms (47 USGS)
            1. Precipitation, stage, air/water temp, pool, tail, pH, dissolved oxygen, pool/tail elevation, gate opening, etc.
    h. Detroit District
        i. 74 Platforms
4. USACE - Mississippi Valley Division
    a. St. Paul, Rock Island, St. Louis, Memphis, New Orleans and Vicksburg Districts
        i. 798 GOES PDT's
            1. 710 are active (300 Baud)
        ii. Channels 31, 49, 58, 73, 177
        iii. 30-minute and 1-hour transmit intervals
        iv. 5 and 10 second windows
    b. St. Louis District
        i. 122 PDT's (118 active)
            1. 64 distributed throughout central and eastern Missouri
            2. 54 sites in central and southern Illinois
            3. Elevation, stage, precipitation, air/water temp, wind speed/direction, water quality, etc.
        ii. 10 major water resource projects (5 reservoirs, 5 locks and dams)
        iii. 100+ levee systems
        iv. 10 CS2 transmitters deployed, 30 on the shelf

v. Use DRGS and LRIT to receive data
vi. Continuing to upgrade to CS2 (25-50 DCP's/year)
vii. Will need 4-5 new DCP assignments per year for the next 5 years

c. Rock Island District
    i. 155 active DCP's (161 PDT's)
        1. 22 CS2 Platforms
        2. Contract with USGS to maintain 103 active MVR stations
        3. Receive and decode 165 additional USGS gages
        4. Fund 85 USGS gages
    ii. 23 Projects (20 Navigation Locks and Dams and 3 Multi-purpose Reservoirs)
        1. MET Stations: Air/water temp, wind speed/direction, gate opening, pool/tail stage, precipitation, pool/tail elevation
        2. Half-hourly transmissions
        3. Send minute interval data using network DCP's
        4. Display real-time data on homegrown web GUI served from Sutron DCP
        5. Acquire data locally: monitoring includes all Corps GOES DCS channels
            a. East and West DRGS cages with LRIT as secondary GOES downlink
            b. Distribute data Corps-wide as Data Acquisition Center
            c. Host Cove DCP-Monitor: decode and collect districts' GOES data and display performance stats

5. USACE - Northwestern Division
    a. Kansas City, Omaha, Walla Walla, Seattle and Portland Districts
        i. ~391 GOES PDT's
            1. 341 are active (300 Baud)
        ii. Channels 58, 88
        iii. 1-hour intervals
        iv. 5, 10 and 20 second windows
    b. NWW has 18 platforms
        i. Mostly elevation, weather, water temp and stage
        ii. 15 platforms are maintained by the USGS but owned and monitored by NWW
        iii. Plan to add 7 platforms in the next year for temp monitoring and elevation
        iv. Plan to add another 7 in the next 2-3 for project data, weather and water temp
        v. Plan to add 6 platforms for fish passage purposes
    c. NWK has 123 active platforms
        i. Transmitting 15-minute data every hour

ii. A few platforms log 5-minute data and transmit hourly
iii. Typical configuration consists of a Sutron DCP with orifice lines and/or radar gages
iv. Plan to add 2 new platforms next year

d. NWP 66 active DCP's
i. Adding 35 additional DCP's this year through early next year
ii. Want to move key/critical DCP's from 30-minute to 15-minute transmissions
1. Would like to move platforms from channel 88 to another channel that can accommodate more frequent transmissions
2. Open for suggestions on how to accomplish
iii. SatLink2 and SatLink3's at 300 baud
1. New SatLink3's are as dependable as SatLink2's

6. USACE - Southwestern Division
a. Tulsa, Fort Worth and Galveston Districts
i. Galveston transferred all DCP's to USGS
1. Funds equipment, operation and maintenance
ii. ~388 GOES PDT's
1. 345 active DCP's (300 Baud)
iii. Channels 31, 49, 88 and 162
iv. 1-hour intervals
v. 5 and 10 second windows

7. USACE - South Pacific Division
a. Sacramento, San Francisco, Los Angeles and Albuquerque Districts
i. ~263 GOES PDT's
1. 221 are active (300 Baud)
ii. Channels 17, 31
iii. 1-hour intervals
iv. 5 and 10 second windows

8. USACE Summary
a. ~2936 owned GOES PDT's
b. ~2527 active GOES platforms
c. Channels: 17, 25, 31, 41, 49, 58, 73, 88, 161, 162, 177
d. All 100 Baud DCP's removed
e. Still a desire for more frequent transmissions at critical locations
f. "300 series" channels
g. Continue updating Group Id's in DADDS

Appendix III – Bureau of Land Management (BLM)

Data Collection Platforms (DCP's) and Direct Readout Ground Station (DRGS's)
121st GOES DCS Technical Working Group Meeting:
Wednesday, September 13, 2016

The following is a list of the number of DCP's in use by the Bureau of Land Management (BLM) from the Remote Automatic Weather Stations User Report by Robert Swofford at the 121st GOES DCS Technical Working Group Meeting, September 13, 2017.

1. Permanent Weather Station
   a. 2136 Permanent Weather Stations in the Network
   b. Stations are located in the 50 United States, Puerto Rico, and Guam
   c. All Stations are 300 baud Hourly Transmissions
   d. Fire Weather and Resource Applications
2. Permanent Stations Standard
   a. Fire Weather Stations Must Meet National Fire Danger Rating Standards (NFDRS)
      i. Minimum Sensor Complement
      ii. Relative Humidity
      iii. Air Temperature
      iv. Wind Speed
      v. Wind Direction
      vi. Solar Radiation
      vii. Rain Gauge
      viii. Alternate Sensor Complement
      ix. Fuel Moisture
      x. Fuel Temperature
      xi. Soil Moisture
      xii. Soil Temperature
      xiii. Barometric Pressure
3. Portable Stations
   a. 562 Portable Weather Stations in the Network
   b. Stations are located in the 50 United States, Puerto Rico, and Guam
   c. All Stations are 300 baud Hourly Transmissions
   d. Fire Weather and Resource Applications
4. Portable stations Standards
   a. Portable Stations Have NFDRS Recommendations
      i. Sensor Complement
      ii. Relative Humidity
      iii. Air Temperature
      iv. Wind Speed
      v. Wind Direction

vi. Solar Radiation
vii. Rain Gauge
viii. Fuel Moisture
ix. Fuel Temperature
x. Incident Remote automatic weather stations (IRAWS)
xi. 75 IRAWS in Inventory
xii. IRAWS are used on All Risk Incidents
xiii. Normally used on Wildfires
xiv. Have been deployed to the Exon Valdez Oil Spill, 9-11 World Trade Center Disaster, Columbia Space Shuttle Disaster, Hurricanes Katrina and Rita
xv. 84 Deployments as of 9 September 2017

5. IRAWS (Incident Remote Automatic Weather Stations)
   a. Radio Voice Transmitter and GOES
   b. Radio Voice sends Weather Data and Alerts
   c. GOES Transmissions are 5 Second Windows every 15 Minuets
6. Smoke monitors
   a. 85 Stations in the Network
   b. Stations are Deployed on Wildfire Incidents
   c. All Stations are 300 baud
   d. Fire Weather Applications
   e. Data is sent to the Western Regional Climate Center (WRCC) for Distribution
7. Weather data
   a. Have a DRGS and 2 LRIT Receivers
   b. Collect Data from Wallops and EDDN
   c. Have 3 LRGS, One Primary, One Backup, and One Test
   d. Data is converted in the Wildland Fire Management Information (WFMI) Software.
   e. Converted Data is sent to WIMMS, GEOMAC, WRCC, MESOWEST, and the Alaska Fire Service; and distributed further from these locations

Appendix IV: Alberta Environment and Parks (AEP)

Data Collection Platforms (DCP's) and Direct Readout Ground Station (DRGS's)
121st GOES DCS Technical Working Group Meeting:
Wednesday, September 13, 2016

- AEP currently has approximately 555 stations that are acquired through GOES.
- Agencies that we gather data from - 15 different groups
  - AEMSD 193 stations
  - AGRIC 172 stations
  - BC HYDRO
  - MSC
  - RAMP Oilsands Monitoring Network
  - IMCIN Irrigation Management Climate Information Network
  - NRCS (SnoTel)
  - TAU TransAlta Utilities
  - USBR / USGS
    - WSC All: 332 Stations (WSC AB; WSC NWT; WSC BC; WSC SK)
- SEASONAL STATION BREAK DOWN
  - 2-10 Stations 7
  - 3-10 Stations 174
  - 4-10 Stations 19
  - 4-11 Stations 4
  - 5-10 Stations 21
  - 5-11 Stations 1
  - 10-5 Ice Stations 3
  - 12-2 Ice Stations 1
  - 1-12 Stations 545
- STATION TYPE — No. of Stations
  - GOES 555
  - Emergency Mobile GOES 13
  - Ice Monitoring Stations with Random GOES 4
  - LoggerNet CDMA 99
  - LoggerNet Modem 17
  - FTS Modem 33
  - VedasII 29
  - Campbell Modem 27
  - Sutron Modem 3
  - Satlink Modem 1
  - SCADA 43
  - TAU 11
  - SnoTel 6
  - USBR 1
  - BC Hydro 1

Appendix V: List of Acronyms

AEP-	Alberta Environment and Parks (Canada)
BLM-	Bureau of Land Management
CBU-	Consolidated Backup Facility, Fairmont, WV
CDA -	Command and Data Acquisition Station
DADDS-	Data Collection System (DCS) Administration & Data Distribution System
DAPS-	GOES Data Collection System Automatic Processing System (DCS)
DCP-	Data Collection Platform
DCPI-	Data Collection Platform Interrogate
DCPC-	Data Collection Platform Command
DCPR-	Data Collection Platform Radios
DCS-	Data Collection System (GOES)
DOMSAT-	Domestic Satellite (Commercial Satellite Broadcast Service)
DRGS-	Direct Readout Ground System
EMWIN-	Emergency Managers Weather Information Network (NWS)
FCC-	Federal Communications Commission
FCDAS-	Fairbanks Command and Data Acquisition Station, AK
GOES-	Geostationary Operational Environmental Satellite
HADS-	Hydrometeorological Automated Data System (NWS)
HRIT-	High Rate Information Transmission, GOES R Series (G16)
IRAC-	Independent Radio Advisory Committee
LRGS-	Local Readout Ground System
LRIT-	Low Rate Information Transmission, GOES 13, 14 & 15 broadcast
NIFC-	National Interagency Fire Center (BLM)
NOAA -	National Oceanic and Atmospheric Administration
NESDIS -	National Environmental Satellite, Data, and Information Service
NOS-	National Ocean Service (NOAA)
NSOF-	NOAA Satellite Operations Facility, Suitland, MD
NWS-	National Weather Service
NWSTG-	National Weather Service Telecommunications Gateway
OSPO-	Office of Satellite and Product Operations
STIWG-	Satellite Telemetry Interagency Working Group (DCS)
TWG-	Technical Working Group (DCS)
USACE-	U.S. Army Corps of Engineers
USGS-	United States Geological Survey
WBU-	Wallops Backup, Goddard Space Flight Center, MD
WCDAS-	Wallops Command and Data Acquisition Station, VA

Appendix VI – Participants:

First Name	Last Name	Organization
Sherif	Ahmed	Sutron Corporation
Quentin	Anderson	Tennessee Valley Authority
Arthur	Armour	U.S. Army Corps of Engineers
Philip	Bartlett	FTS (Forest Technology Systems)
Brett	Betsill	Microcom Design, Inc.
LySanias	Broyles	U.S. Army Corps of Engineers (USACE)
Tammy	Bryant	U.S. Army Corps of Engineers (USACE)
Chris	Buchner	Sutron Corporation
João Carlos	Carvalho	Brazilian Water Agency (ANA)
Matt	Ceanfaglione	Microcom Design Inc.
Denis	Champagne	Environment Quebec
Shawn	Cherry	Alion Science and Technology
Rick	Clayton	Bureau of Reclamation
Seth	Clevenstine	NOAA/NESDIS/OSPO/SPSD
Mike	Coffill	Alberta Government Environment and Parks
Adrian	Cortez	International Boundary and Water Commission
Larry	Crippen	Alion Science and Technology
Shayne	De Dominicis	Manitoba Hydro
Trent	Demuzio	YSI - Xylem Inc.
Yu	Deng	NOAA / NESDIS / OSPO
Howard	Diamond	NOAA /OAR / ARL
Jason	Dong	Science Systems and Applications, Inc. (SSAI) / NOAA / NESDIS / OSPO / SPSD / DSB
Warren	Dorsey	OSGS PETD (Affiliate)
Scott	Embler	NOAA / CWC / U.S. Climate Reference Network (USCRN)
Paul	Fajman	NOAA / NWS / Office of Dissemination
Manuel	Fernandez	ETESA (Empresa de Transmisión Eléctrica, S.A)
William	Finn	International Boundary and Water Commission

First Name	Last Name	Organization
Allen	Furlow	U.S. Army Corps of Engineers (USACE), Northwestern Division
Jesse	Gray	Bureau of Land Management
Brandi	Greenberg	Alion Science and Technology and USACE
Jeff	Gregory	U.S. Army Corps of Engineers (USACE), Nashville District
Matt	Hardesty	Colorado Division of Water Resources (DWR)
Jim	Heil	NOAA / NWS
Bradley	Heisterman	Bureau of Reclamation (USBR)
Nathan	Holcomb	NOAA-NOS
Samantha	Hussey	Environment and Climate Change Canada
Leona	Hyde	Government of Newfoundland and Labrador
Brian	Jackson	NOAA / NWS/ Office of Dissemination
Jeffrey	Jacquez	U.S. Army Corps of Engineers (USACE)
Mary Jane	Jojic	Ministry of Environment, Canada
Paul	Kawata	California Department of Water Resources
Linnea	Keating	USDA Forest Service
Brian	Kopp	The Semaphore Group, LLC
Warren	Krug	NOAA / NOS /CO-OPS / OSTEP (Affiliate)
David	Lubar	Aerospace and GOES-R Program Office / PSE-Spectrum
Carlos	Maldonado	Guatamala Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH)
Mike	Maloney	Cove Software
James	McNitt	NOAA /NESDIS / OSPO / SPSD / DSB
Joseph	Medina	California Department of Water Resources
Gail	Monds	U.S. Army Corps of Engineers (USACE), Detroit District
Kara	Morris	Oregon Water Resources Department
Luis Fernando	Murcia	Corporaciones Autonomas Regionales (CARs) of Colombia
Eric	Novotny	U.S. Army Corps of Engineers (USACE), Detroit District
Richard	Pardee	USGS Water Mission Area (WMA)
Jonathan	Paredes	Servicio Nacional De Meteorologia e Hidrologia del Peru (SENAMHI)
Norman	Penton	Government of Newfoundland and Labrador, Canada

First Name	Last Name	Organization
Allen	Phillips	U.S. Army Corps of Engineers (USACE)
Kristin	Powers	U.S. Army Corps of Engineers (USACE), Portland District
Duane	Preble	Microcom Design, Inc.
Craig	Pulford	Microcom Design, Inc.
Valerie	Randall	Science Systems and Applications, Inc. (SSAI) / NOAA / NESDIS / OSPO / SPSD / DSB
Letecia	Reeves	NOAA / NESDIS / OSPO / SPSD / DSB
Scott	Rogerson	NOAA / NESDIS / OSPO / SPSD / DSB
Timothy	Rutkowski	NOAA / National Weather Service/Eastern Region Headquarters
Dan	Schwitalla	USGS / Emergency Data Distribution Network (EDDN)
Paul	Seymour	Systems Integration & Development, Inc / NOAA / NESDIS / OSPO / SPSD / DSB
Bruce	Smiley	BC Hydro, Canada
Eric	Smith	U.S. Army Corps of Engineers (USACE)
Robert	Swofford	DOI /BLM / RSFWSU (RAWS)
Karl	Tarbet	Bureau of Reclamation
Roger	Teolis	Canadian Environmental Assistance
Travis	Thornton	NOAA / NESDIS / OSPO / Wallops Island Command and Data Acquisition Stations (WCDAS)
Perry	West	Microcom Design, Inc.
Philip	Whaley	NOAA / NESDIS / OSPO / Wallops Island Command and Data Acquisition Stations (WCDAS)
Terri	Weddell	Alion Science and Technology
Bonnie	Wyatt	U.S. Forest Service
Bill	Wychulis	Science Systems and Applications (SSAI) / NOAA / NESDIS / OSPO / OSGS
Steven	Yeadon	National Data Buoy Center

121st GOES Data Collection System – Technical Working Group – Participants
Yellow Signifies In-person Attendance

Appendix VII: Agenda

121st GOES DCS Technical Working Group Meeting:
Wednesday, September 13, 2016

Admin:

9:00-9:30----- Meet at NCWCP; Clear Security; Arrive Conference Room 4552-4553
9:40-9:45----- Connect (WebEx / Conference Line)
9:45-10:00---- Introductions (Role) – using Roster of Registrants

Session 1:

10:00----------Introductory Remarks – Scott Rogerson
10:10----------User Reports - LySanius Broyles, Robert Swofford, Bryan Jackson
10:40 ----------NOAA/NESDIS/OSPO Report – GOES DCS Status/Updates
(Letecia Reeves, Valerie Randall, Travis Thornton, Philip Whaley)

11:20-11:40---Break

Session 1 Continued:

11:40----------STIWG Report – LySanias Broyles
12:10----------DOMSAT Discussion – All (facilitated by Scott Rogerson & Philip Whaley)
12:30 ----------GOES-16 – Jim McNitt, Seth Clevenstine, Philip Whaley

1:00-2:00------Lunch

Session 2:

2:00---------- Manufacturer Remarks
2:10---------- Spectrum Report / Discussion – David Lubar
2:50---------- Two-Way Prototype Update – Brett Betsill
3:00---------- Thoughts Towards a New File Format – Brett Betsill

3:20-3:40---Break

3:40---------- DADDS Training – Letecia Reeves & Matt Ceanfaglione
4:20---------- Any Other Business / Future Plans – Scott Rogerson and all
4:35---------- Draft / Review Action Items – Paul Seymour and all
4:50---------- Closing Remarks – Scott Rogerson and all
5:00---------- Adjourn