NOAA NESDIS
GOES Data Collection System
Spacecraft and Ground System Overview
May 2022 TWG

NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

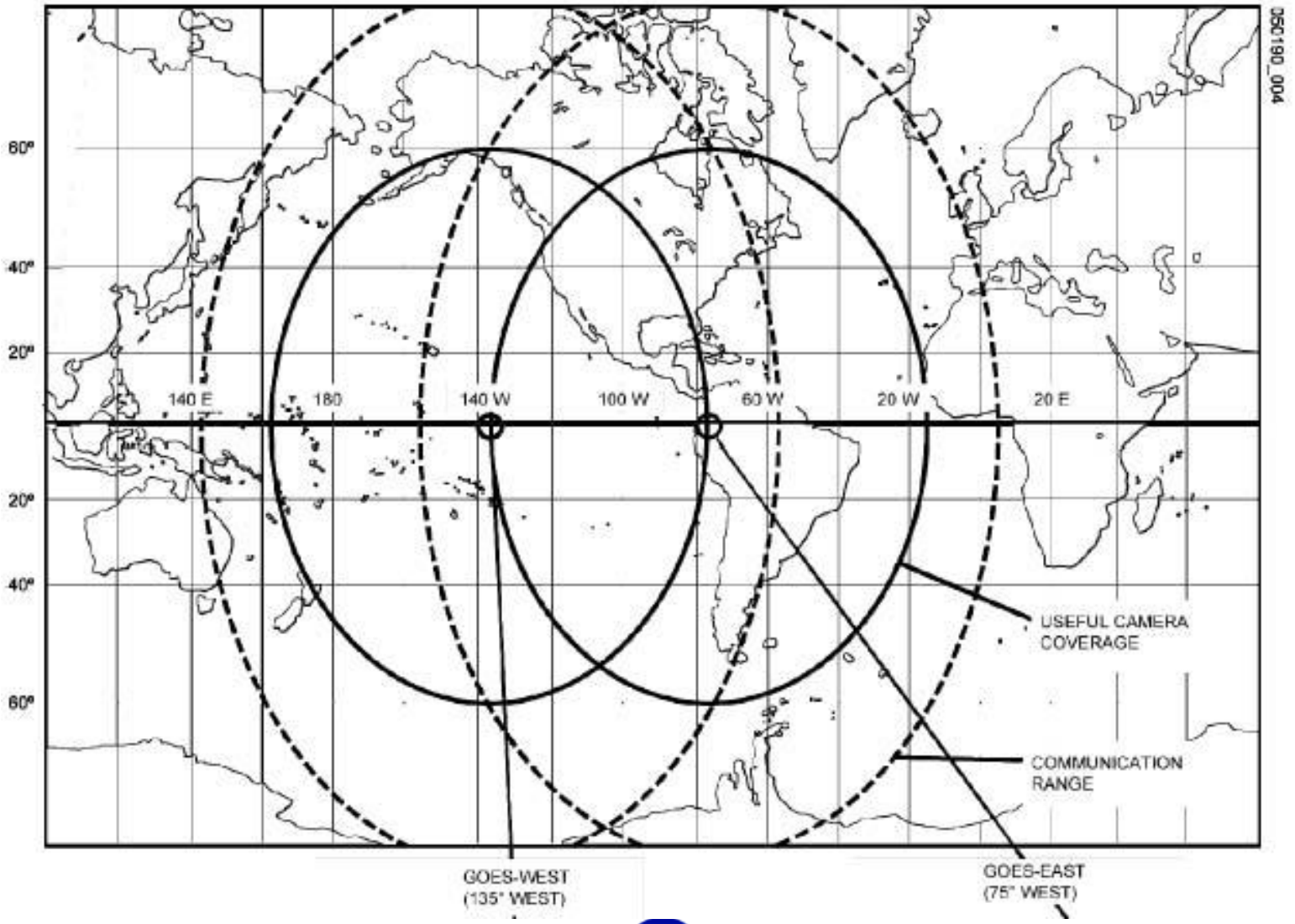
GOES Spacecraft Constellation

- GOES-16: Prime East S/C @ 75.2° W Longitude
  - Replaced G13 18 Dec, 2017
- GOES-17: Prime West S/C @ 137.2° W Longitude
  - Replaced G15 15 Nov, 2018
- GOES-14: Storage @ 105° W Longitude
- GOES-13: Transferred to USSF to support the GOES IO mission
  - Became operational 9 Sep 2020, renamed EWS-G1 (Electro-optical Infrared Weather System Geostationary)
- GOES-15: Storage @ 128° W Longitude

GOES T (18) Launch – Spring 2022

- NASA launched the third spacecraft in the GOES R series on March 1st, 2022 from Cape Canaveral Space Launch Complex 41 (SLC-41)
- Post-launch testing (PLT) is ongoing. Following successful completion of PLT, GOES 18 will drift to a co-location position with GOES 17 in June 2022.
- Current NESDIS operational plans involve replacing GOES 17 as the operational GOES West satellite in January 2023.

Current GOES Series Footprints



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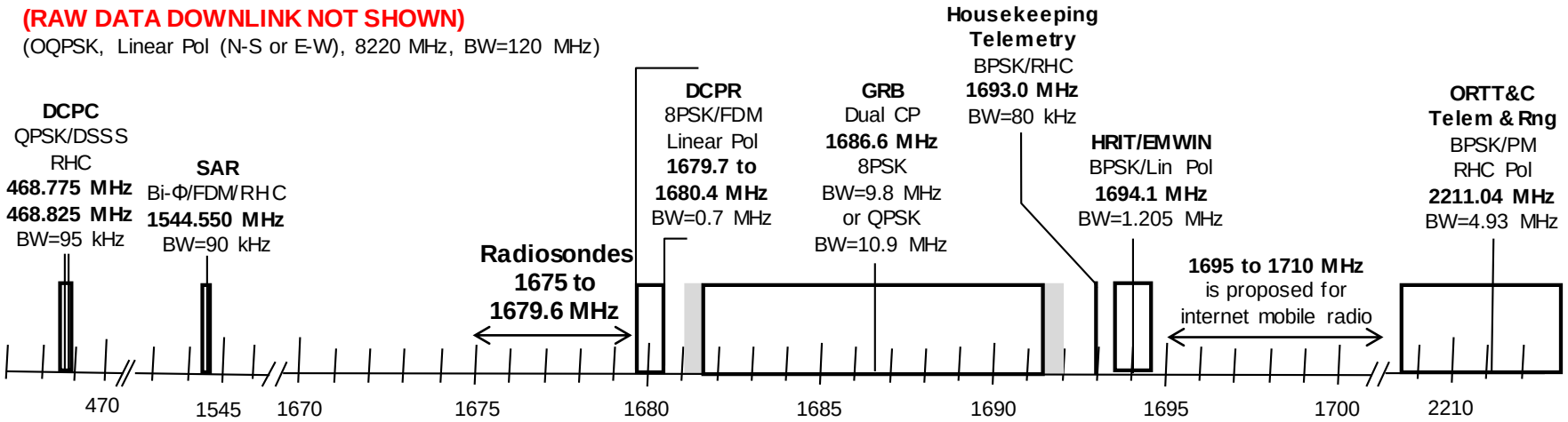
GOES R Frequency Plan

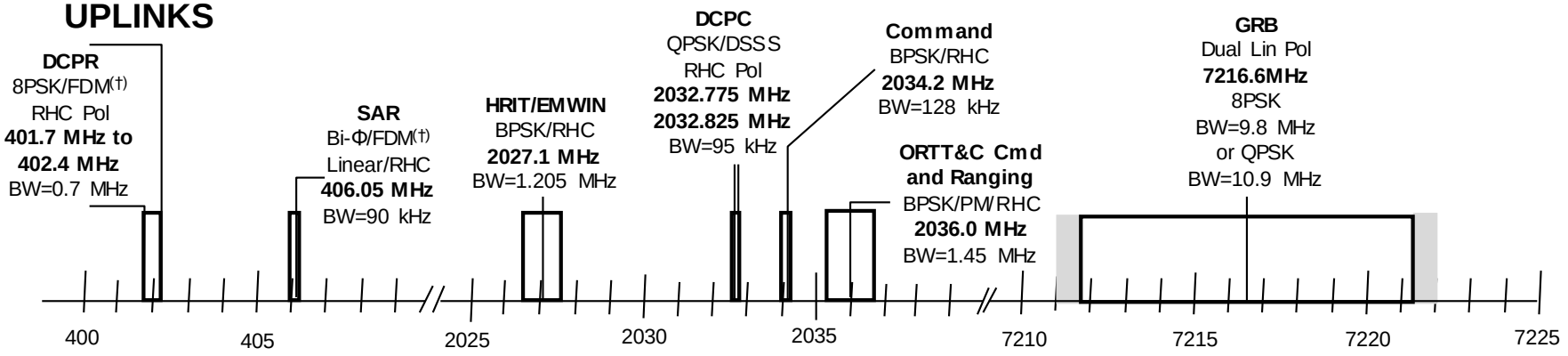
DOWNLINKS

(RAW DATA DOWNLINK NOT SHOWN)

(OQPSK, Linear Pol (N-S or E-W), 8220 MHz, BW=120 MHz)



UPLINKS



NOTES †: DCPR (8PSK) and SAR (Bi-Φ) are individual uplinks FDM'ed in the spacecraft transponder.

: Indicates possible extra GRB bandwidth for QPSK modulation

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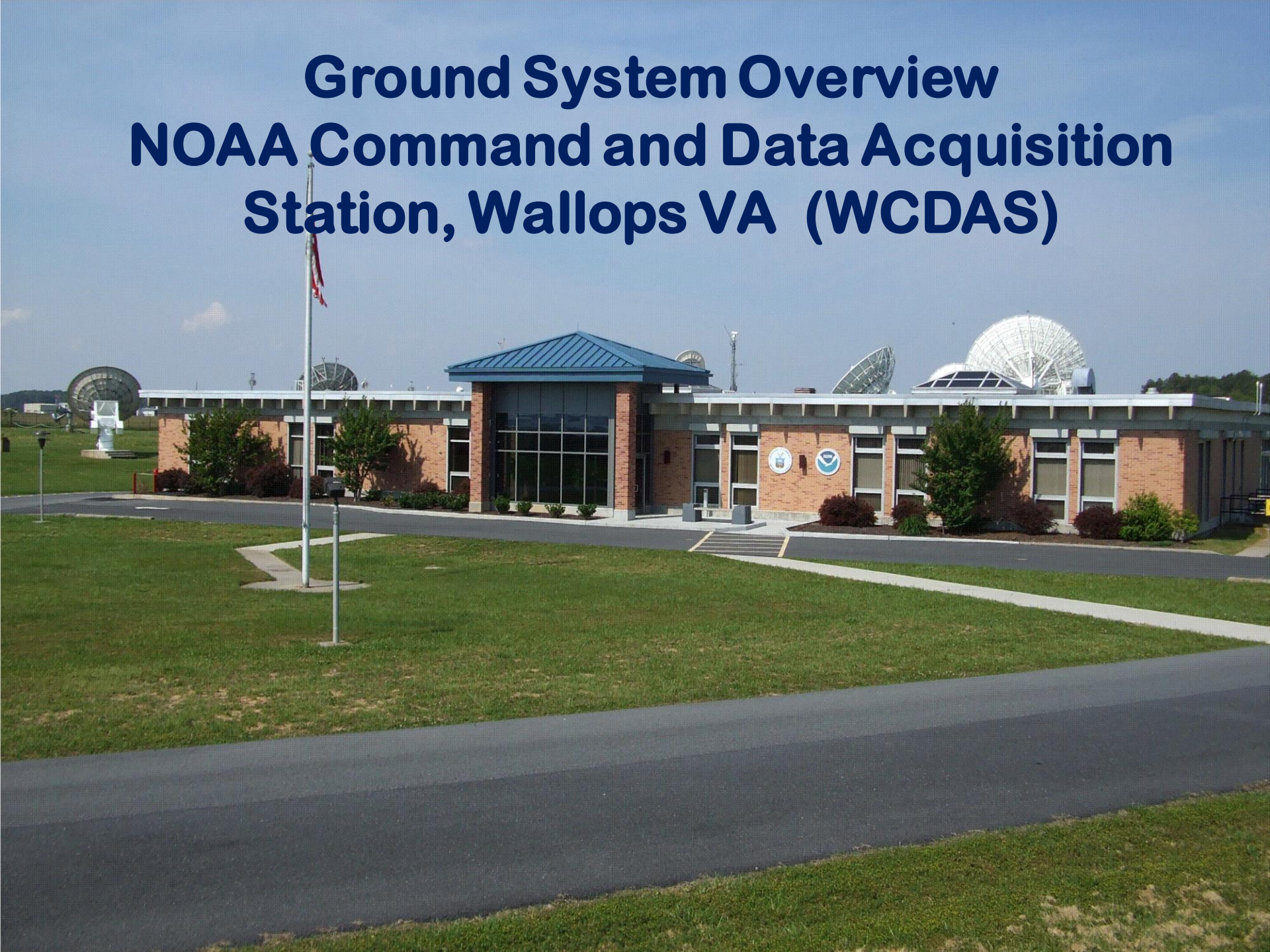
Ground System Overview
NOAA Command and Data Acquisition Station, Wallops VA (WCDAS)



16.4m Hurricane Rated (HR) Parabolic Antenna

- Rx Capability
  - 1670-1695 MHz (L-band)
  - 2200-2240 MHz (S-band)
  - 8100-8350 MHz (X-band)
- Tx Capability
  - 2025-2050 MHz (S-band)
  - 7208-7225 MHz (X-band)
- There are currently three HR antennas at WCDAS (HR4, HR5, and HR6) and three at CBU (HR7, HR8, and HR9) capable of supporting the GOES R series spacecraft.
- Two legacy HR antennas at WCDAS (HR1 and HR2) are currently undergoing upgrades/enhancements to facilitate GOES R support. Upgrades currently scheduled for completion Spring/Summer 2022.

DCS Primary Pilot Antennas – 401.85 MHz WCDAS

NESDIS GOES Backup Sites

- GOES Consolidated Backup (CBU)
  - Located in the I-79 Technology Park in Fairmont, WV
  - Provides full mission backup capability for GOES 14-17 **with the exception of a DCS receive ground system.**
  - Provides the Backup DCS Pilot at 401.7 MHz
  - Installation of 3.8m Backup Pilot antennas in progress.

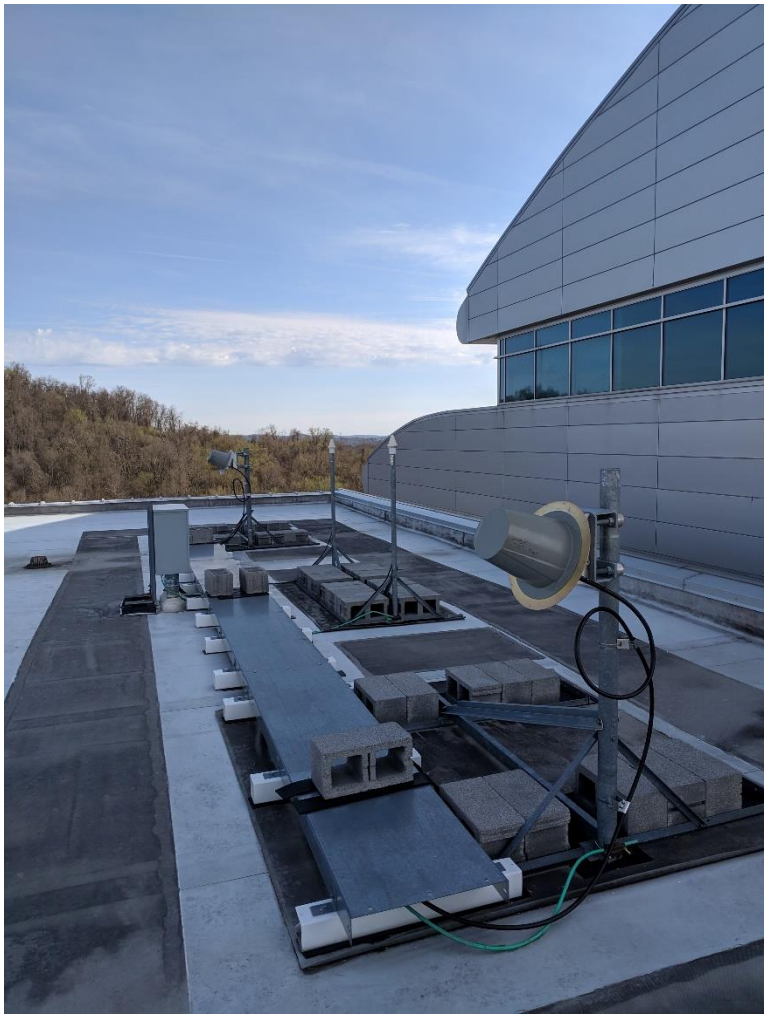
- NOAA Satellite Operation Facility (NSOF)
  - Located in Suitland, MD
  - Currently holds the backup DCS receive system, including DAMS-NT, DADDS, and LRGS.
  - Tentative plans to move all DCS backup ground equipment to CBU in late 2022.

NOAA Satellite Operations Facility, Suitland Md (NSOF)

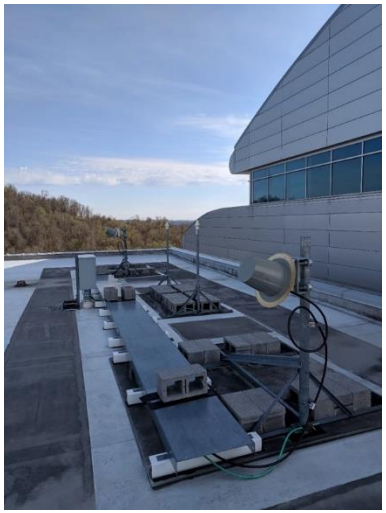
- Four 9.1m parabolic antennas (N1, N2, N3 and N4) in support of the GOES R series spacecraft.
- Rx Capability
  - 1670-1710 MHz (L-band)
- L-band Rx-only capability provides limited support.

NOAA Consolidated Backup (CBU), Fairmont WV

Backup Pilot Antennas – 401.7 MHz CBU



CBU Backup Pilot Antenna Upgrade



NOAA seeks to replace the omni-directional backup pilot uplink antenna currently installed on the roof of CBU with two 3.8m parabolic antennas similar to the primary pilot uplink antennas at WCDAS.

CBU Backup Pilot Antenna Upgrade cont.

- Parabolic antennas provide increased signal stability and enhance system redundancy.
- Antenna and shelter installation was completed in March 2022.
- Operational implementation of the new antennas scheduled for June 2022.
- No DCS message traffic interruption expected during antenna transition.

Red "X"s indicate planned location of new backup pilot antennas.

NOAA GOES DCS Data Services

NOAA/NESDIS provides both terrestrial and direct broadcast methods of GOES DCS message data dissemination from two facilities; the prime system is at the Wallops CDAS while the backup is at the NSOF. Wallops Operations monitors and controls both systems. The DCS supports the following dissemination services:

- **National Weather Service Telecommunication Gateway (NWSTG)**
  - WMO Header service from Wallops or NSOF DADDS
- **Local Readout Ground Station (LRGS)**
  - File sharing service from/with Wallops, EDDN & NSOF DAMS-NT
- **High Rate Information Transmission (HRIT)**
  - GOES R Series link, DCS data from Wallops or NSOF DADDS
- **DCS Administration and Data Distribution System (DADDS)**
  - Supports message ingest, processing and distribution and provides system administration functionality.

DCS National Weather Service Telecommunication Gateway (NWSTG)

- DCS messages processed are embedded with a World Meteorological Organization (WMO) header and then sent to the NWSTG for distribution.
- WCDAS and NSOF systems are both providing DCS data to the Gateway. This, in theory, enables the Gateway to select which stream to disseminate, with the default being Wallops is Prime.
- Wallops DCS Operators are able to determine which site (WCDAS or NSOF) is actively providing message data based on operational needs.
- Data customers using the NWSTG are largely unknown.

Local Readout Ground System (LRGS)

- NOAA Wallops CDAS hosts 2 LRGS,
  - CDADATA:
    - LRGS Address ; cdadata.wcda.noaa.gov
    - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Primary is NLRGS1, DDS Backup is EDDN1
  - CDABACKUP:
    - LRGS Address ; cdabackup.wcda.noaa.gov
    - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Primary is CDADATA, DDS Backup is EDDN2

- 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 NLRGS2, 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 EDDN2, DDS Receive Backup is CDADATA

High Rate Information Transmission (HRIT)

- HRIT is a GOES R series broadcast that provides the following services:
  - Reduced resolution Imagery Data
  - Emergency Managers Weather Information Network (EMWIN)
  - Data Collection System (DCS) messages
- GOES East & West DCS data is provided by the DADDS for inclusion in the GOES East and West HRIT broadcasts.
- GOES HRIT coverage extends well beyond the CONUS coverage offered by DOMSAT.
- GOES HRIT services can be supported by a 1m to 1.2m receive antenna system.
- For more information on the GOES HRIT system:
  - https://noaasis.noaa.gov/GOES/HRIT/about_hrit.html
  - https://www.goes-r.gov/users/hrit.html

DADDS Webservers https://dcs1.noaa.gov/

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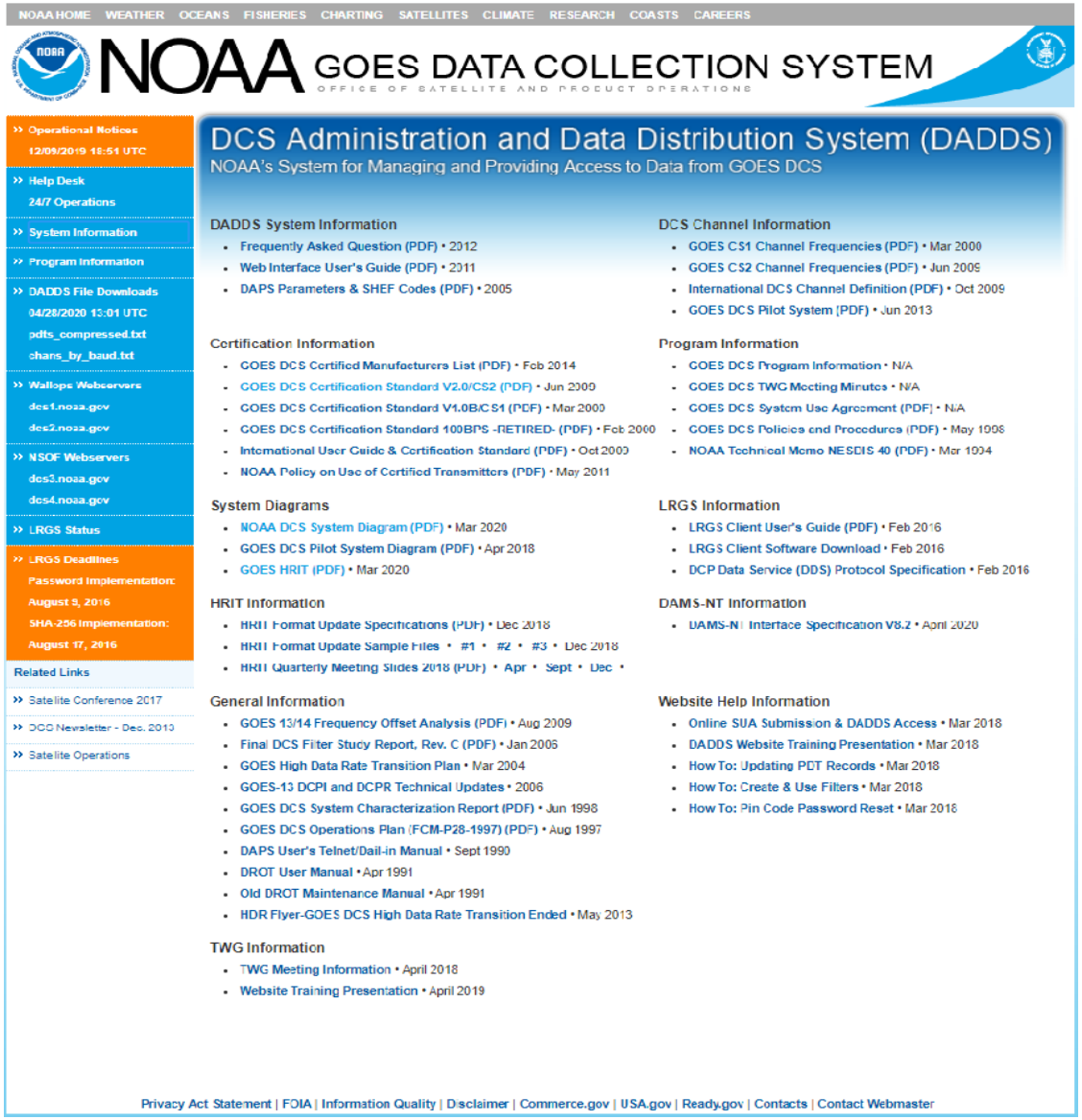
DADDS Webservers System Information



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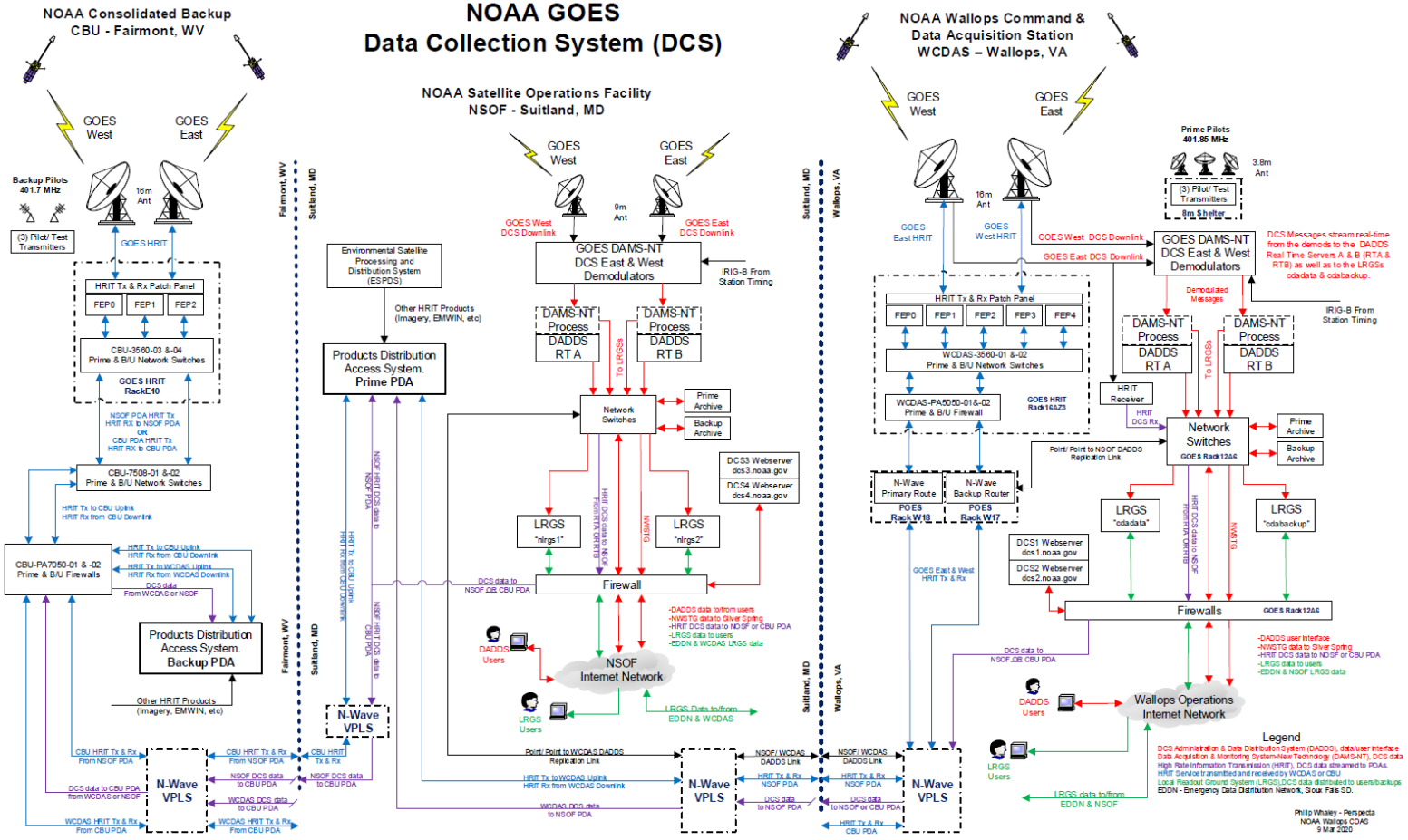
NOAA DCS System Diagram



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NOAA Wallops CDAS
DCS Support Contacts

- Wallops Help Desk: 757-824-7450, wdcs@noaa.gov
  - 24/7 Technical Support for DCS, LRGS, DADDS, HRIT

- Travis Thornton: 757-824-7316, joseph.t.thornton@noaa.gov
  - WCDAS Operations Shift Supervisor
  - DCS Operations Team Lead

- Matthew Sullivan: 757-824-7360, matt.g.sullivan@noaa.gov
  - DCS RF Systems Specialist
  - WCDAS Frequency Spectrum Manager

Acronyms

- **NOAA**: National Oceanic and Atmospheric Administration
  - Office/Agency of the Department of Commerce.
- **NESDIS**: National Environmental Satellite, Data, and Information Service
  - Line office of NOAA
- **OSPO**: Office of Satellite and Product Operations
  - Suitland MD, Wallops VA, Fairbanks AK, College Park MD
- **NSOF**: NOAA Satellite Operations Facility, Suitland, MD
- **WCDAS**: Wallops Command and Data Acquisition Station, VA
- **GOES:** Geostationary Operational Environmental Satellite
- **CBU**: Consolidated Backup Facility, Fairmont, WV
- **DADDS**: Data Collection System (DCS) Administration & Data Distribution System
- **DRGS:** Direct Readout Ground System
- **LRGS**: Local Readout Ground System
- **LRIT:** Low Rate Information Transmission, GOES 13, 14 & 15 broadcast
- **HRIT:** High Rate Information Transmission, GOES R Series (G16)
- **NWSTG**: National Weather Service Telecommunications Gateway

Thank you for your attention.

Questions?