NOAA NESDIS
GOES Data Collection System
Spacecraft and Ground System Overview
April 2024 TWG

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

GOES Spacecraft Constellation

GOES R Series

- GOES-16: Prime East S/C @ 75.2° W Longitude
- GOES-18: Prime West S/C @ 137.0° W Longitude
- GOES-17: Storage @ 105° W Longitude
  - G17 DCPR downlink was temporarily activated on Feb 5 to mitigate RFI being experienced on G16

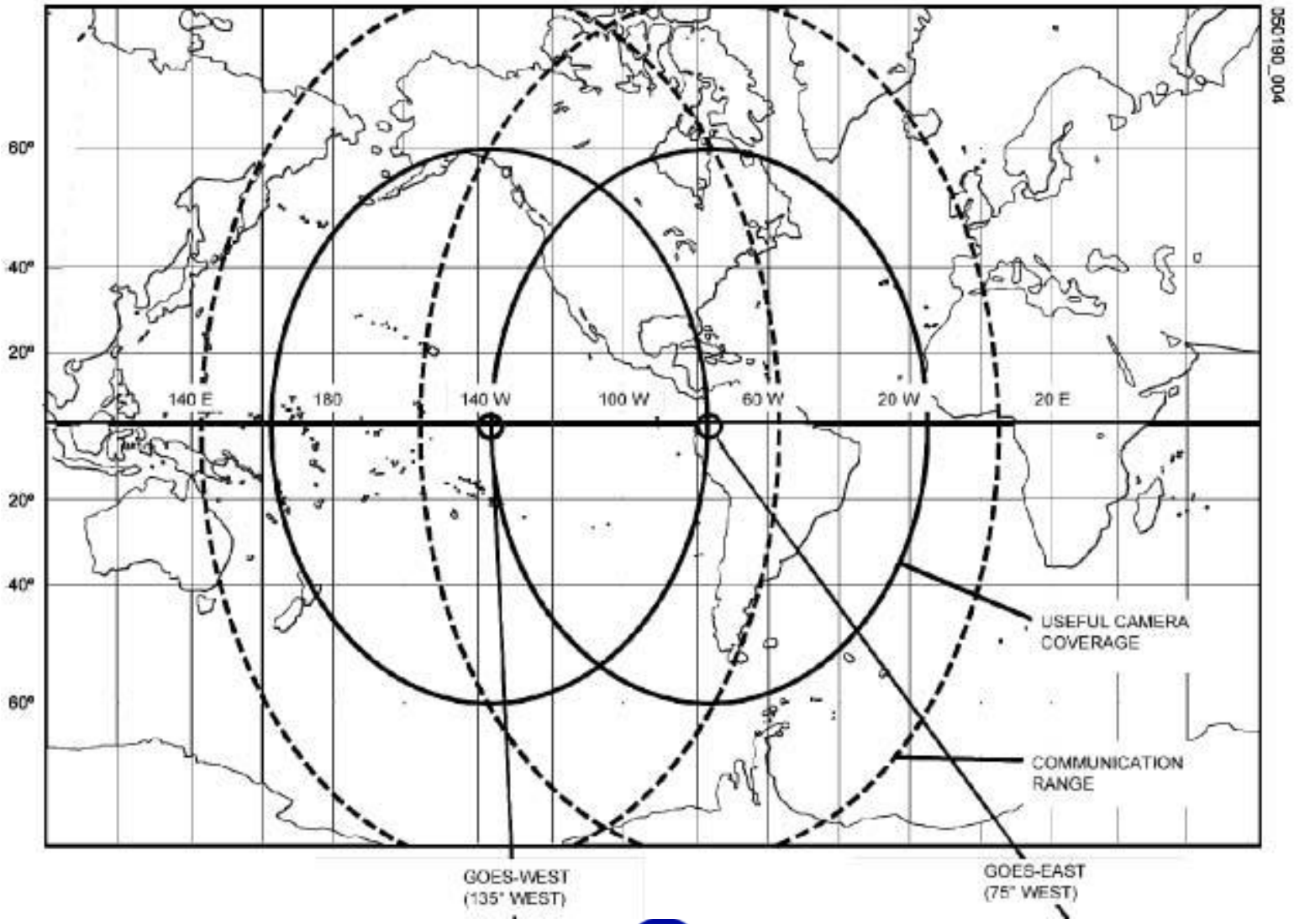
GOES N Series

- GOES-14: Storage @ 108.2° W Longitude
- GOES-15: EWS-G2 (Electro-optical Infrared Weather System Geostationary)
  - Replaced G13 (EWS-G1) on September 8, 2023 as the operational EWS satellite for the USSF in the Indian Ocean theater.

GOES U (19) Launch – Summer 2024

- NASA plans to launch GOES U, the fourth and final spacecraft in the GOES R series, on June 25, 2024 from the Kennedy Space Center.
- Following a successful launch, orbit-raising, and post-launch testing period, GOES U will be renamed GOES 19 and join NOAA's fleet of operational GOES satellites.
- The Geostationary Extended Observations (GEOXO) satellite series will replace the GOES series by the early 2030's.

Current GOES Series Footprints



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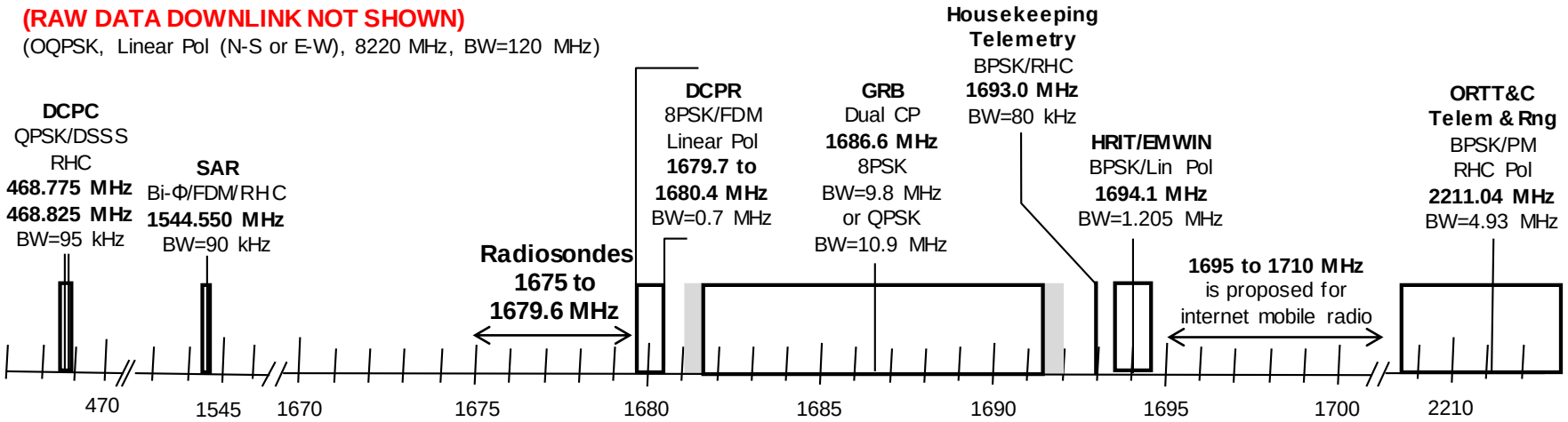
GOES R Frequency Plan

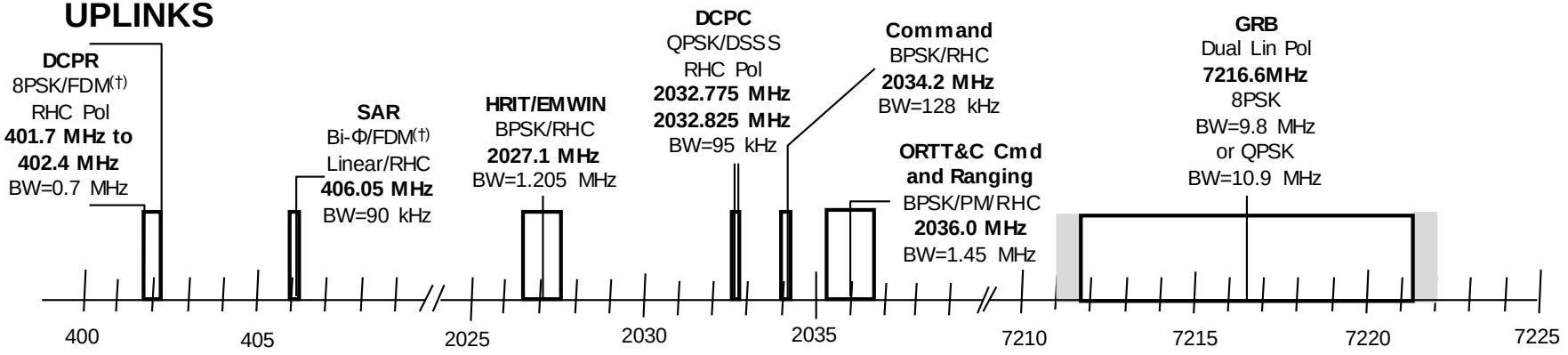
DOWNLINKS

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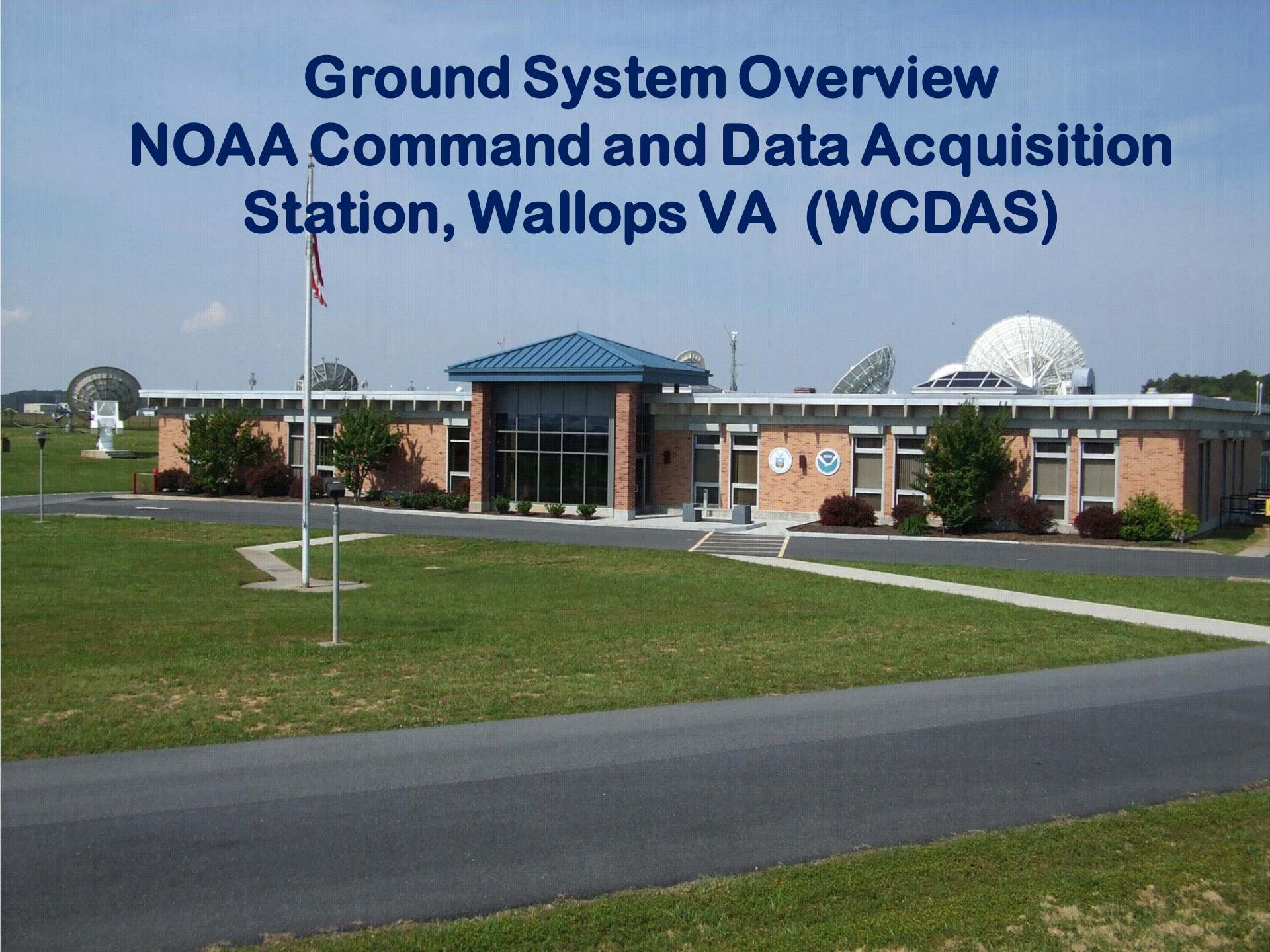
Ground System Overview
NOAA Command and Data Acquisition Station, Wallops VA (WCDAS)



16.4 meter 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) capable of supporting the GOES R series spacecraft.
- In addition to the primary HR antennas, WCDAS has the following legacy antennas capable of supporting the DCS:
  - HR1
  - HR2
  - 14.2 meter
  - 8 meter

WCDAS 3.8 meter Pilot Uplink Antennas

- GOES East – Primary Pilot (401.85 MHz)
- GOES West – Primary Pilot (401.85 MHz)
- GOES 17 – Primary Pilot (401.85 MHz) and Backup Pilot (401.7 MHz)

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 14-18 **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 completed in Sept 2022.

- 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 scheduled for 2024 following the GOES U launch.

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

CBU 3.8 meter Pilot Uplink Antennas

GOES East – Backup Pilot (401.7 MHz)

GOES West – Backup Pilot (401.7 MHz)

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)**
  - DCS message distribution service from/with Wallops, EDDN & NSOF utilizing the OpenDCS software in a client-server model.
- **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 enables the Gateway to select which stream to disseminate, with the default being Wallops is Prime.
- Data customers using the NWSTG are largely unknown.

Local Readout Ground System (LRGS)

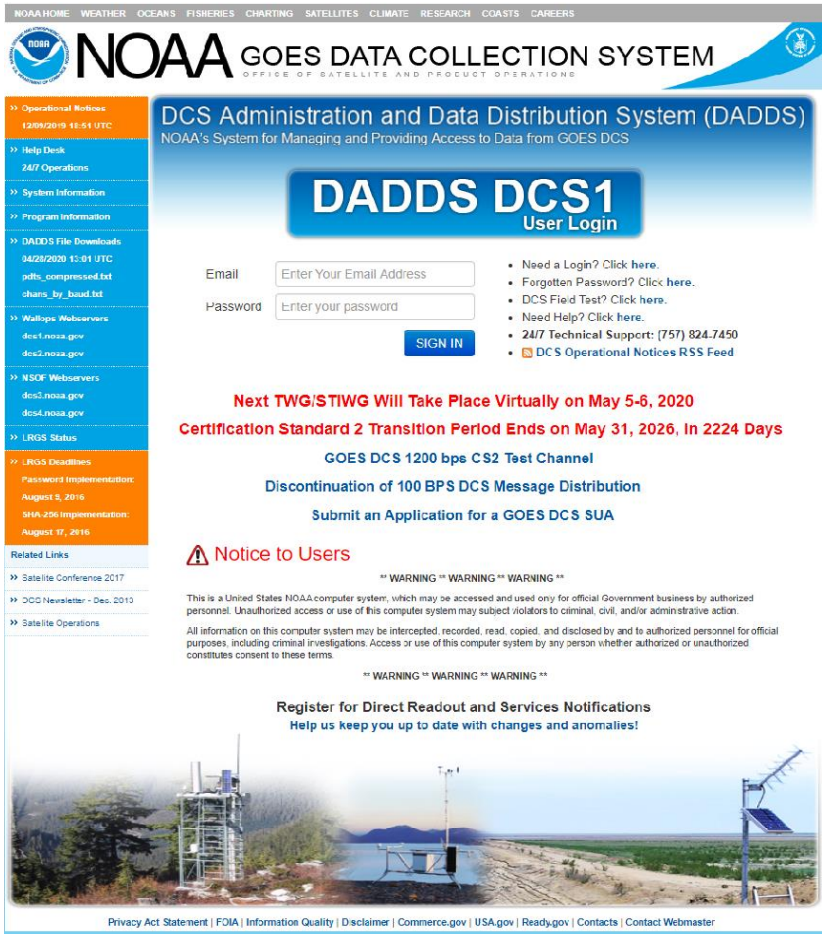
- NOAA Wallops CDAS hosts 2 LRGS,
  - CDADATA:
    - LRGS Address ; cdadata.wcda.noaa.gov
    - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Primary is NLRGS1, DDS Backup is EDDN1
  - CDABACKUP:
    - LRGS Address ; cdabackup.wcda.noaa.gov
    - DRGS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

DCS Administration and Data Distribution System (DADDS)

- Web-based platform that provides DCS users and administrators the various administrative functions necessary to maintain a properly functioning DCS .
- Detailed system performance statistics used by DCS operators and program staff to troubleshoot anomalies and track system metrics.
- Field test capability to aid users in the installation and testing of DCPs.
- Message data export functionality
- Accessed via the following links:
  - https://dcs1.noaa.gov/
  - https://dcs2.noaa.gov/
  - https://dcs3.noaa.gov/
  - https://dcs4.noaa.gov/



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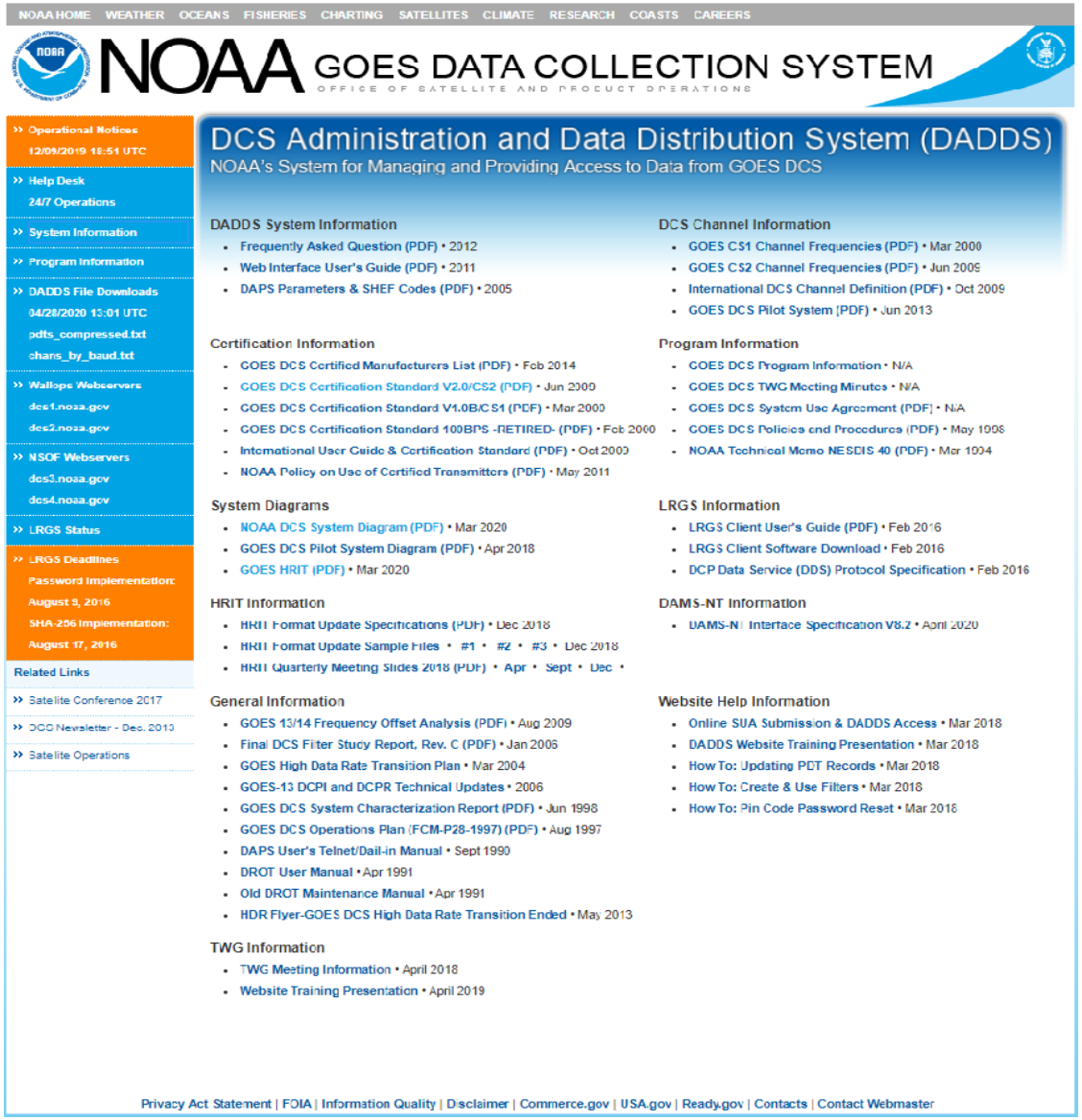
DADDS Webservers System Information



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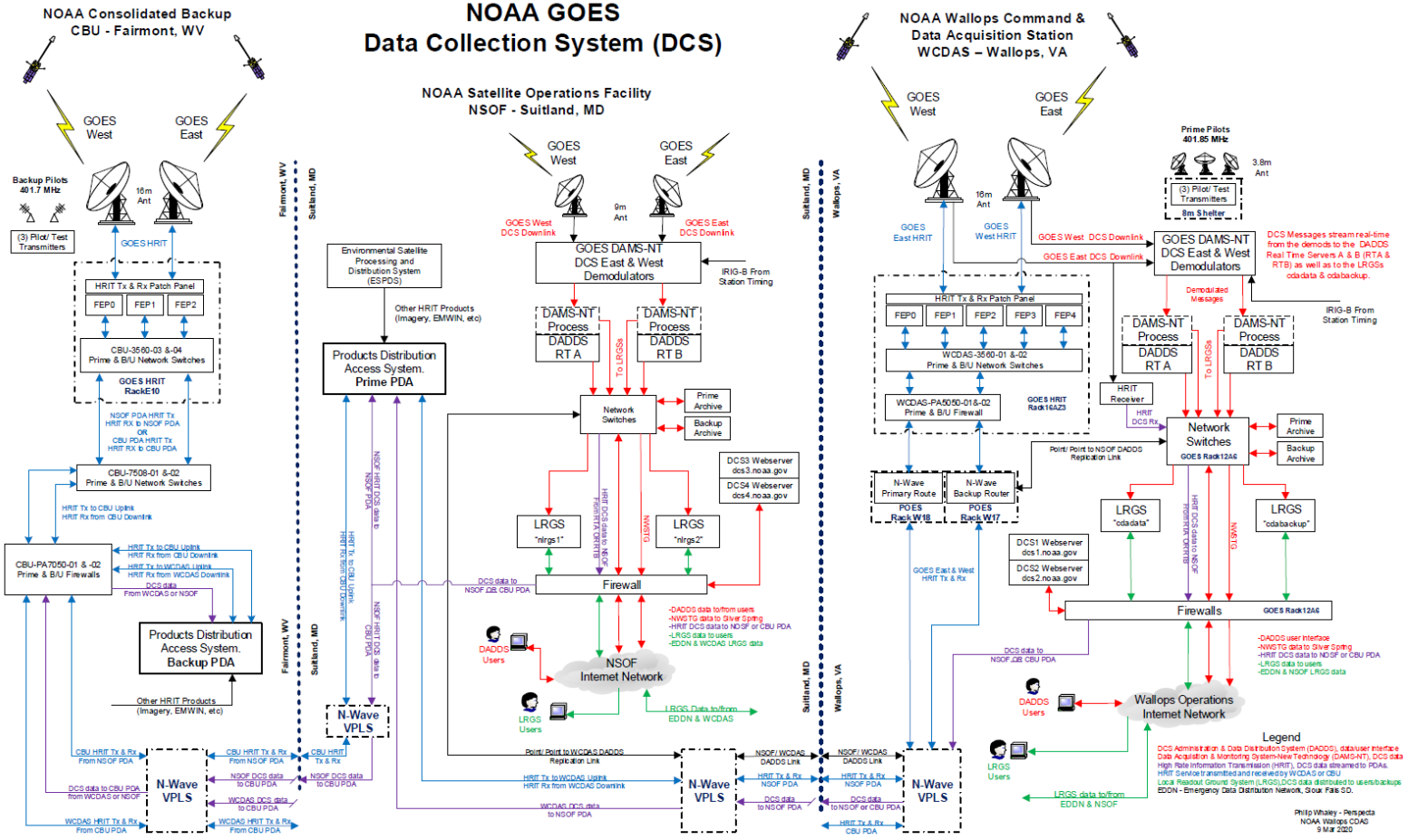
NOAA DCS System Diagram



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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
  - DCS Operations Supervisor
- Matthew Sullivan: 757-824-7360, matt.g.sullivan@noaa.gov
  - DCS Systems Engineer
- Christine Kuhner: 757-824-7450, christine.j.kuhner@noaa.gov
  - DCS Team Lead

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
- **GEOXO:** Geostationary Extended Operations
- **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
- **HRIT:** High Rate Information Transmission, GOES R Series (G16)
- **NWSTG**: National Weather Service Telecommunications Gateway

Thank you for your attention.

Questions?