GOES DBF (DCS Backup Facility) Study

Presented to STIWG

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Agenda

- Study Approach

- Requirements and Open Issues

- System Design

- Distributed Wallops Backup

- Failover Scenarios

- Site Selection

- Status

Study Approach

Study Approach

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- Study a basic system which receives DCP Messages from GOES East and GOES West and disseminates them to users via
  - Internet DDS Protocol
  - DOMSAT Satellite
  - National Weather Service Gateway
  - LRIT

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Study Approach

- Add quality control, system administration and management capabilities, PDT (Platform Description Table) management, equipment monitoring and control and message statistics to the basic system

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Requirements and Open Issues

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There are no requirements for…

- DCP interrogations or the GOES time code

- The "do not disseminate" flag for each PDT

- FTP scripts, web interface or dial-in access for users

- A backup for the actual LRIT uplink

- Failover of Internet DDS services from the WCDAS to the backup

- User access to the system except for the Internet DDS

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Open Issues

- ## GOES DCS Pilot
  - The current design relies on the Wallops CDAS Pilot Backup at WBU.
    - This will automatically come on if the pilot is not being received from one of the satellites.
    - We are assuming the failover will occur within a minute.
  - A requirement for a GOES DCS Pilot Backup may be added for the DBF

- ## NWSTG Dissemination
  - NWS has indicated that they may not want to receive a redundant feed from the DBF all the time
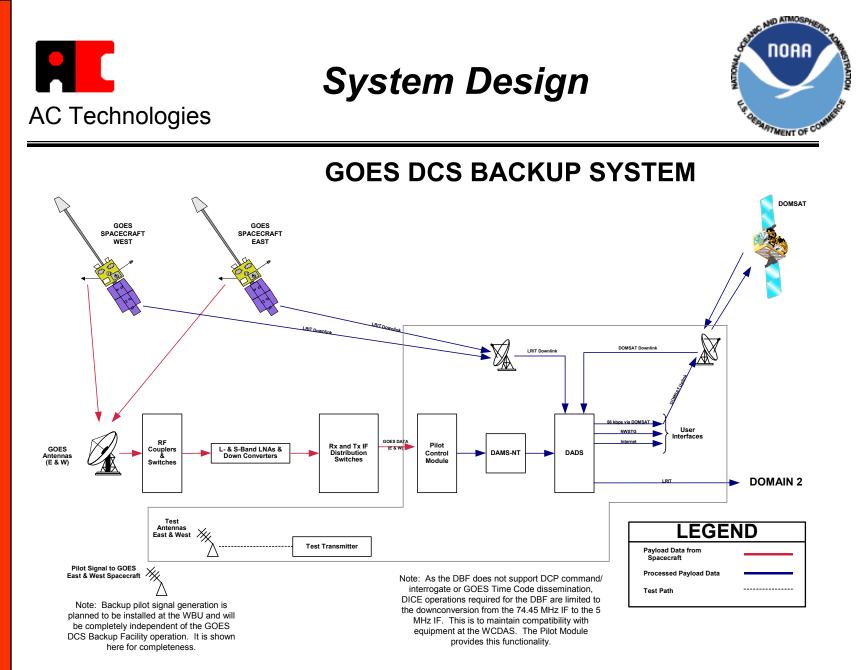 - We are continuing to discuss the NWSTG switchover scenarios with NWS

- # Demodulator Self-Test
  - – 99.5% Availability requirement leads to a 2-hour MTTR (Mean Time To Repair)
  - – The individual demodulator cards are the primary driver
    - With automatic testing and switchover of a failed demodulator channel, the required MTTR increases to ten hours
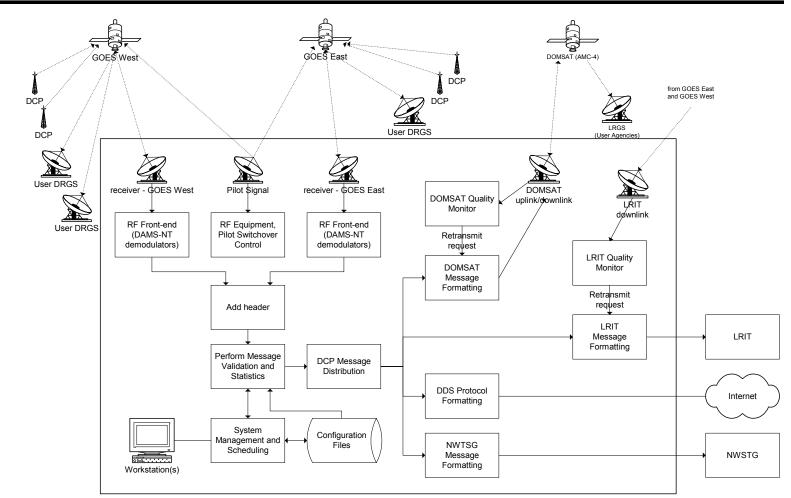 - – New system requirements would have to be added for demodulator self-test

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System Design

System Design

GOES DCS BACKUP SYSTEM

LEGEND

Payload Data from Spacecraft	———
Processed Payload Data	———
Test Path	---------

Note: Backup pilot signal generation is planned to be installed at the WBU and will be completely independent of the GOES DCS Backup Facility operation. It is shown here for completeness.

Note: As the DBF does not support DCP command/ interrogate or GOES Time Code dissemination, DICE operations required for the DBF are limited to the downconversion from the 74.45 MHz IF to the 5 MHz IF. This is to maintain compatibility with equipment at the WCDAS. The Pilot Module provides this functionality.

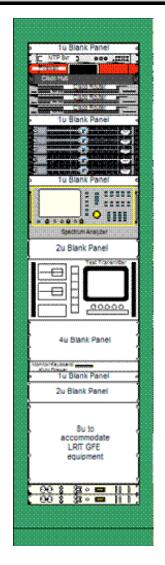**March 24, 2004**

Why a Database Server?

- For DADS (DCS Acquisition and Distribution System), we envision an off-line database. When the database is updated, a new ASCII dump is created and installed on the RTS.

- There are many advantages to this approach:
  - Real-time components can be developed and tested without reliance on a database.
  - Database interfaces do not need to be installed on the real-time systems.
  - The overall scope and processing load of the database is greatly reduced.

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DADS Rack Layout

- This rack provides the space for
  - Test transmitter
  - Spectrum Analyzer
  - Real Time Server (RTS)
  - Database Server (DBS)
  - LRIT Server (LS)
  - Internet User Server (IUS)
  - Operator Workstation
  - Combination monitor, keyboard, KVM switch
  - NTP Server
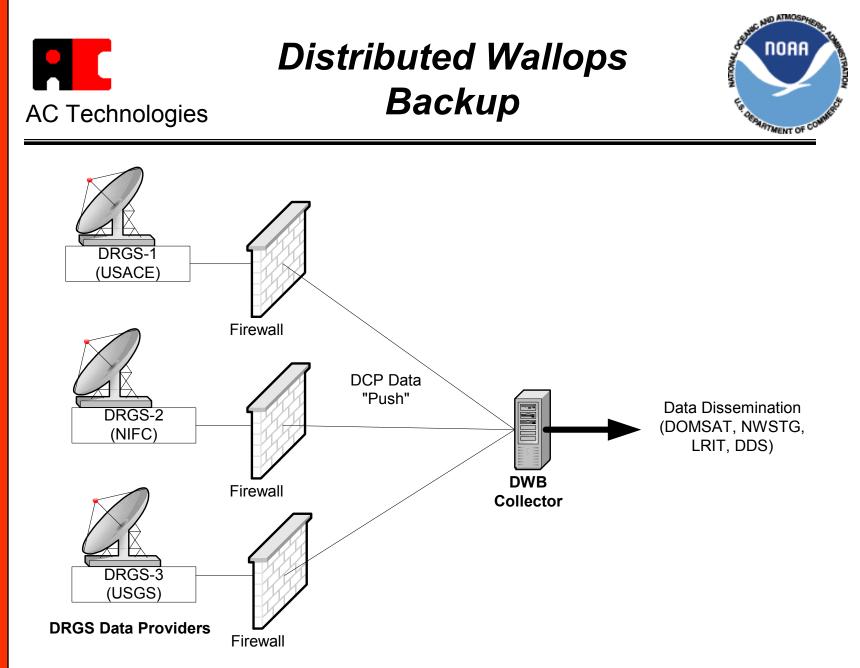 - LRIT Receiver
  - Firewall

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Distributed Wallops Backup

- As part of the GOES DCS Backup Facility study, AC Technologies developed a high-level design for a DWB (Distributed Wallops Backup)

    – The DWB differs from the centralized backup facility design only in how the data is received.

    – Once data is received and archived, all down-stream functions (DOMSAT, NWSTG, LRIT, DDS) can be implemented in exactly the same manner as the centralized backup.

Distributed Wallops Backup

DRGS-1
(USACE)

Firewall

DRGS-2
(NIFC)

DCP Data
"Push"

Firewall

DRGS-3
(USGS)

DRGS Data Providers

Firewall

**DWB
Collector**

Data Dissemination
(DOMSAT, NWSTG,
LRIT, DDS)

Distributed Wallops Backup

Distributed Wallops Backup

DRGS Data Provider		Secure Internet Data Transfer	DWB Collector	
Antenna, Archive, RF, and other Modules	**DWB Communications Module**		**DWB Communications Module**	Archive, Distribution, and other Modules
	Short-Term Archive Module.		**Sort/Merge Filter Module**	**Reporting & User Interface Module**
			Channel Monitoring & Data Recovery Module	**DWB Config & Control Module**

o o o   (Several Data Providers hosted
by Multiple Agencies)

Failover Scenarios

- There are requirements which correspond to three different durations for DBF operation:
  - Immediate
  - Approximately 24-48 hours
  - Approximately one week (or more)
- There are three overall functions of the GOES DCS Ground System which can be switched from the WCDAS to the DBF:
  - DCS Message Dissemination
  - DCS Troubleshooting
  - DCS System Administration

- Internet DDS Protocol

- NWSTG

- DOMSAT Transmission

- LRIT Transmission

- # Internet DDS Protocol
  - ## – The DBF provides a backup to the WCDAS DDS data stream.
  - ## – Users can choose their DDS stream.
    - No explicit switchover is required.
    - The DBF can always disseminate messages via DDS.
    - We plan to enhance the DDS Client to allow automatic switchover to a backup server if no messages are received from the primary server for a period of time.

- # NWSTG
  - ## The DBF provides a backup to the WCDAS NWSTG data stream.
  - ## The NWS initially suggested a duplicate data stream from the DBF at all times.
    - ### No explicit switchover required.
    - ### The DBF always disseminates messages via NWSTG.
  - ## AC Technologies met with NWS yesterday (March 23)

Failover Scenarios – DOMSAT

- ## DOMSAT Transmission
  - The DBF provides a backup to the WCDAS DOMSAT uplink and uses the same satellite transponder frequency.
    - Allows all DOMSAT users (including LRGSs) to use the same receive frequency for DOMSAT data disseminated by either the WCDAS or the DBF.
    - Requires manual intervention by Americom to change transmitters.
    - The DBF will continuously monitor the DOMSAT downlink. If the DOMSAT downlink message stream is absent for a period of time, the DBF will transmit a test message on the DOMSAT uplink. The DBF will continue to monitor the DOMSAT downlink to determine when to begin transmitting DCP messages on the DOMSAT uplink.
    - Reversion to WCDAS requires manual coordination.

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- LRIT Transmission
  - The DBF does *not* provide a backup to the WCDAS LRIT uplink.
  - The DBF will continuously monitor the LRIT downlink. If the LRIT downlink message stream is absent for a period of time, the DBF will transfer a test message to DOMAIN 2. The DBF will continue to monitor the LRIT downlink to determine when to begin transferring DCP message files to DOMAIN 2.
  - Reversion to WCDAS requires manual coordination.

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Failover Scenarios – User Support

- Troubleshooting support will continue to be done by the GOES DCS operators normally stationed at WCDAS

    – If the operators are relocated to the DBF or WBU, we recommend using call forwarding or an off premise extension to allow users to get support

    – Most DBF functions can be accessed from WCDAS or WBU

        - This does not include the test transmitter or spectrum analyzer for system debugging

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- The major function that will be failed over is the databases system.

  - If changes are made to the database tables at the DBF, revised database tables and a "change log" will be provided to WCDAS.

  - These changes will be done locally at the DBF in Suitland, MD.

  - Lack of user access to the database tables will increase operator workload for maintaining the databases. Users must call or use e-mail to request changes.

Site Selection

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Site Selection Process

- Completed an initial evaluation for each site

- Presented the findings to NOAA at a Site Selection meeting in December 2003

- Considered a seventh site: Aviation Weather Center, Kansas City, MO

- AWC (Aviation Weather Center), Kansas City, MO

- Bureau of Reclamation, Boise, ID

- EROS Data Center, Sioux Falls, SD

- NIFC (National Interagency Fire Center), US Forest Service, Boise, ID

- NSOF (NOAA Satellite Operations Facility) Building (under construction), Suitland, MD

- SSEC (Space Sciences Engineering Center), Madison, WI

- WBU (Wallops Backup), Building 25, Goddard Space Flight Center, Greenbelt, MD

- AWC, Kansas City, MO
  - The existing 5 M antennas are adequate and the site will not charge rent for use of the facility
  - AWC replaced EROS Data Center in our original recommendations
  - EROS Data Center scored almost as well as AWC in our evaluation

- NSOF, Suitland, MD

- WBU, Goddard Space Flight Center, MD

Status

Status

- The GOES DCS Backup Facility Study is nearly completed
  - We have completed and delivered the system requirements and system design
    - We conducted a Requirements Review on February 4, 2004 and a Design Review on March 16, 2004
  - We will deliver our final report in April

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Discussion