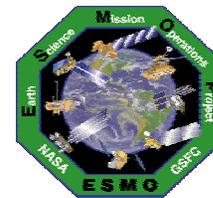




**Joint AMSR
Science Team Meeting
August 3, 2004**



**EOS Data and Operations
System (EDOS)**

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EDOS Operations Manager
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Topics

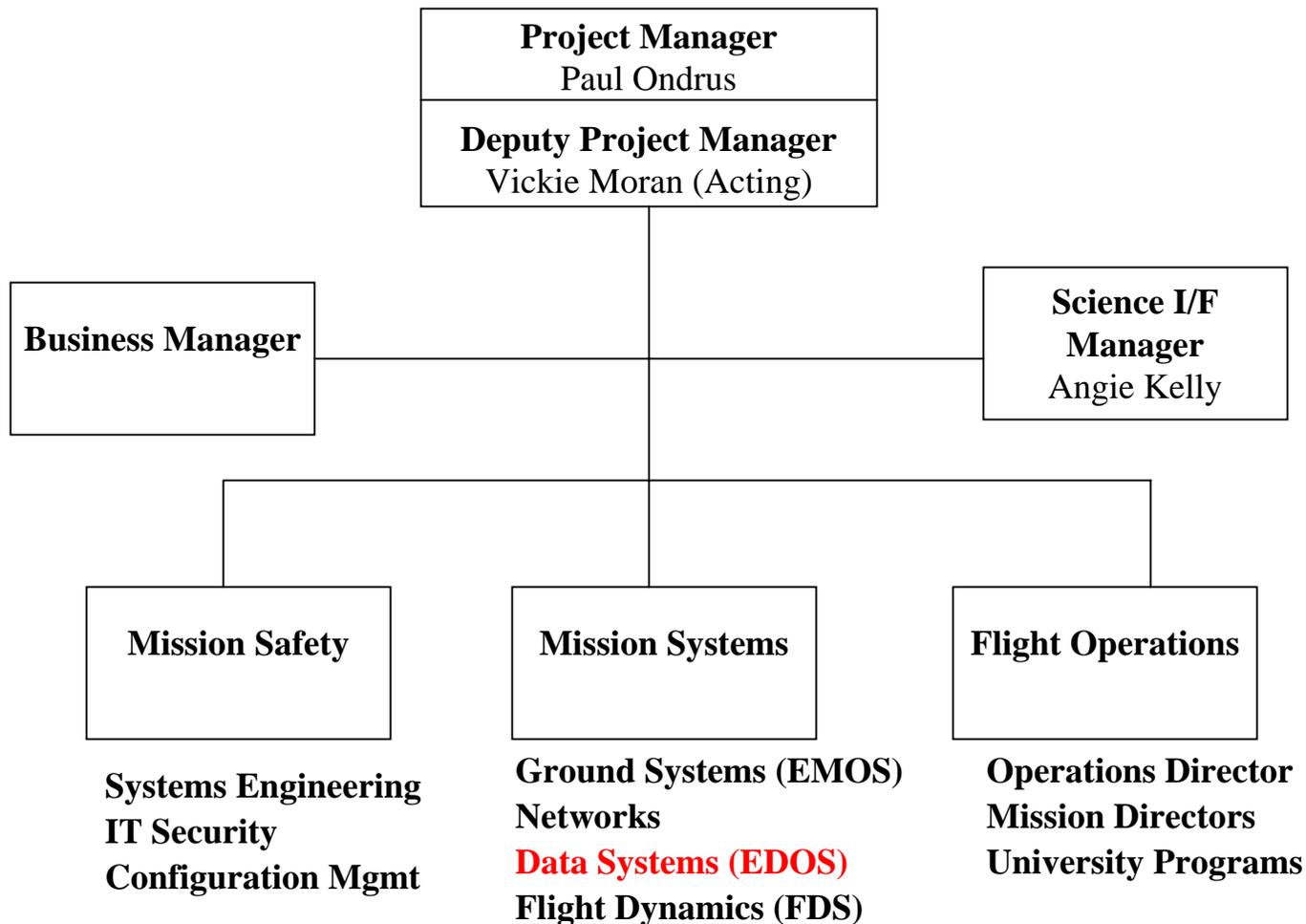
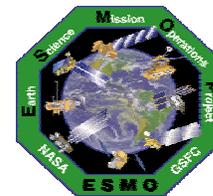


- **EDOS Overview**
- **Technical Review**
 - **Product Overview**
- **EDOS/AMSR-E Interface**
- **Latency Enhancements**
 - **Early RLSS**
 - **Data Filtering**
- **EDOS/JAXA Interface**
- **Proposed enhancements to interface**
 - **Expected improvement in latency**
- **EDOS recent and planned upgrades**



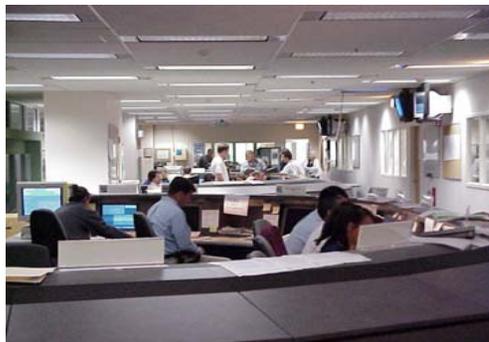
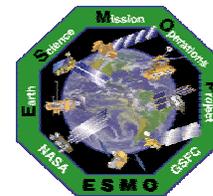
ESMO

Earth Science Mission Operations Project





EDOS Facilities



Level Zero Processing Facility (LZPF)
Building 32, Rooms C-210 & S-9, GSFC



Ground Station Interface Facilities (GSIFs)
White Sands Complex (WSC), New Mexico;
Alaska Ground Station (AGS), Alaska;
Svalbard Ground Station (SGS), Norway

Sustaining Engineering Facility (SEF)
Building 3/14, GSFC



Data Archive Facility (DAF)
WSC, New Mexico



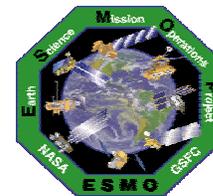
EDOS Responsibilities / Capabilities Overview



- **Synopsis of Requirements for EDOS Operations**
 - **GSIF**: Capture, monitor and retransmit science data to the EDOS LZPF from multiple satellites: Terra, Aqua, ICESat, and Aura. Located at WSC, AGS, and SGS in support of transmissions from TDRSS, AGS, PF1, FCDAS at Gilmore Creek, SGS, SKS, and SG3
 - **LZPF**: Perform CCSDS Physical Channel Processing (frame synchronization, Reed-Solomon decoding) plus CCSDS Path & VCDU Service Processing
 - **LZPF**: Process data products including: Rate-Buffered (Path & VCDU) EDOS Data Units (EDU), Production Data Sets (PDS), EDS (Expedited Data Sets)
 - **LZPF**: Provide 45 days of raw data storage
 - **DAF**: Retain the PDS data products for life of mission
- **Level Zero data volume produced and distributed**
 - Terra: 205 GB/day
 - Aqua: 89 GB/day
 - Aura: 43 GB/day
 - ICESat: 4.9 GB/day



EDOS Products



- **High Level Description of EDOS Products**

- **EDOS Rate Buffered Data (RBD) Service**

- » Perform RB transfer of EDOS Path and Virtual Channel Data Unit (VCDU) Service EDU files
- » Initiate RBD transfer within 5 minutes of completion of Return Link Service Session (RLSS)
- » EDOS has the goal to deliver RBDs within 3 hours from the end of observation

- **Expedited Data Sets (EDS)**

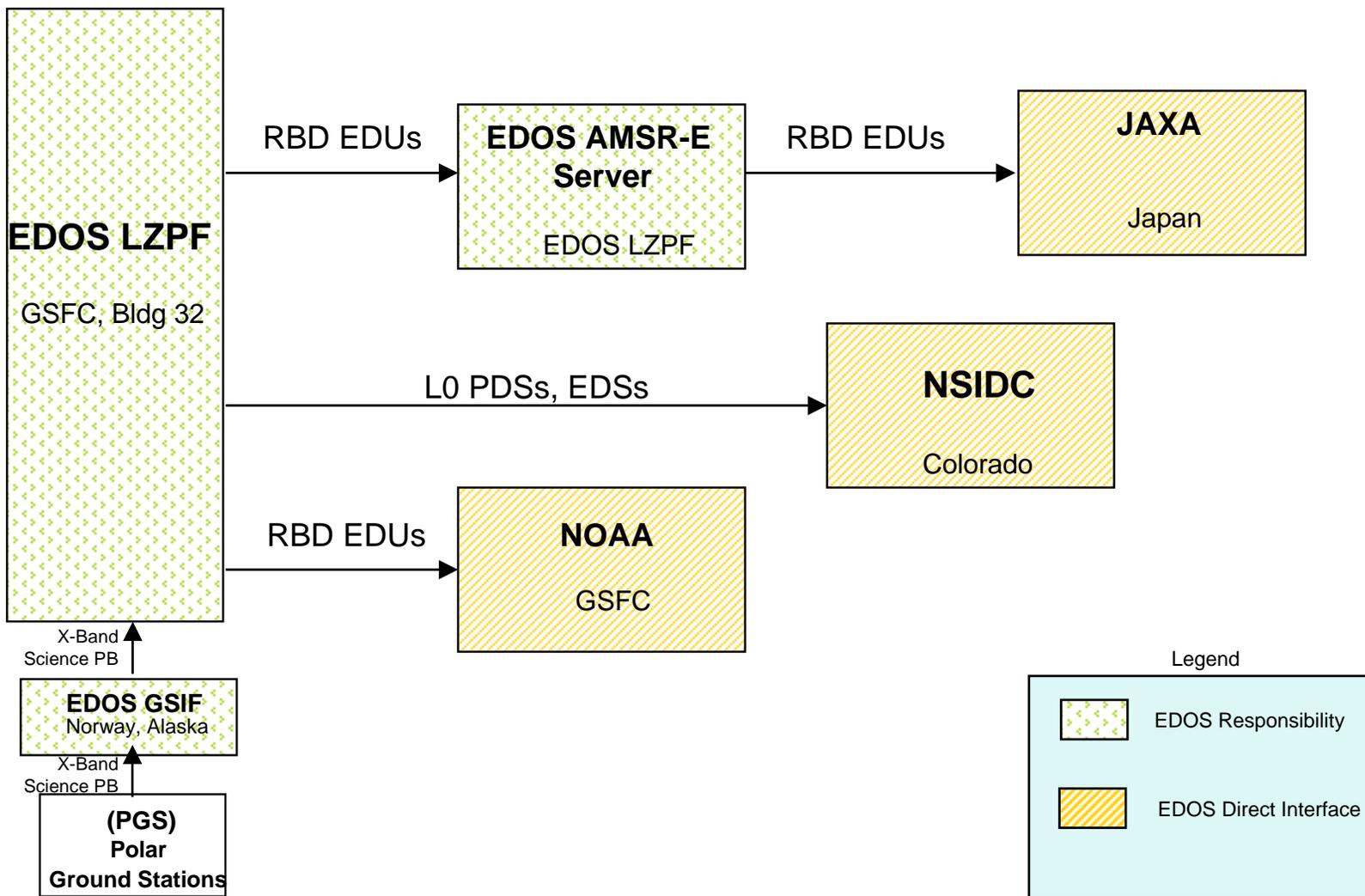
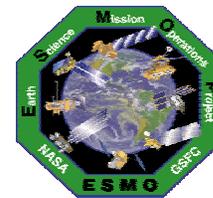
- » Generate Expedited Data Sets (EDSs) based upon s/c quick-look flag activation or user request
- » Are based on a single contact
- » Perform EDS processing for up to 2% of the average daily data volume
- » Initiate delivery within 60 minutes of completion of RLSS

- **Production Data Sets (PDS)**

- » Generate PDSs based upon a 2-hour (or multiple of 2 hours) time span for a single APID
- » Complete delivery within 24 hours after the end of the RLSS

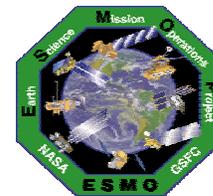


EDOS AMSR-E Interface





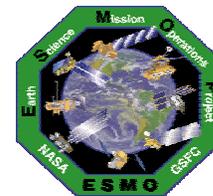
Latency Enhancements



- **Two major design enhancements have reduced the time to create products**
 - **Early Return Link Service Session (RLSS) – (11/02)**
 - **Data Filtering (10/03)**



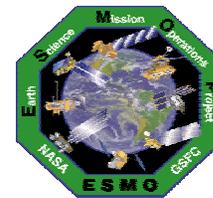
Early RLSS



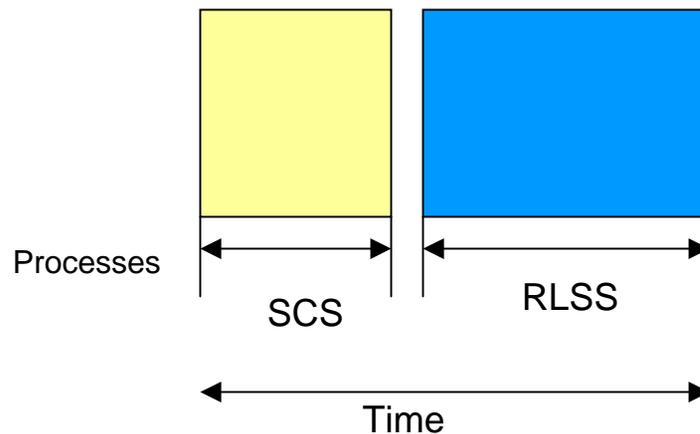
- **During a Spacecraft Contact Session (SCS) the spacecraft high-rate data gets captured from the ground stations at the EDOS GSIF. During a Return Link Service Session (RLSS) this data is forwarded to the EDOS LZPF in Greenbelt, MD for processing.**
- **Originally, the SCS and the RLSS were sequential processes so the RLSS could not start until the SCS finished. This dependency added a 5 to 10 minute delay in data transfers.**
- **The “Early RLSS” concept consists of the transfer of data to the LZPF as soon as the data sync pattern is detected during the SCS.**



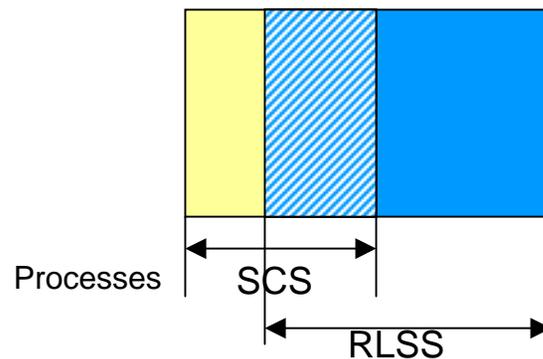
EDOS “Early RLSS” Concept



Before

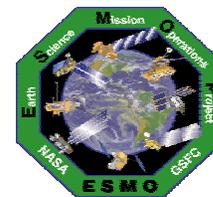


After





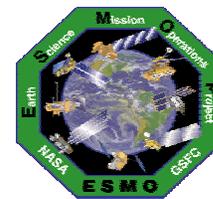
Data Filtering



- **Basis for this enhancement was to limit the data that gets played from a GSIF to the LZPF to only the valid science playback**
 - Reduces link utilization
 - Reduces rate-buffered latency
- **Typical capture files include clock-only segments + direct broadcast + valid science playback**
 - Clock-only segments result from stations that keep clock on-line between passes and delays in dumps after Acquisition of Signal (AOS)
 - Direct broadcast includes valid real-time science along with real-time fill

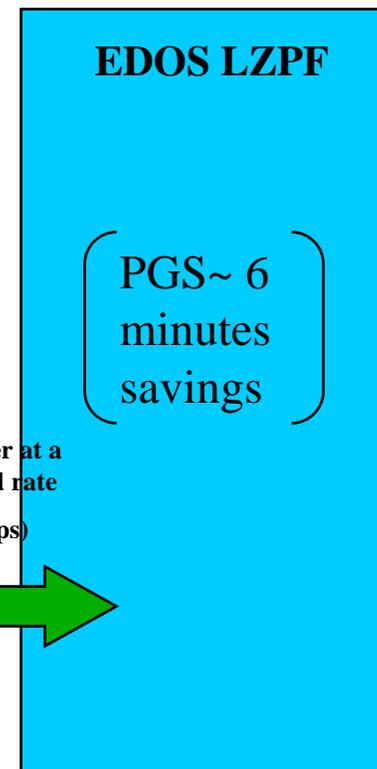
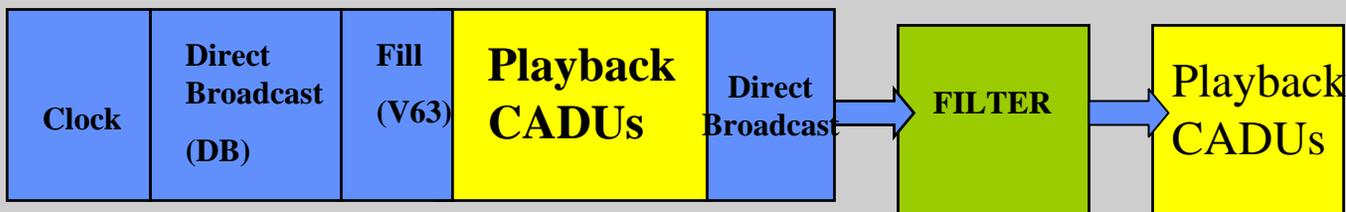


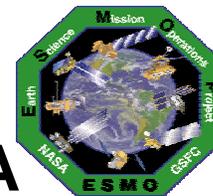
EDOS "Data Filtering" Concept Block Diagram



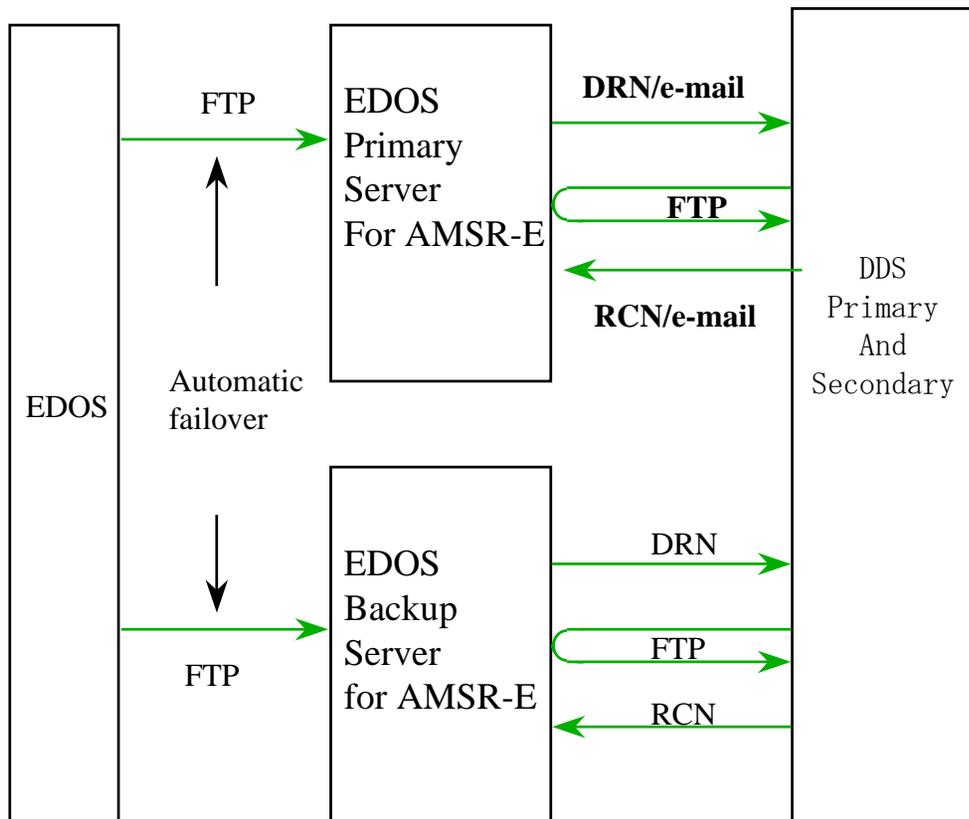
GSIF(s)

Data received during the SCS
(Spacecraft Contact Session)



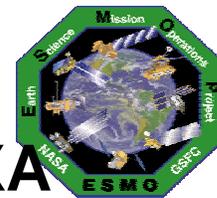


Current: Detail Interface between JAXA EOC & EDOS

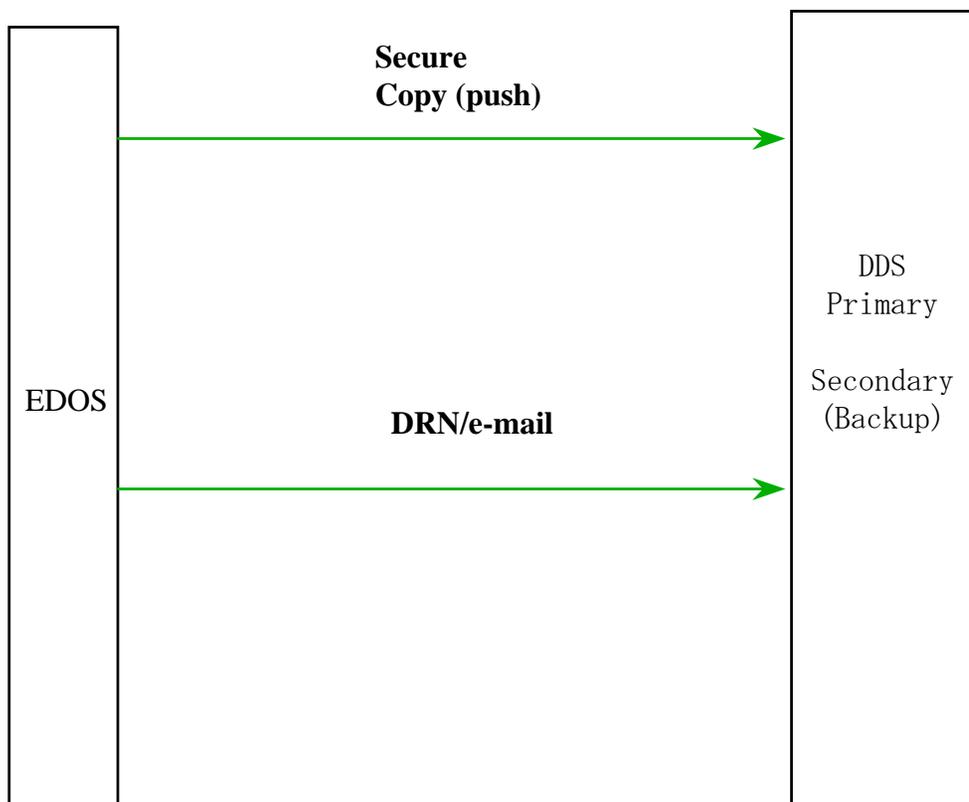


Sequence:

1. EDOS transfer file to local AMSR-E Server.
2. Local server sends email notification to JAXA
3. JAXA “gets” the RBD files.
4. JAXA sends email notification of files received.



Proposed: Detail Interface between JAXA EOC & EDOS (for AMSR-E)

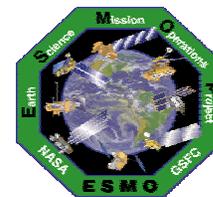


Plan:

1. EDOS transfers files to DDS prime. (Assume: DDS prime online/secondary cold backup)
2. EDOS sends mail signaling delivery complete.



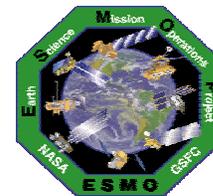
Benefits of this proposal



- **Simplify data interchange with JAXA. Standardize to the EDOS delivery mechanism used with other RBD recipients.**
- **Improve security by using Secure FTP protocol rather than FTP.**
- **Improve reliability by eliminating a point of failure.**
- **Reduce latency time to JAXA.**
- **U.S. SIPS could produce higher-level products more quickly.**



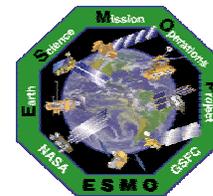
Delivery Latency



ACTIVITY	TIME (min:sec)
EDOS to EDOS AMSR-E server	1:48
Email delivery to JAXA EOC + JAXA initiates 'get'	6:50
Transfer to JAXA ends	4:50
Email delivery to EDOS	
TOTAL	13:28



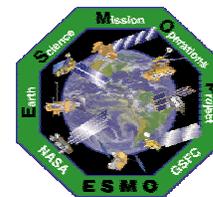
Expected New Delivery Latency



ACTIVITY	TIME (min:sec)
EDOS to JAXA EOC	4:50
Email delivery to JAXA EOC	
TOTAL	4:50 Improvement: 8:38!



EDOS Upgrades



- **Hardware**

- 11/03 - Hardware upgrades consisting of new production data processors, additional storage space, and new RBD processors. Added a 5th high-rate return link. Upgraded GSIF processor and memory.
- 10/04 - Systems RAID upgrade to hold RBD and PDS products on-line for 5 days after production.
- 11/04 - Hardware refresh plan includes new Oracle servers and new data capture systems at the GSIFs.
- 2005 - Raw data retention moves from AMPEX drives to Storage Area Network (SAN).
- 2005 – Adding a new GSIF at Wallops

- **Software**

- 11/04 - Add checksum to PDS deliveries
- 11/04 - Software upgrades to integrate the new data capture systems (Kongsberg Systems).