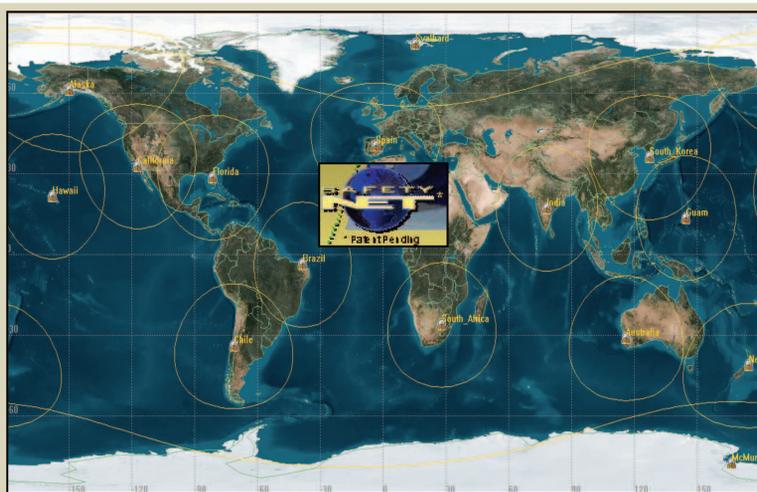
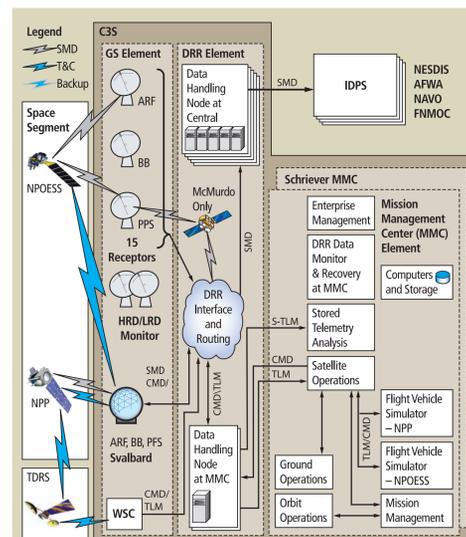


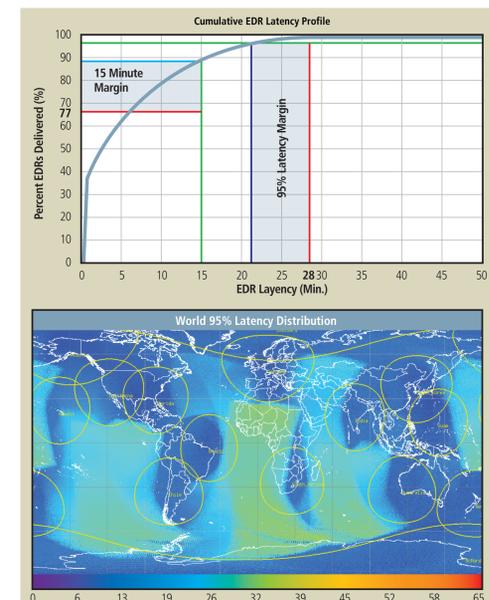
# National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Command, Control, and Communications Segment



**SafetyNet™** – 15 globally SMD receptors linked to the Centrals via commercial fiber – enables low data latency and high data availability.



Low-cost, reliable, and timely data delivery with flexibility to accommodate system growth and technology insertion.



## Features & Functions

### Key Architecture Features:

- Polar Telemetry & Control (T&C) ground with no blind orbits
- SafetyNet™ mission data receptors
- Data routing through commercial network
- Redundant Mission Management Distributed data monitoring & recovery, and front-end processing
- Local network infrastructure at each site
- Use of established product lines for mission management

### Manage Mission:

- Mission Guidance
- External reporting
- Plan mission events
- Build command segment
- Maintain satellite databases

### Manage Satellite Operations:

- Monitor and control satellite
- Prepare and send commands
- Perform engineering and analysis
- Analyze flight dynamics
- Simulate satellite
- Maintain flight S/W

### Space/Ground Communications:

- Control ground communications
- Position antennas
- Uplink satellite loads
- Receive telemetry
- Receive Stored Mission Data (SMD)
- Monitor High-Rate & Low-Rate Direct Readout Data (HRD/LRD)
- Preprocess downlinked data
- Compare received vs. transferred

### Data Routing and Retrieval:

- Provide inter-segment communications
- Provide intra-segment communications for C3 and Data Processing Segments
- Data Monitor and recovery

### Bottom Line Summary:

- Revolutionary Engineering – innovation, products re-use and processes.
- Successful C3S through Eclipse, software 2.0M SLOC system in 4 years.
- NPOESS demonstrates the way to future on developing large-scale ground system – reliable, affordable & delivered on schedule.

## C3 Segment Design

### Ground Station (GS) Element provides reliable and timely space-ground connectivity

- Svalbard Polar GS for NPP SMD, NPP/NPOESS T&C, HRD/LRD Monitoring
- Global receptors for NPOESS SMD
- White Sands Center (WSC) for launch, early-orbit & acquisition (LEO&A), emergency backup, and NPP calibrations

### Data Recovery & Retrieval (DRR) Element provides reliable and secure data recovery

- Svalbard fiber to CONUS
- CONUS wide-area network
- Data handling & front-end processing of SMD at each Central Data Processor
- Front-End Telemetry & Command Encryption Processing at MMC
- Local network infrastructure at each site

### Mission Management Center (MMC) Element provides insight and oversight of total operations

- Mission operations planning, monitoring and control
- Satellite and C3S ground resource management
- Computer & storage infrastructure at each site
- Primary MMC used initially for NPP with operations expanding for NPOESS
- Schriever MMC comes online prior to launch of the first NPOESS satellite

## C3 Segment – Current Status

### NPP Development progressing well

- Contract award – August, 2002
- Software Builds completed (86% SW reuse demonstrated >2.0M lines of code delivered)
- Deployments completed to: NOAA Satellite Operations Facility, Air Force Weather Agency, White Sands and Svalbard
- Segment Acceptance Test (SAT) completed August, 2006 (2 months ahead of schedule)
- Initial Transition to Operations and Sustainment – on track for January, 2007

### Key Risk Reduction Efforts

- Early operations support at Svalbard for Windsat-Coriolis, Aqua, Aura, Terra, and POES
  - Antenna & support equipment in place & operational at Svalbard
  - Fiber communications Svalbard-to-NOAA/NASA in place & operational
- Early Landing Rights discussions with potential receptor host countries; 7 of 9 frequency submissions completed

### NPOESS C3S will evolve from NPP

- Segment and SW PDR Already Completed