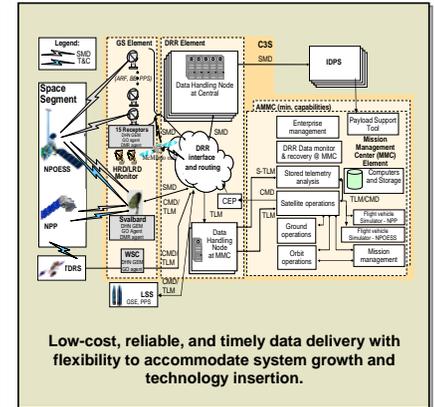
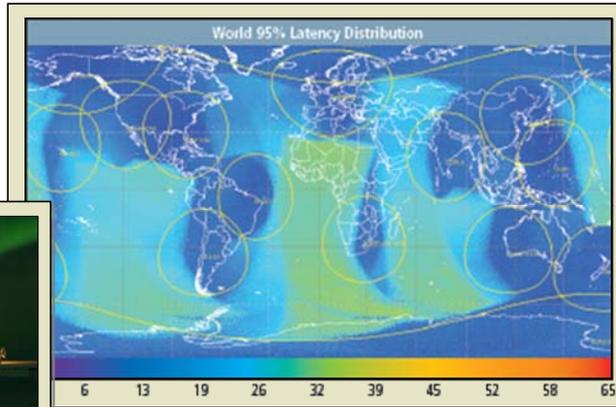
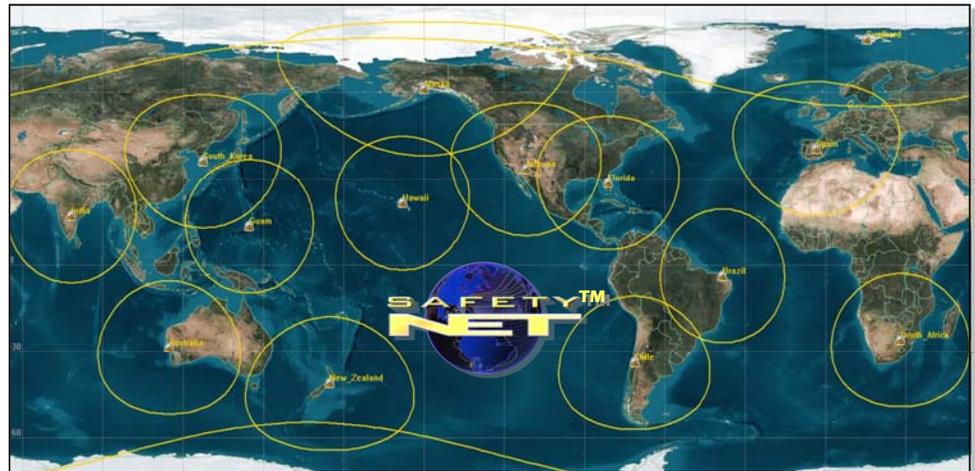
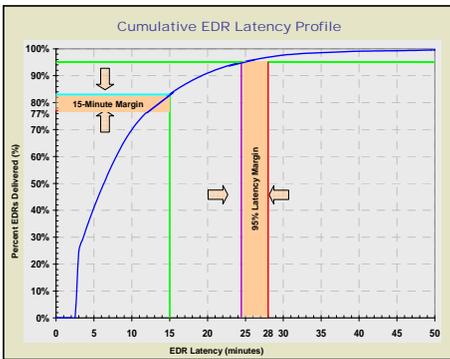


Command, Control and Communications Segment



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



SafetyNet™ – 15 globally SMD receptors linked to the Centrales via commercial fiber – enables low data latency and high data availability. SafetyNet is a Trade Mark of Northrop Grumman Space Technology

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 SW

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 (HRDL/RD)
- 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

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

- Svalbard Polar GS for NPP SMD, NPP/NPOESS T&C, HRDL/RD 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, monitor 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
- Aurora MMC (AMMC) comes online prior to launch of the first NPOESS satellite

NPP Development Completed

- 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)
- Final Transition to Operations and Sustainment completed August, 2007

Key Risk Reduction Efforts

- Early operations support at Svalbard for Windsat-Corollis, 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 discussion with potential receptor host countries: 7 or 9 frequency submissions completed

- NPOESS C3S will evolve from NPP
- Segment and SW PDR Already Completed

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