



Mission Services Customer Forum

**November 20, 2003
Building 3 Goett Auditorium
Goddard Space Flight Center
Greenbelt, Maryland**



Agenda

1:00	Welcome and Introductory Comments	A. Levine
1:15	Open Floor (Customer Concerns)	All
1:30	Contract Status <ul style="list-style-type: none">• CSOC Phaseout• NENS• MOMS	J. Jackson K. McCarthy R. Mahmot
2:00	Featured Topics <ul style="list-style-type: none">• Network Security• FDF Beam Angle Display	B. Tomardy S. Lindsey



Agenda (cont)

- | | | |
|-------------|---|--|
| 2:30 | System Status Update | T. Gitlin |
| | SN Status | |
| | <ul style="list-style-type: none">• TDRS Constellation Status• Ka-Band Data Services Project• Second Guam Antenna System Project• DAS• BRTS Augmentation/FDF• SNAS | |
| | GN Status | S. Currier |
| 3:30 | Enterprise Updates | |
| | <ul style="list-style-type: none">• Earth Sciences (Code Y)• Space Sciences (Code S)• Human Space Flight (Code M) | E. Macie
R. Mahmot
B. Schneck |
| | Closing Remark and Action Item Review | A. Levine |



CSOC Transition



CSOC TRANSITION ACTIVITIES



- **Closed Consolidated Logistics Facility at Annapolis Junction, MD on 09/30/03 (30,000 square foot facility serving GSFC, JPL, MSFC, JSC, and KSC.) All logistics distributed to local depots at GSFC, JPL, MSFC, JSC, and KSC.**
- **20 Labs moved from Goddard Corporate Park (GCP) to GSFC. (5,848 sq. ft reduction at GCP) Security Plans for labs being updated by CSOC.**
- **Completed wall-to-wall property inventory at GSFC, WFF, MILA, and WSC. Audit at GSFC showed >10% error rate. Restarted wall-to-wall property inventory at GSFC. Currently 63% complete with 16% error rate. All erroneous records corrected in Maximo Database.**
- **Reconciliation (151 missing items to date: GSFC 123; WFF 5; WSC 23)**
- **3950 Equipment Line Items excessed during FY03.**
- **Provided documents for Bidders Libraries for NENS & MOMS Procurements**
- **Weekly transition meetings held with CSOC, Code 450, Code S and Code Y.**



Consolidated Logistics Facility



CLF





Consolidated Logistics Facility





Consolidated Logistics Facility





Consolidated Logistics Facility





Near Earth Networks Services (NENS)

Kevin McCarthy
NENS COTR
November 20, 2003



NASA/GSFC Goals for NENS



- **NASA/GSFC goals as defined in the NENS Contract (NN-G-04-DA00-C):**
 - **Enable mission success for every customer using NENS services.**
 - **Provide NASA with services that are highly reliable, affordable, and contribute to the safe operation of the mission.**
 - **Implement a safety, health, and mission assurance program that provides a safe and healthy work environment, minimizes program risk, and maximizes NASA mission success.**



NENS Statement of Work (SOW)



- **NENS provides tracking and data acquisition for near-Earth customer missions**
 - **Core requirements and IDIQ**
 - **Core requirements are Program & Business Management and Space Network. Core requirements are fixed for the length of the contract**
 - **IDIQ for Ground Network (inc. the WFF Range), development, customer commitment support, etc.**
 - **Performs sustaining engineering, logistics, facilities management, and hardware and software development**
 - **Broad SOW which, for example, could deliver a turn-key ground station to a Flight Project.**



NENS Basics



- **NENS is a Cost Plus Award Fee (single award)**
- **NENS Phase-in October 9 - December 31, 2003**
 - **CSOC is fully responsible for technical performance through December 31, 2003**
- **Five year period of performance: October 9, 2003 - October 8, 2008**
 - **No Options**
 - **Core (Program Management Office & Space Network Operations & Maintenance) is \$185M**
 - **IDIQ Task Order minimum is \$4M and maximum value is \$600M**
- **NENS Full Operations Responsibility effective January 1, 2004**
- **The GSFC Task Ordering Management System (TOMS) is used to issue tasks**
 - **NENS SOW is on TOMS**



The NENS Contractor Team



Honeywell

GENERAL DYNAMICS
Strength on Your Side



SGT, Inc.
Implementing Tomorrow's Technologies



the Hammers Company
Software Solutions for Complex/Real-Time Systems



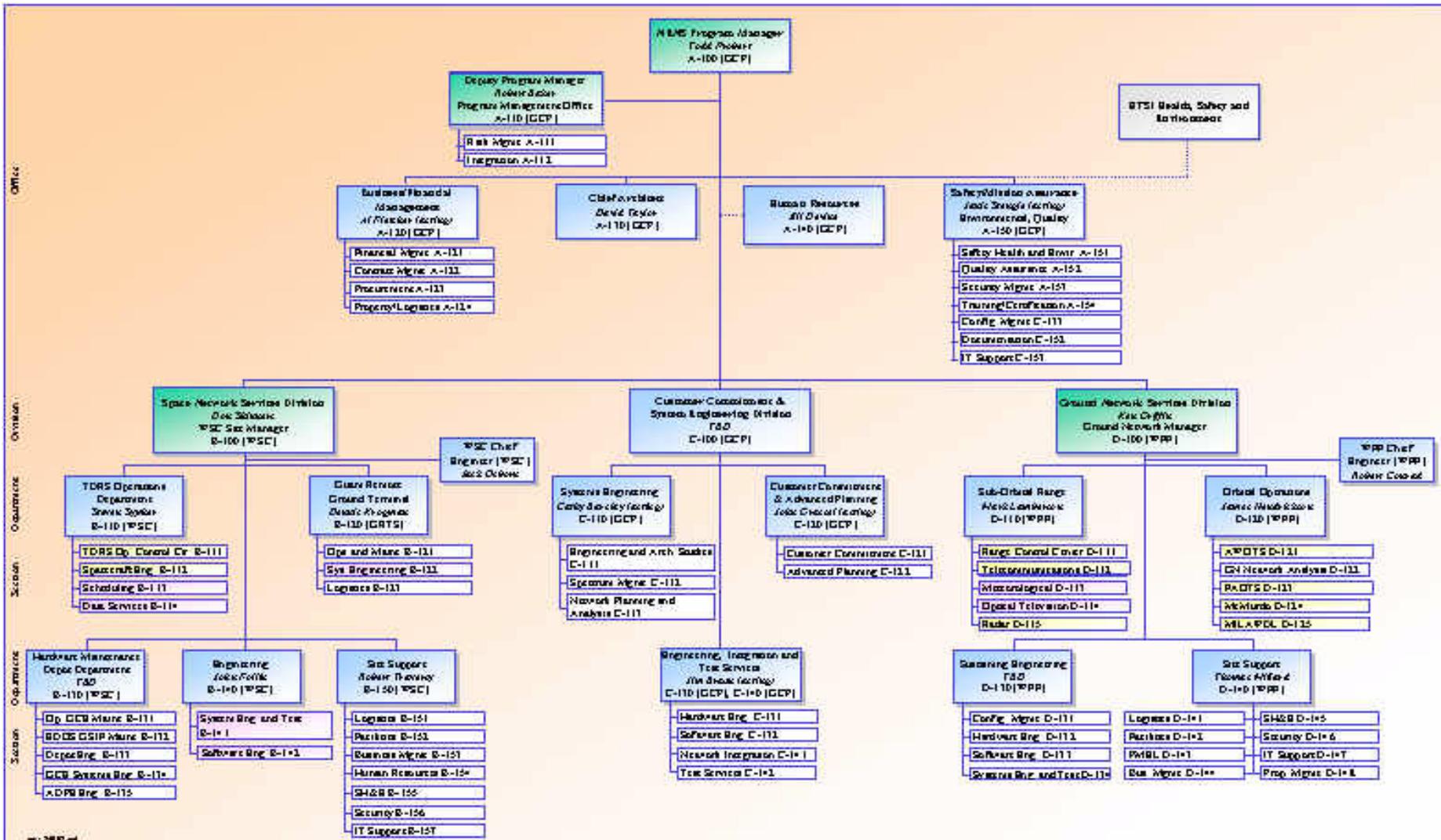
Booz | Allen | Hamilton

universal space network
access your world

Partners in Pursuit of NASA's Mission



NENS Organization





NENS Phase-in



- **NENS contract selection announced and awarded to Honeywell on 10/9**
 - **Kick-off Meeting between MSP and NENS management held on 10/15.**
 - **NENS Phase-in Readiness Review Board meets weekly with MSP participation**
 - **Phase-in Operational Readiness Review is scheduled for 12/17**
- **NENS Job fair at WFF, held the week of the 10/27, went extremely well**
- **Joint MOMS/NENS job fair for GSFC scheduled for 11/5 went well, ~500 applicants**
- **MILA/PDL and WSC hiring actions underway**



NENS Phase-in



NENS Phase-In

Page 1 of 1

11/12/03

	TASK	2003				2004	
		September	October	November	December	January	February
1	NENS Contract	SSA Briefing 9/24	Contract Award 10/9 NENS Kickoff 10/15	QA Plan & Risk List 11/7	ORR Phase In 12/17 Safety & Health Plan 12/3	"Day 1" NENS 1/1	
2	Critical CDRLs				Performance Metrics & Gov't Prop. Mgmt. Plan 12/4 CM Plan - 12/5		
3	Tier 1 Tasks (GN, Range, SP&M, CIT, MILA)		To vendor for proposal 10/9	To vendor for proposal 10/31	Response to ATR 11/30	CO Issues Task 12/10	
4	Tier 2 Tasks		To vendor for proposal 10/9	To vendor for proposal 11/14	Response to ATR 11/30	CO Issues Task 12/10	
5	Mission Support Readiness Reviews		SeaLaunch TBD		ISS-13P MLV-14 11/20	Titan IV/B-39 12/31	Atlas III/AMC-10 1/13
6	Launches				Atlas III/MBSat - 12/17 Delta III/Aura - 12/23	Taurus/ROCSAT-2 1/14	SOYUZ/ISS 8S 2/9 Titan IV/B-39 2/14
7	Product/Project Reviews					SNAS PDR 1/14	Delta III/Aura 1/31 2/6 SWSI ORF DAS ORR 2/13
							Atlas III/AMC-10 2/27



MSP RISK FOCUS



Rank	Risk ID	Risk Statement	Approach & Plan	Comments
2	014	<p>Loss of Key Incumbent Personnel (D. Vander Tuig)</p> <p>If there is a significant loss of specific technical talent, especially those with security clearances required to operate the Space Network, MILA/PDL and WFF Range</p> <p>Then the NENS contractor will be unable to adequately recruit, clear, and train new personnel in the transition period</p>	<p>Accept</p> <ul style="list-style-type: none"> Normal risk associated with networks procurement 	<ul style="list-style-type: none"> Evaluation of offeror's proposed staffing plan was a key item under Mission Suitability Subfactor B, Compensation and Staffing NENS Phase-In is progressing; successful job fair held at WFF High risk areas are receiving heightened management attention

M

Risk Criticality   



MSP RISK FOCUS



STATUS AS OF: 10/31/03

Rank	Risk ID	Risk Statement	Approach & Plan	Comments
3	013	<p>Length of Transition Period for NENS (D. VanderTuig)</p> <p>If an adequate transition period (≥ 3 months) is not provided for NENS</p> <p>Then customer mission support may be negatively impacted, particularly those in launch and early orbit phase (exacerbated by start of other SMCDS contracts)</p>	<p>Mitigate</p> <ul style="list-style-type: none"> - Offeror's Transition Plan required with proposal submission. Evaluation will be under Mission Suitability Subfactor C, Management Approach. - Update NENS Phase-in Plan delivered by HTSI - COTR participating in daily NENS meetings - MSP personnel on Phase-in Review Boards - Phase-in ORR scheduled for 12/17 	<ul style="list-style-type: none"> - NENS contract awarded to HTSI 10/9 with an immediate start (82-day transition period). - Updated Phase-in Plan delivered 11/7

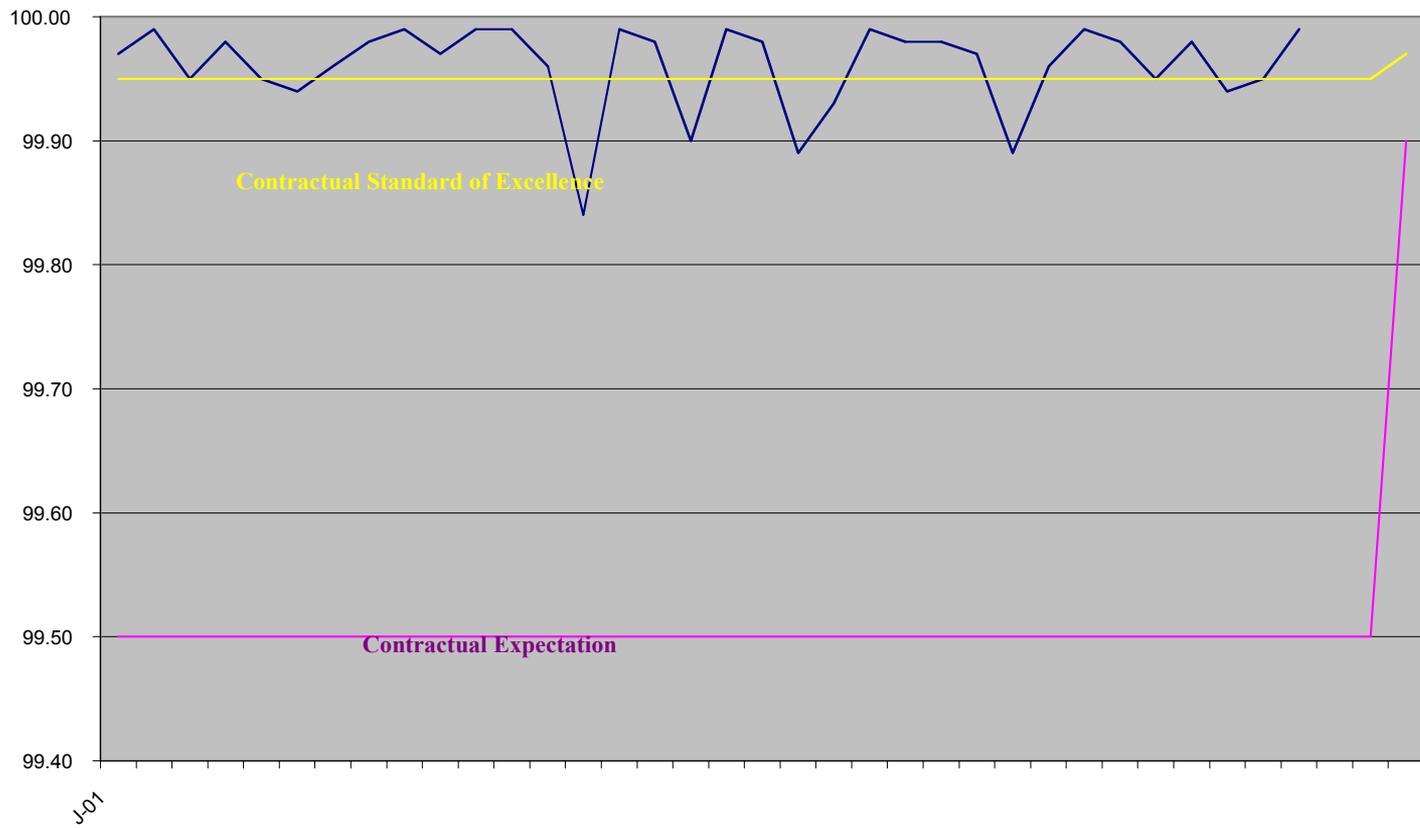
Risk Criticality   



New SN Proficiency Requirement Under NENS



Space Network Proficiency





NENS Surveillance & Performance Evaluation Plans



- **450-MGMT-0002, Surveillance Plan for NENS**
 - May be modified by NASA unilaterally
 - Status: Signed
 - Posted to the CCMS
- **450-MGMT-0003, Performance Evaluation Plan (PEP) for NENS**
 - May be modified by NASA unilaterally, in accordance with process and timetable in the PEP
 - Status: Still in “Draft”, but approved by 450 CCB. Currently in signature cycle. Signature by the GSFC Procurement Officer anticipated soon.
 - The performance factors to be evaluated are identified below. The evaluation criteria for each factor are specified in the indicated section of this appendix.

<u>Factor</u>	<u>Weight</u>
• Program/Business Management	25%
• Technical/Schedule Performance	50%
• Cost Performance	25%
 - A Performance Evaluation Board composed of 450 personnel as well as 420, 444, and 210 participants has been appointed
 - The Government will provide an Area of Emphasis Letter to identify areas of contractor performance that will receive special attention in the performance period.



NENS Area of Emphasis Letter for Period #1



- **In addition to meeting GSFC's expectations that HTSI will meet the contract requirements by providing successful network operations and system development while minimizing risk, the following are specific areas of emphasis the Government will focus on during the first award fee evaluation period:**
 - 1) **Provide Space Network and Ground Network critical support to Human Space-flight missions, Special Projects & Missions, Expendable Launch Vehicle support, spacecraft launch and early orbit operations. GSFC's expectation for critical support is that all of the missions' requirements are met with 100% service proficiency.**
 - 2) **Successful test and integration of new missions with the supporting networks and participation in internal and external reviews as required to demonstrate to GSFC a readiness to provide NENS support as specified in each customer's mission requirements documentation. In this evaluation period, special emphasis will be placed upon the Space Shuttle return to flight activities, Aura, C-NOFS, SWIFT, and other scheduled payload launches of Expendable Launch Vehicles and will require significant pre-mission support.**
 - 3) **Successful execution of the Phase-In Plan, including the timely submission of Data Requirements Descriptions per the Contract Data Requirements List and their approval by GSFC, property management/accountability, subcontract management, hiring of qualified staffing at appropriate skill levels to provide effective and efficient services, and responsiveness to task orders. Focus is to be directed toward the seamless assumption of full operations and technical responsibility from the predecessor contracts on January 1, 2004.**



MOMS



- Mission Operations & Mission Services Contract Status
 - Contract effective date: November 1st
 - Phase-in task for CSOC SSEO work: November 1st through Dec. 31st
 - MOMS tasks representing CSOC SSEO work: EDOS Mission Data Operations, WIND/POLAR/GEOTAIL Mission Operations, Code Y Pacor-A Mission Data Operations, TRMM Mission Operations Support, HST Data Operations Center (DOC)/Systems, HST PACOR-A, EO-1 Mission Operations, SOHO Mission Operations, Space Science MOC Sustaining, SMEX Mission Operations, ACE Mission Operations, FD Attitude Determination and Support, FD Orbit Determination and Product Generation, FDF Sustaining Engineering, FD Software Maintenance, FD Human Space Flight Support, FD Tracking Data Evaluation Support, FD ELV Support, FD Orbit Maneuver Planning and Support, RXTE Mission Operations, Information Services and Mission Operations Communications Support Task, Mission Operations Support Team (MOST), ESMO Engineering and System Administration, SSMO DSN Scheduling, Operations Automation, Flight Software System Administration
 - Phase-in challenges: Incumbent capture in the FDF and Sustaining areas, property transfer



IONet Security Overview

Bernie Tomardy, Code 297
Head, GSFC Enterprise IT Security Branch
and IONet Network Security Officer



IONet Security Audit Overview

- **Authority**
 - **Public Law 100-235, “The Computer Security Act of 1987” dated January 8, 1988**
 - **Directive received from Headquarters August 4, 1988 “Nascom Access Control Policy”**
 - **Driving force guidelines NPG 2810.1**
 - **IONet interpretation of the “Internet Protocol Operational Network Access Protection Policy and Requirements 290-004”**



IONet Security Audit Overview

- **IONet further restricted by the NASA Resource Protection Program (NRP)**
- **NRP requires National Agency Checks for personnel with access to the IONet**
 - **Closed IONet supports Spacecraft Command and Control**
- **Final Hammer - Inspector General lives in my pocket (which is why my interpretation is the one that counts)**



IONet Security Audit Overview

- **IONet security procedures are binding on all customers such as NASA Centers/facilities, contractors, universities, commercial facilities, and International Partners**
- **Code 290/Information Services Division expects all projects with foreign & commercial users to incorporate required security safeguards in contracts with these users**



IONet Security Audit Overview

- **290-004 “Internet Protocol Operational Network Access Protection Policy and Requirements” Document is available on-line at**

<http://code297.gsfc.nasa.gov>



IONet Security Audit Overview

- **Audit Process**
 - **New projects should coordinate with the NISN NSM or GSFC PCE**
 - **Audit checklist available at <http://code297.gsfc.nasa.gov>**
 - **Security Plans, Contingency Plans, Authorization to Process, Rules of Behavior, and Risk Analysis are required for all Projects/Connections.**

**Completed documentation must be sent via U.S. Mail or FAX.
DO NOT USE E-MAIL – Unless You Use NASA PKI Encryption**



IONet Security Audit Overview

- Audits will include compliance with Physical and IT Security Policies
- Questions generated by audit review will be discussed with project personnel.
- Vulnerability scans will be performed by IONet Audit Team.
- NSO, and his team, make recommendations for remediation of outstanding issues, if required.



IONet Security Audit Overview

- Audits are mandated for New Projects, Compromised Systems, and/or at the least, Annually for all projects.
- The NSO is required to audit all locations with connection to IONet.
- NISN has the responsibility to provide complete NETWORK security.
 - Data confidentiality, if needed, is the responsibility of the data owner.



IONet Security Audit Overview

- **Contact Information**

Network Security Officer

Bernie Tomardy

301-286-8089

E-mail bernie.tomardy@nasa.gov



Flight Dynamics Facility SN BEAMS Display Capabilities

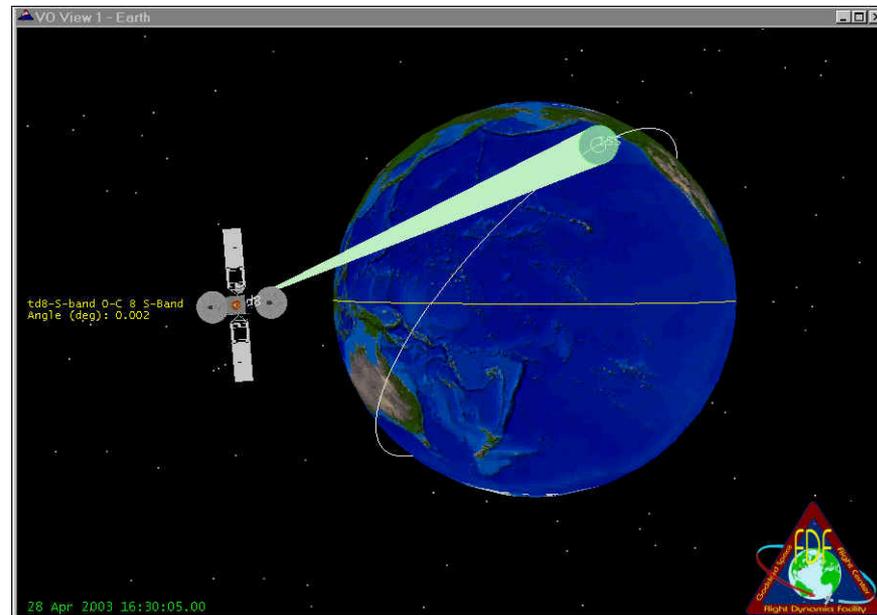
Shawn Lindsey
November 20, 2003
Goddard Space Flight Center
Greenbelt Maryland



SN BEAMS

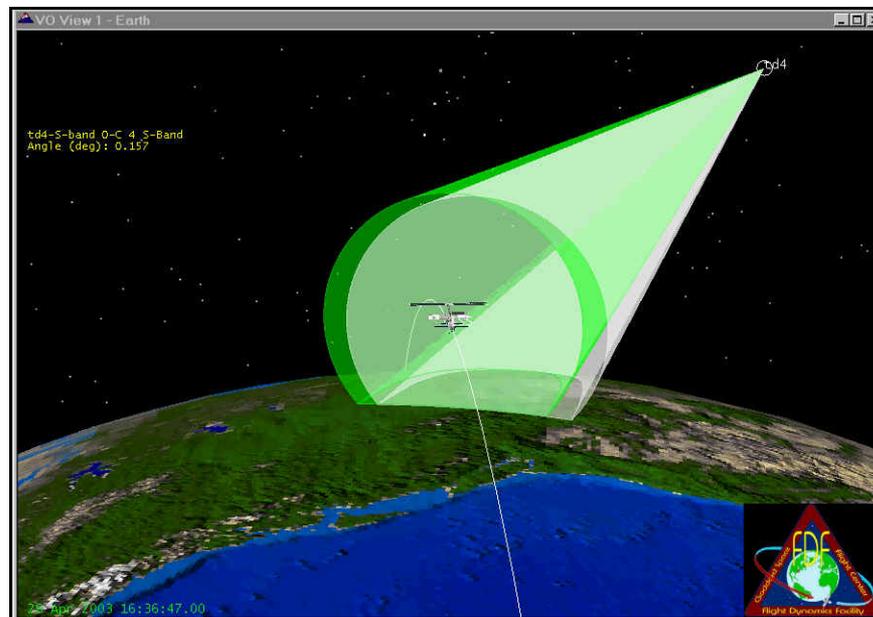
Agenda

- Definition and Objective
- Applications
- Current Status
- Enhancements
- Questions and Comments



Definition and Objective

- SN BEAMS: Space Network Beam Angle Measurement System
- Objective: To better understand communication geometry in near real-time by displaying: a) TDRS antenna beam angles and footprint, and b) target spacecraft information.

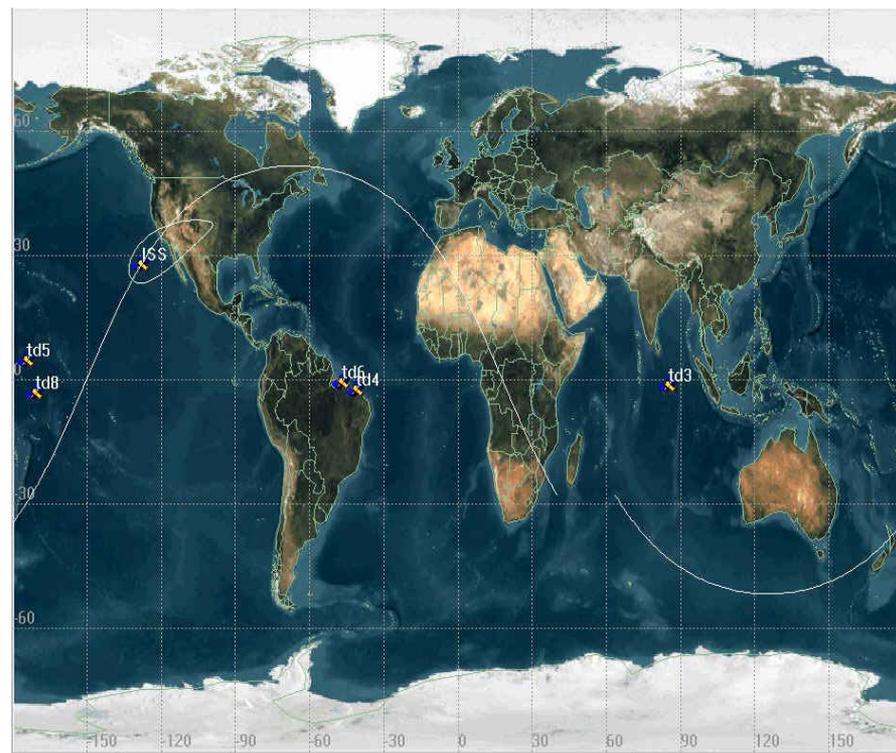




SN BEAMS

Current Status

- SN BEAMS is available in a 2-D or 3-D display.
- Display update is at the rate of the TDM (typically $1/_{10}$ or $1/_{1}$ TDM per second).
- SN BEAMS can support one user spacecraft and one TDRS contact at a time including TDRS handovers.
- FDF can export SN BEAMS to customers inside the closed IONet firewall.
- SN BEAMS displays can be exported to customers over the open Internet.
- SN BEAMS has been run successfully for up to 8 hours uninterrupted.

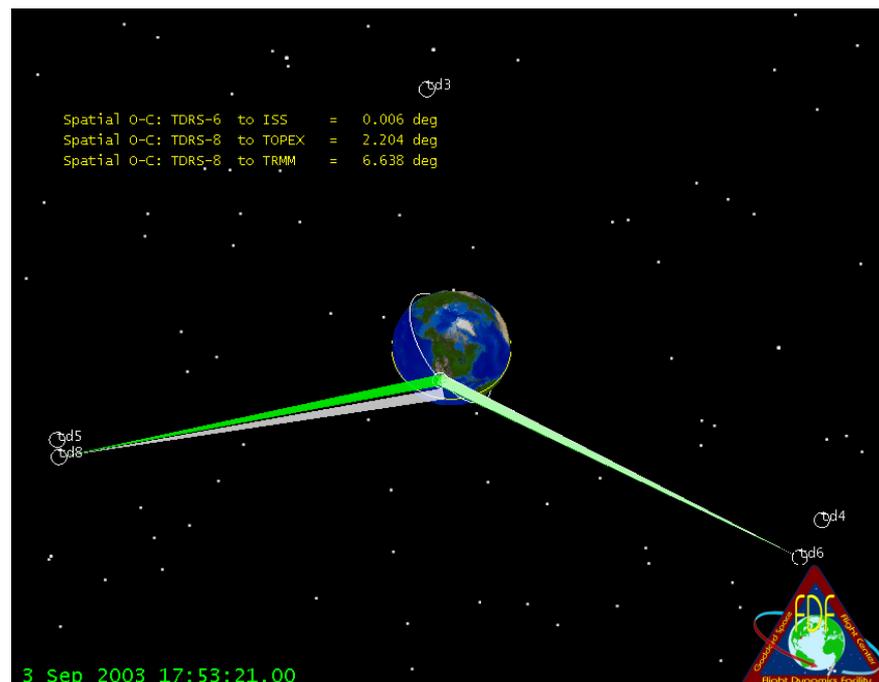




SN BEAMS

Enhancements

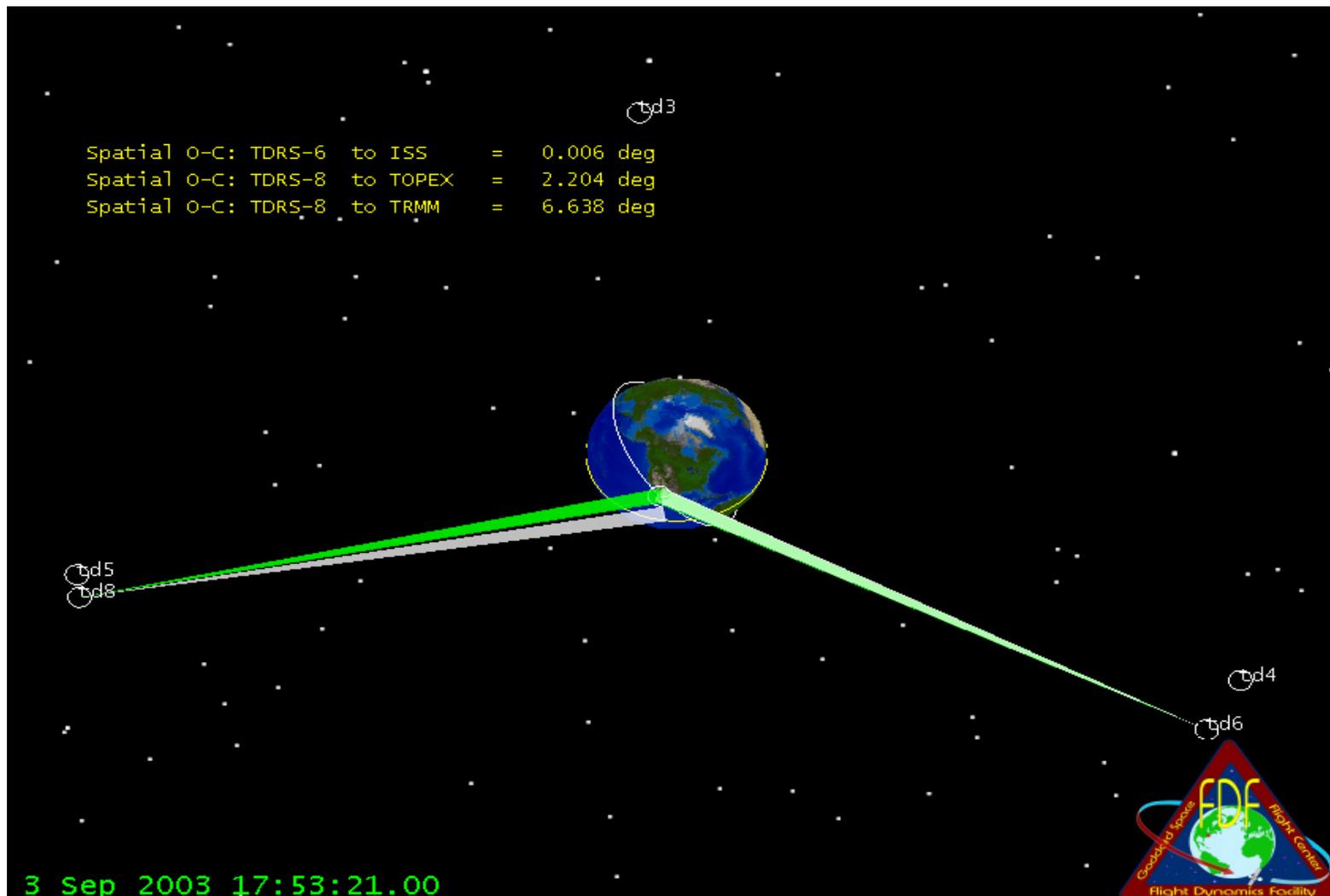
- Multiple TDRS contacts
- Link margin data display
- Observed minus calculated (O-C) values of TDRS antenna pointing
- Displays using target spacecraft or vehicle telemetry (such as CAS data in the case of Shuttle)
- GN BEAMS - Ground Network beam angle measurement system
- Export of display to Closed IONet customers outside the GSFC Firewall





SN BEAMS

Questions or Comments?





System Status Update



Space Network Status

Tom Gitlin
Deputy Project Manager
Space Network Project
GSFC/Code 452



TDRS Constellation Status



TDRS	Inclination ↑ - Increasing ↓ - Decreasing	TDRS Assignment	Ground Station and SGLT
TDRS-1	11.59° ↑	WART (49W)	WSGT
TDRS-3	7.46° ↑	TDRS-275	WSGT/SGLT-6
TDRS-4	5.39° ↑	TDE (41W)	STGT/SGLT-2
TDRS-5	4.60° ↑	TDW (174W)	STGT/SGLT-1
TDRS-6	3.77° ↑	TDS (47W)	WSGT/SGLT-6
TDRS-7	6.06° ↑	Stored	WSGT/STTC
TDRS-8	4.55° ↓	TDRS-171	WSGT/SGLT-4
TDRS-9	7.79° ↓	Stored	STGT/STTC
TDRS-10	6.60° ↓	Stored	STGT/SGLT-3



TDRS Constellation Status



- **TDRS-9 and -10**
 - **NASA is transitioning TDRS-9 and -10 into operations to demonstrate their ability to support to support the SN Customer community**
 - **The 171W longitude slot will be used for transitioning the spacecraft into operations**
 - **Each spacecraft will provide a minimum a 6 months of operational support**
 - **Relocation Activities**
 - **TDRS-9 will be drifted to the 171W location and put into operations**
 - **TDRS-7 will be drifted to 150W and remain stored at S-band**
 - **TDRS-8 will remain collocated at 171W and be stored at S-band**



SN Ka-Band Initiatives



- **Motivations for Space Network Ka-Band Initiatives**
 - **Space Network frequency allocations in Ku-Band are secondary**
 - **Future fixed satellite service operations may interfere with Space Network Ku-Band customer operations**
 - **Ku-Band return channel bandwidth is limited to 225 MHz**
 - **Higher bandwidth channels at Ka-Band enable higher return data rates**
- **TDRS Fleet Ka-Band Capabilities**
 - **Each TDRS-HIJ has two Single Access Antennas which can provide Ka-Band (or Ku-Band) services simultaneously with S-Band services**
 - **Ka-Band 50 MHz forward channels and 225 MHz return channels are similar to TDRS-1 through -7 Ku-Band channels, except Ka-Band forward and return frequencies are tunable**
 - **One Ka-Band return channel per TDRS can be switched to a 650 MHz bandwidth channel**



SN Ka-Band Initiatives



- **Current Ground Systems Ka-Band Capabilities**
 - **Ka-Band forward services are similar to Ku-Band forward services**
 - **225 MHz Ka-Band return services are similar to Ku-Band return services, limited to 300 Mbps**
 - **TDRS-HIJ or SNIP frequencies, Non-coherent, non-spread (no tracking services)**
 - **650 MHz Ka-Band return services are limited to an Intermediate Frequency Local Interface (IF LI) in which customers provide receive equipment at WSC**
 - **TDRS-HIJ frequencies only**
 - **Services management (scheduling, real-time control, and status) is automated end-to-end**
 - **Rooftop Ka-Band antenna (from BSS) for TDRS calibration and testing**
 - **Not an integrated system with regard to signal interfaces or control/status**
 - **Unable to transmit and receive simultaneously**
 - **Poor pointing performance**



SN Ka-Band Initiatives



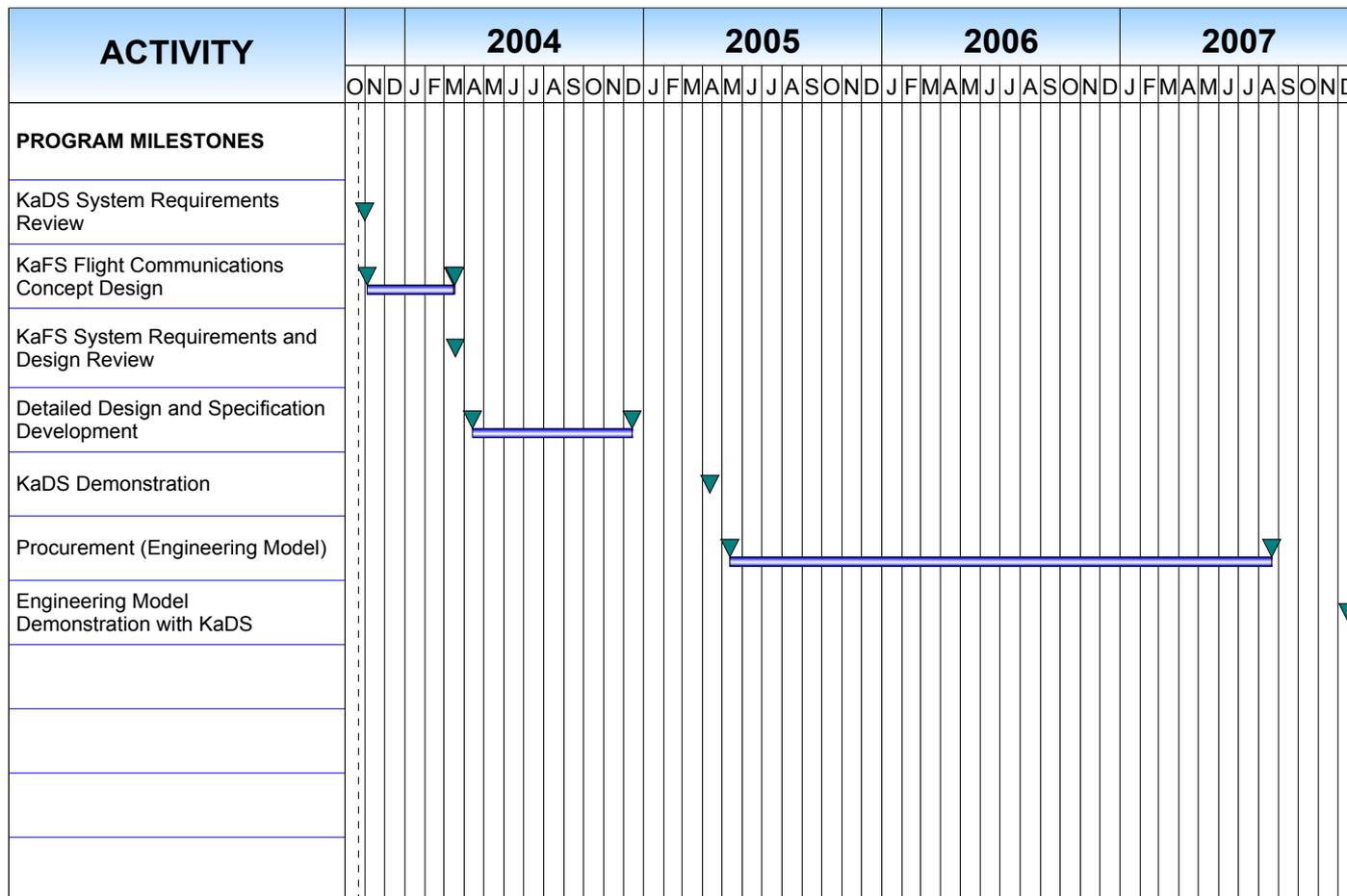
- **Ka-Band Data Services Project (<http://kads.gsfc.nasa.gov>)**
 - Will reduce costs to missions
 - Provide multi-mission ground station receivers capable of data rates of at least 1.2 Gbps
 - With existing IF service, missions would need to provide receiver(s) at WSC
 - Reduce customer spacecraft EIRP requirement by 3.5 dB (as compared to LEO Program Track) by providing TDRS Single Access Antenna Autotrack capability
 - Enable standard spacecraft communication systems by standardizing signal design
 - Will also provide
 - Loop and end-to-end test capabilities
 - Automated end-to-end service management (scheduling, real-time control, and status)
 - Plan to conduct a high rate demonstration to reduce project risk
- **Ka-Band Flight Systems (KaFS) Project**
 - Will provide missions with a reduced risk, lower cost path to obtaining flight communications systems for ultra high data rate services
 - Develop flight systems engineering models including a 1.2 Gbps transmitter, a flight receiver for rates up to 7 Mbps, and an antenna by 2007
 - Demonstrate a Space Network compatible customer communications terminal, building customer confidence and promoting the service
 - Looking for opportunities to partner with potential customers



SN Ka-Band Initiatives



Ka-Band Flight Systems Project





Second Guam Antenna System (SGAS)



- **Super typhoon Pongsona hit Guam on December 8, 2002. The storm packed sustained 150 mph winds with gusts in excess of 180 mph. Although there was minor damage to the GRGT (mostly to the roof), efforts were taken to identify and mitigate several vulnerabilities of the station.**
 - **One such vulnerability identified was the lack of a backup space-to-ground link antenna system.**
 - **Efforts on defining requirements for the antenna system just began**



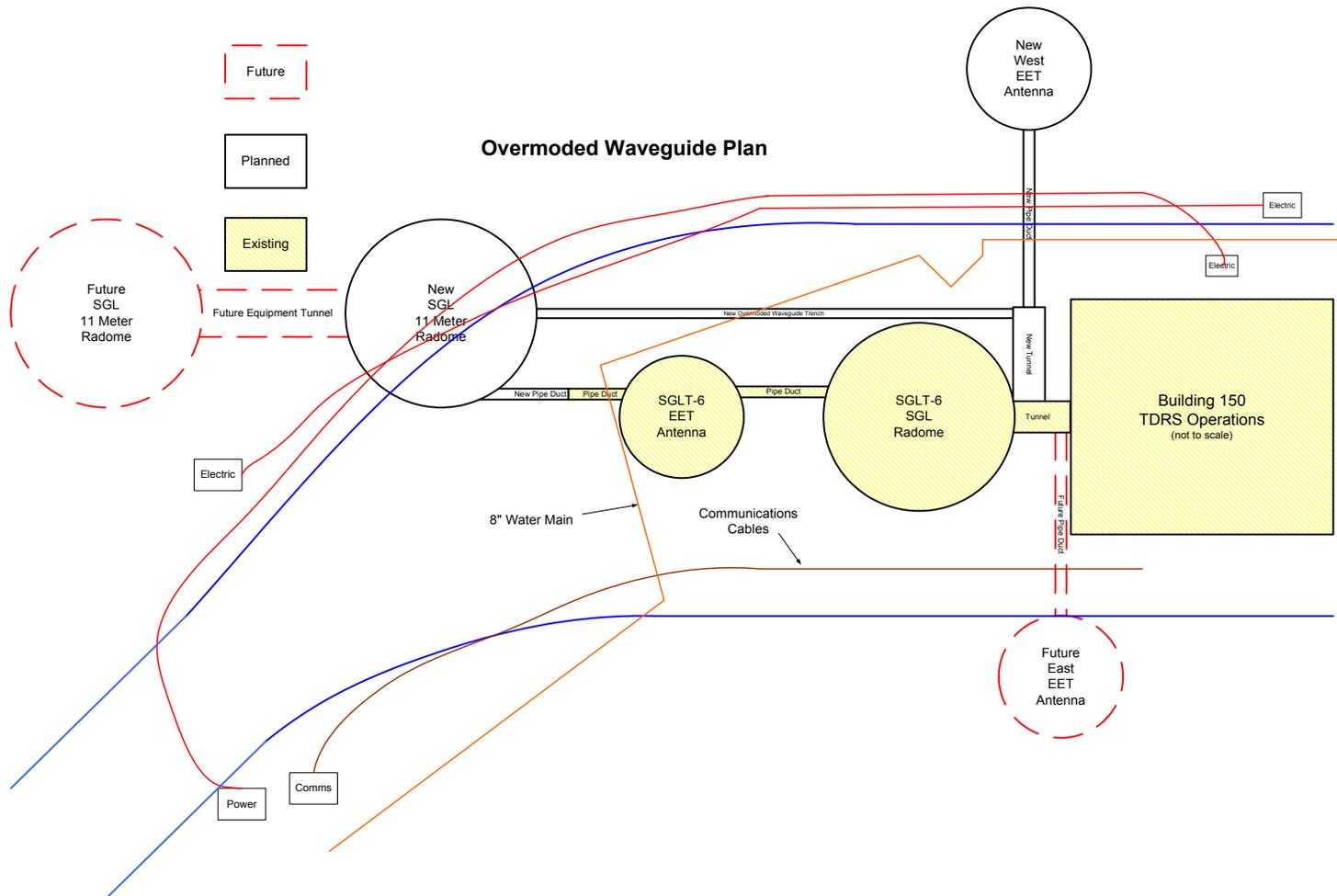
Second Guam Antenna System (SGAS)



- The US Navy will perform facilities modifications since the facility is on Navy property
- The NENS contractor will procure, install, integrate and test
- Schedule
 - Project Start Oct 24, 2003
 - SRR Jan 26, 2004
 - PDR/CDR Apr 26, 2004
 - Delta CDR Jun 24, 2004
 - Facility Mods Complete Jan 24, 2005
 - ORR Late Jun 2005



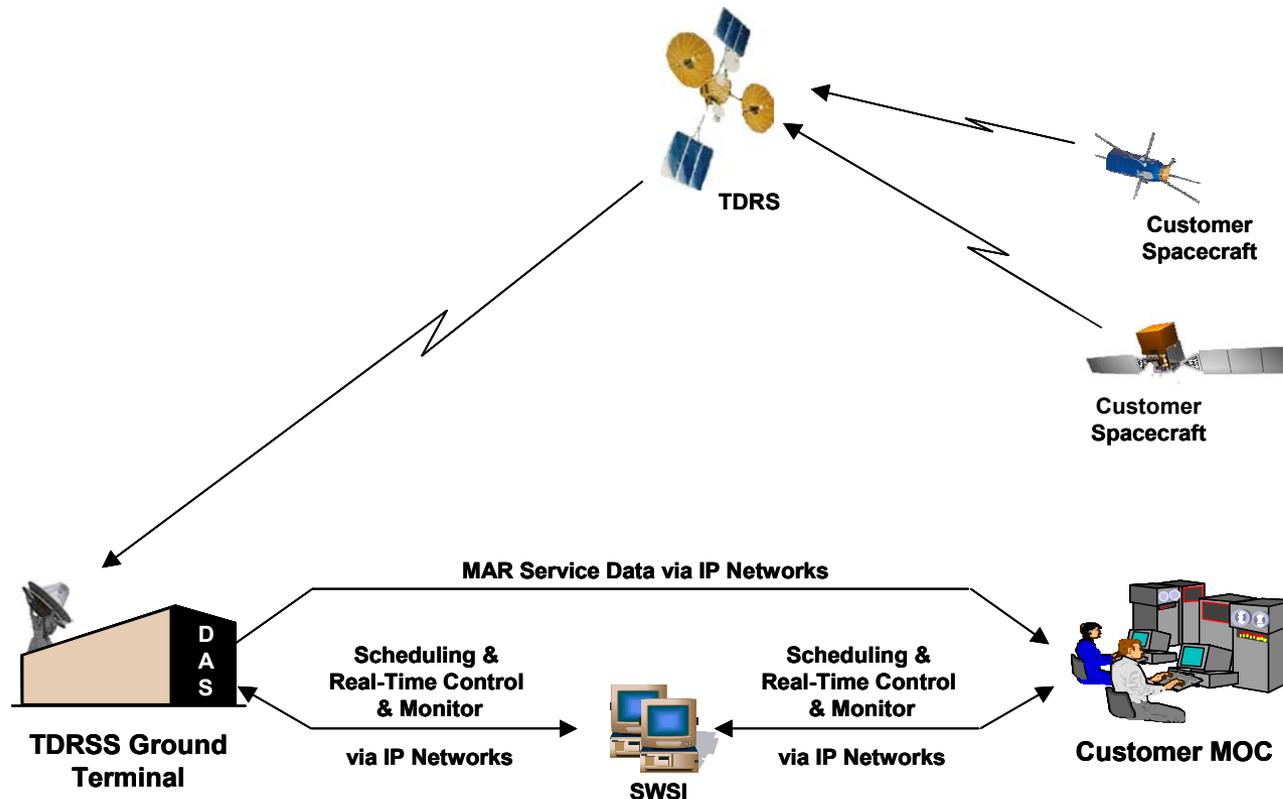
SGAS Preliminary Antenna Locations





Demand Access System (DAS)

DAS expands TDRS Multiple Access (MA) return service capabilities by adding new receivers, TCP/IP telemetry distribution capabilities, and limited CCSDS data processing capabilities via the NISN IONet. The DAS is controlled and monitored by the Space Network Web Services Interface (SWSI). SWSI/DAS functionality continues to be tested in preparation for operations. SWSI/DAS functionality is planned to become operational in February 2004.





Demand Access System (DAS)



- **The DAS Full Operations Capability Review was held on October 7, 2003**
 - **The review was successful, however six liens were assigned, and one significant problem was found since the review:**
 - *The Programmable Telemetry Processor (PTP) under certain conditions loses telemetry data. Status: Closed*
 - *The cause and resolution of the recent DASCON platform crashes need to be addressed. Status: Closed.*
 - *The DAS Controller (DASCON) platform software build procedures need to be delivered by the vendor (ITT) and successfully exercised by site personnel (WSC). Status: Closed.*
 - *The Demodulator Units (DMUs) require final firmware delivery and test. Status: Closed*
 - *After resolution of the above liens, a clean run of a 72-hour duration DAS confidence test is required. Status: Open. Test scheduled for late Nov/Early Dec*
 - *The final resolution of the (few) outstanding DASCON Security issues is required. Status: Open. Final issues being worked.*
 - **A flaw in the way the DAS demodulators handles carrier offsets was discovered during Swift testing in early November. Fixes are being identified and the DAS Confidence Test will be postponed pending installation and test of the fixes.**
- **Transition of DAS to O&M contractor is planned for December 2003**



BRTS Augmentation Background



- **BRTS is critical in providing SN customers with extremely accurate tracking services**
- **The BRTS System is over 20 years old**
- **Some BRTS subsystems have no spare parts**
- **Some critical subsystems are not repairable**
- **Loss of BRTS Stations will degrade or prevent SN from meeting Customer Tracking requirements**



BRTS Augmentation Background



Current Configuration

- **WSC**
 - Two working transponders & telemetry subsystems
 - Three antennas
- **Ascension**
 - One working transponder with no backup
- **Alice Springs**
 - One working transponder & telemetry subsystem
 - Two antennas
- **American Samoa**
 - One working transponder
 - One failed telemetry transponder



BRTS Augmentation



- **Requirements for augmentation of the existing system with new transponders are being developed to address the maintainability issues**
- **Procurement methods haven't been decided upon yet**
- **BRTS Augmentation is intended to “keep the system alive” vice introduce new technologies or operations concepts**



BRTS Augmentation Schedule



System Requirements Review	January 04
System Design review	April 04
Procurement Begins	May 04
Implementation Complete	June 05
Integration & Test Complete	August 05
Operational Readiness Review	September 05
Transition to O&M/Sustaining	December 05



FDF Highlights



- **TDRS Conjunction Analysis**
 - Prompted by potential conjunctions between TDRS-3 and Russia's Raduga spacecraft, FDF has begun routinely looking for conjunctions between the TDRSs and other geostationary spacecraft
 - The STK Collision Avoidance Tool will be used to automate this process
- **FDF Backup in Building 13 Status**
 - Setup and initial checkout scheduled to complete on 11/14
 - Application testing scheduled to complete 11/18
 - Operations testing scheduled to begin 11/19
 - Planned completion 12/5
 - ORR TBD



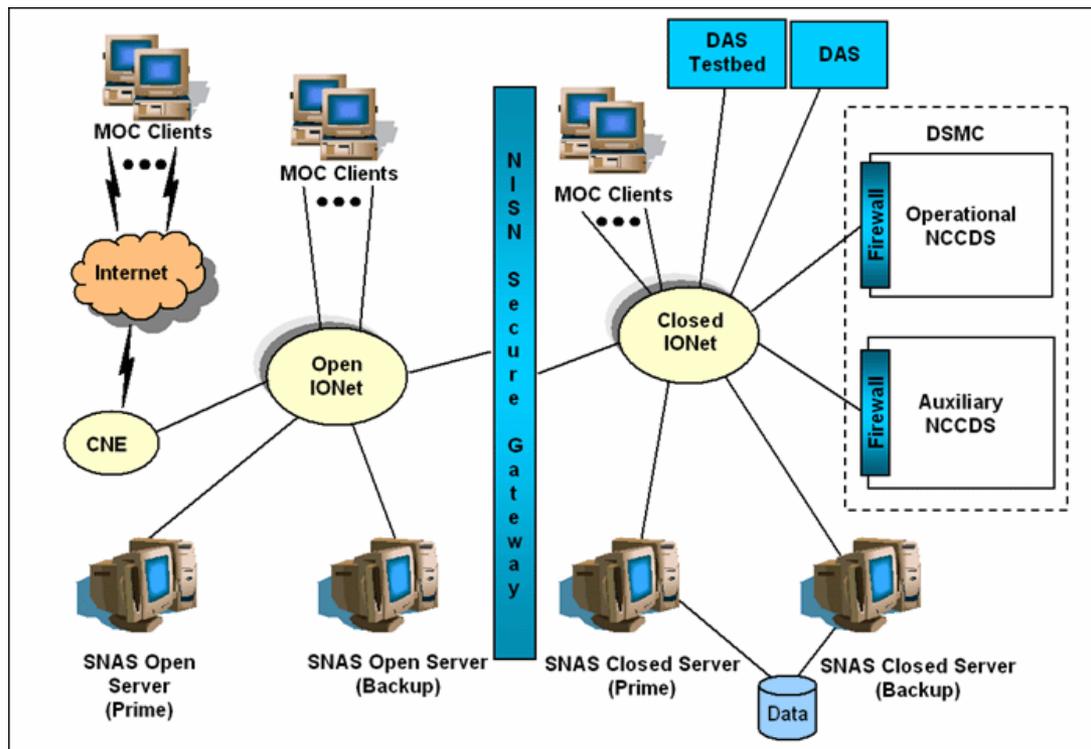
Space Network Access System (SNAS)



- **SNAS is being developed as a single customer interface for performing SN customer scheduling and real-time service monitoring and control**
- **SNAS will:**
 - **Consolidate the functionalities of the User Planning System (UPS) and the SN Web Services Interface (SWSI) into a single system**
 - **Replace the UPS and SWSI as the premiere customer access system for managing TDRSS resources**
- **SNAS Capabilities:**
 - **Provides a networks-based (server-client relationship) customer interface for performing SN scheduling and real-time control and monitoring**
 - **Supports customers who schedule SN services through both the Network Control Center Data System (NCCDS) and the Demand Access System (DAS)**
 - **Accessible from the Internet and the NISN Open and Closed IONet**
 - **Provides for easy system setup and workstation independence for the SN customer (the SNAS client software is envisioned to run on any type of personal computer or workstation that can run Sun Microsystems Java Virtual Machine)**



SNAS Reference Architecture



- **Client:**
 - Client software will reside on SN Customer MOC workstation or PC
 - Provide access to the SN via the Open or Closed SNAS Servers
- **Servers:**
 - Act as proxies to route requests from the client to the NCCDS and/or the DAS, and return responses to the client
 - Establish and maintain all required Transmission Control Protocol (TCP) connections
- **Database:**
 - Operates on the Closed IONet side of the NISN Secure Gateway
 - Hold static data, semi-static data, and dynamically updated data
 - SNAS customers will be granted access privileges depending upon their roles



SNAS Status/Schedule



- **Completed the SNAS System Requirements Review (SRR) in July 2003**
 - **Currently resolving SRR Requests for Action (RFAs)**
 - **SNAS documentation will be updated based on the SRR and undergo formal CCB review prior to SNAS implementation start**
- **SNAS implementation to begin in February 2004 under the NENS contract**
- **Next Projected Milestone Reviews:**
 - **SNAS Preliminary Design Review (PDR) – June 2004**
 - **SNAS Critical Design Review (CDR) – October 2004**
- **Projected SNAS Operational Readiness date is February 2006**



Ground Network Update

Stephen Currier



Ground Network Update



- **Ground Network Capabilities in FY04 are more certain**
 - **GN FY04 budget has stabilized**
 - **The Ground Network received McMurdo and Santiago service overguide requests**
 - **All other Ground Network services were requested inguide**
 - **The Ground Network is continuing to evaluate and understand CSOC to NENS transition costs**



Ground Network Update



- **Alaska SAR Facility**
 - **Services are planned to continue in FY 04 at current level**
 - **The Ground Network transitioned tracking services via grant vehicle into existing GSFC DAAC contract April 1, 2003.**
 - **DAAC contract is being renewed and is expected to be in place November 2003. It will include tracking and data acquisition as well as science data processing services.**
 - **Medora Macie is the GSFC COTR.**
 - **Paul Garza is the Associate Technical Representative (ATR) for antenna tracking operations.**
 - **ADEOS II has been declared lost by Japan Aerospace Exploration Agency**
 - **Opportunities for newly available tracking capacity at ASF**
 - **GN will work communications and forward link possibilities**



Ground Network Update



- **McMurdo**
 - **Services are planned to continue in FY 04 at current level**
 - **The Ground Network is proceeding with automation upgrades**
 - **X-band tracking possible with one operator by December 2003**
 - **24 hour per day S-band tracking capability in FY 05**



Ground Network Update



- **Santiago**
 - **Services are planned to continue at current level (2 hrs/day)**
 - **If the CSOC to NENS transition costs are less than the current plan, then services will continue at the current level**
 - **If transitions costs are higher and a new contract with reduced minimums is established, then services may continue at reduced levels**



Ground Network Update



- **Expanded service initiatives**
 - **Enhancing 13-Meter antenna system (SG3) to provide third antenna option at Svalbard**
 - **Aqua and Aura compatibility enhancements complete**
 - **Working tracking data format**
 - **ICESat & QuikScat compatibility scheduled for March 2004**
 - **Enhancing MILA for orbital support capabilities to maintain proficiency and increase flexibility**
 - **Closed IONet connectivity is in place; IONet security scan completed**
 - **Primary PTPs installed, continuing to establish desktops**
 - **Initial compatibility expected end of November (TRACE, FAST, WIRE)**
 - **Enhancements will be final by December 2003 for SORCE and HESSI**
 - **Pursuing contingency support services from NOAA CDA stations**
 - **EOS support from Gilmore Creek CDA station**
 - **NOAA instrumentation mods at WGS progressing, final testing November**
 - **ADEOS II support from Wallops station terminated**



Earth Sciences (Code Y) Enterprise Updates



Earth Science Mission Operations



Paul Ondrus ESMO Project Manager, Code 428

Edward J. Macie ESMO Operations Director

301 614-5416



Earth Science Mission Operations

- **Prepare for Aura launch and operations**
 - Launch is NET March 19, 2004
 - Spacecraft and mission testing continue and will intensify
 - Identify and resolve mission conflicts during L & EO
- **Continue CSOC to MOMS transition**
 - Skill mix retention is a concern
 - Space utilization improvements of facilities continue
 - Property and documentation issues being resolved
 - Identify new tasks or areas not supported post CSOC
- **Continue Space Operations Institute efforts**
 - Grant with Capitol College for Space Operations Institute
 - Flight Operations for ERBS, TOMS-EP, TRMM, and UARS



Earth Science Mission Operations

- **System Architecture must be reviewed for obsolescence, Cost efficiency, and Risk**

- **Develop and maintain a Team of stakeholders and service providers (290, 428, 444, 450, 590)**
 - **FY04 PSLAs need to be updated and signed**
 - **Network/Operations Agreements, Guidelines and Performance Metrics**
 - **Document Roles, Responsibilities**

- **Anomalies - A major risk to spacecraft operations and science customers**
 - **Timely identification and reporting is required**
 - **Prevention**
 - **Resolution and closure process**
 - **Corrective action**



Space Sciences (Code S) Enterprise Updates



Space Science Mission Operations Project (Code 444)

Ron Mahmot
Project Manager

Patrick Crouse
Deputy Project Manager

Valda Jones
Mission Business Manager

Andy Dantzler
Acting Senior Project Scientist

November 20, 2003



AGENDA



- Organization overview
- Current Missions
- Future Missions
- Selected Items of Interest
 - Space Link Extension (SLE)
 - Mission Operations and Mission Services (MOMS) Contract
- Areas for More Work



Organization Overview

Space Science Mission Operations Project

Charter

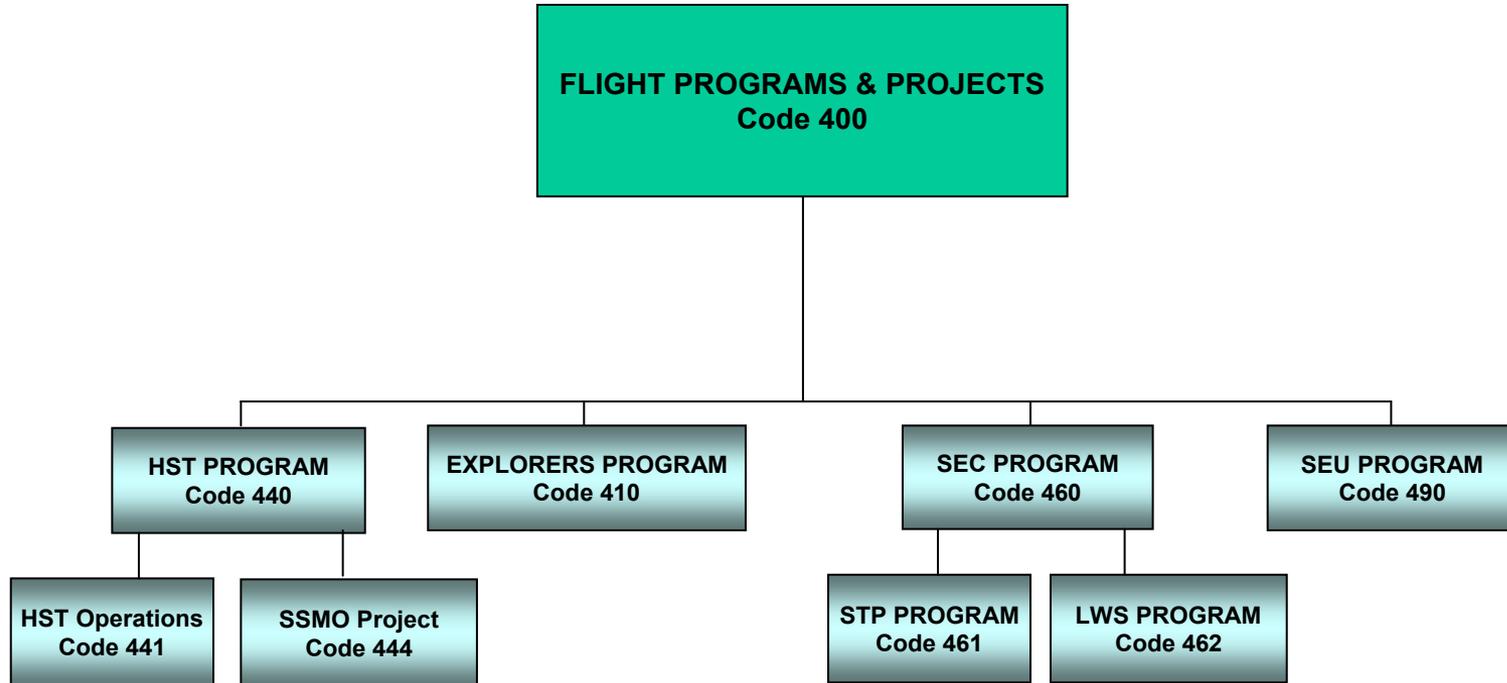
- **SSMO has management responsibility for the safe and productive operations of Goddard Space Flight Center Space Science missions in the operations phase and for selected GSFC instrument operations on non-GSFC managed spacecraft operations**
- **SSMO works with missions in the development phase to feedback lessons learned and to ensure that operations concepts are sustainable**
- **SSMO works with the GSFC Mission Services Evolution Center (GMSEC) to ensure that the mission services infrastructure is kept current, and that technology development and infusion efforts are integrated with mission needs**

Operations Philosophy

- **Mission safety is the number one priority**
- **Goal is to maximize science data collection within budget and risk constraints**

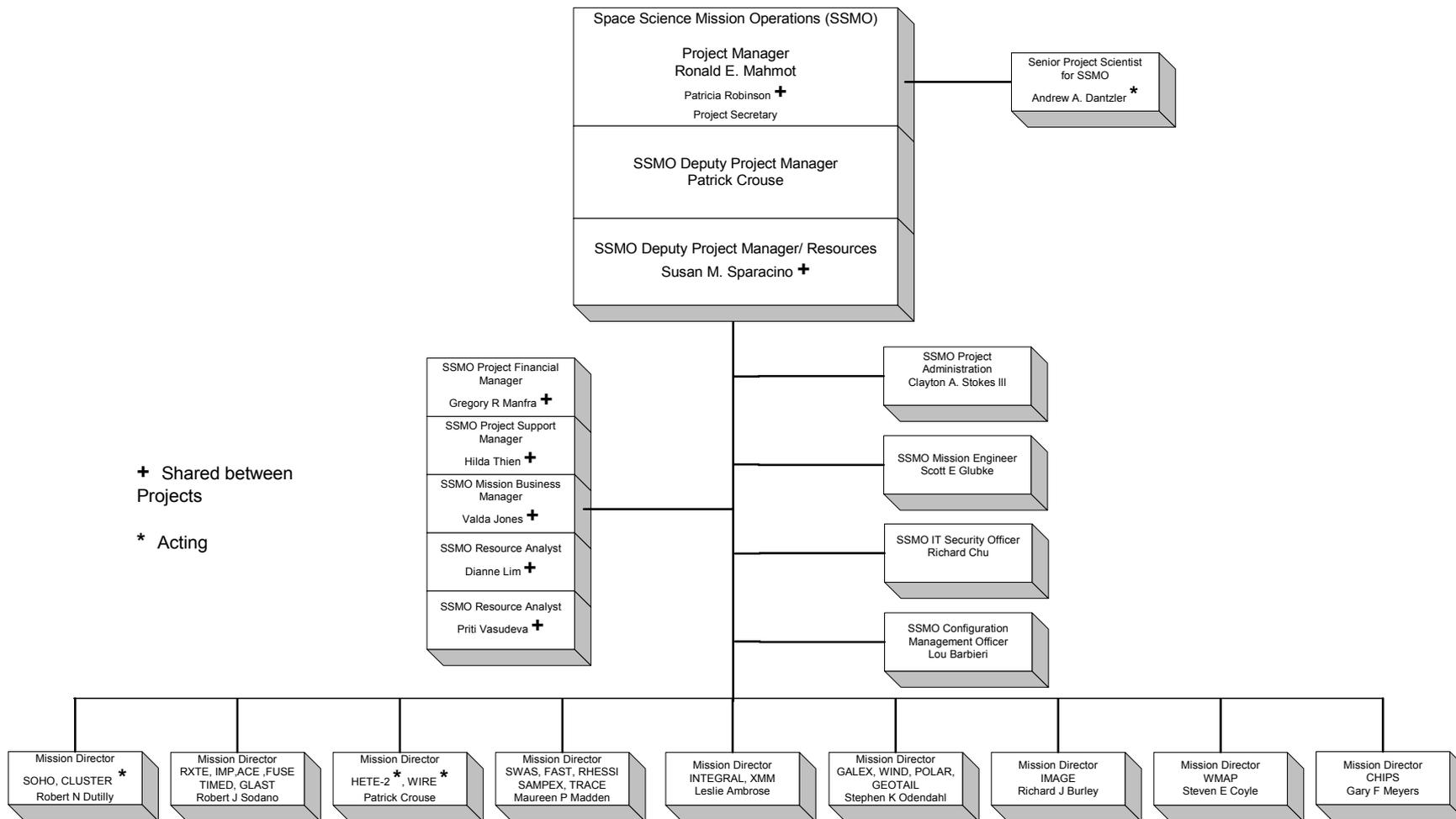


Organization Overview





Organization Overview



+ Shared between Projects
* Acting

Original Signed By

June 4 2003

Ronald E Mahmot, Space Science Mission Operations Project Manager

Date



Mission Set Mission Parameters



Mission	Launch Date	Orbit Type	Attitude Control	Network	Control Center
ACE	08/25/97	L1	Spin @ 5 rpm	DSN	GSFC/CSOC
CHIPS	01/13/03	600km circ @ 94 deg	3-axis	UCB/Adelaide/GN	UCB
FAST	08/21/96	4150 km X 348 km @ 83 deg	Spin @ 12 rpm	GN	UCB
FUSE	06/24/99	775 km circ @ 25 deg	3-axis	UPRM/GN/SN	JHU
GALEX	04/28/03	690 km circ @ 29 deg	3-axis	USN/SN	Orbital
Geotail	07/24/92	2 x 210 Re Equatorial	Spin @ 20 rpm	DSN/ESA	ISAS
HETE-2	10/09/00	625 km circ Equatorial	3-axis	MIT	MIT
IMAGE	03/25/00	1000 km X 45900 km @ 90 deg	Spin @ 0.5 rpm	DSN	GSFC/Honeywell
WMAP	06/30/01	L2	Spin @ 0.5 rpm	DSN	GSFC/Honeywell
Polar	02/24/96	2 X 9 Re @ 86 deg	Spin @ 10 rpm	DSN	GSFC/CSOC
RHESSI	01/24/02	600 km circ @ 38 deg	Spin @ 15 rpm	UCB/GN	UCB
RXTE	12/30/95	565 km X 583 km @ 23 deg	3-axis	SN	GSFC/CSOC
SAMPEX	07/03/92	550 km X 675 km @ 82 deg	3-axis	GN	BSU/GSFC/CSOC
SOHO	12/02/95	L1	3-axis	DSN	GSFC/CSOC
SWAS	12/02/98	600 km circ @ 70 deg	3-axis	GN	GSFC/CSOC
TIMED	12/07/01	625 km circ @ 74 deg	3-axis	APL/USN/SN	APL
TRACE	04/02/98	600 km X 650 km @ 97 deg	3-axis	GN	GSFC/CSOC
Wind	11/01/94	Variable/250 Re Max	Spin @ 20 rpm	DSN	GSFC/CSOC



Mission Set Reentry Analysis



Name of S/C	Earliest Reentry	Reentry Analysis Completion Date	Would uncontrolled reentry result in greater than 1 in 10,000?	Controlled reentry via thrusters possible?	Shuttle return possible?	End of Mission Plan Completion Date	Comment
SNOE	Nov-03	Nov-03	No (6.4 m ²)	No	No	Nov-99	DAS 1.5.3 analysis.
WIRE	Jan-06	Aug-03	No (5.75 m ²)	No	No	TBD	DAS 1.0 analysis. 254 Kg Mass
SAMPEX	Mar-09	Aug-03	No (1.44 m ²)	No	No	TBD	DAS 1.0 analysis. 161 Kg Mass
RXTE	Aug-10	Aug-03	Yes (30.3 m ²)	No	No	TBD	DAS 1.5.3 analysis. 3031 Kg Mass
CHIPS	Nov-10	Aug-03	TBD	No	No	TBD	600 km @ 94° inclination
HETE-2	2028 +	Aug-03	No (<1 m ²)	No	No	TBD	DAS 1.0 analysis. 125 Kg Mass
RHESSI	Apr-11	Aug-03	TBD	No	No	TBD	600 km @ 38° inclination
TRACE	Jun-20	Aug-03	No (6.74 m ²)	No	No	TBD	DAS 1.5.3 analysis. 214 Kg Mass
TIMED	Jul-21	Aug-03	Yes (9.2 m ²)	No	No	TBD	DAS 1.0 analysis. 587 Kg Mass
SWAS	Sep-24	Aug-03	TBD	No	No	TBD	283 Kg Mass
COBE	2028 +	Aug-03	TBD	No	No	TBD	874 km @ 99° inclination
FAST	2028 +	Aug-03	TBD	No	No	TBD	187 Kg Mass
FUSE	2028 +	Aug-03	TBD	No	No	TBD	1335 Kg Mass
GALEX	2028 +	Aug-03	TBD	No	No	TBD	690 km equatorial orbit
Cluster	Centuries	Aug-03	N/A	No	No	TBD	3 R _e x 18.5 R _e Orbit
GEOTAIL	Centuries	Aug-03	N/A	No	No	TBD	9 R _e x 30 R _e Orbit
IMAGE	Centuries	Aug-03	N/A	No	No	TBD	1000 x 7000 Km Orbit
POLAR	Centuries	Aug-03	N/A	No	No	TBD	2 R _e x 9 R _e Orbit
WIND	Centuries	Aug-03	N/A	No	No	TBD	5 R _e x 185 R _e Orbit
ACE	Never	Aug-03	N/A	No	No	TBD	L1 Orbit
SOHO	Never	Aug-03	N/A	No	No	TBD	L1 Orbit
WMAP	Never	Aug-03	N/A	No	No	TBD	L2 Orbit
Spacecraft may violate 25 years after end of mission guideline					Spacecraft violates 8 m ² debris casualty area guideline		



Mission Set

Future Missions/Strategic Planning



- **Have Signed Memorandums of Agreement with Explorers, Solar Terrestrial Probes and Living With a Star Programs. MOA with Structure and Evolution of the Universe Program is pending**
 - Involve operations early in the project life cycle (operations concept development, trade studies, best practices/lessons learned)
 - Communicate SSMO requirements and criteria for successful transition
 - Facilitate maintenance and evolution of operations infrastructure
- **Working with the GSFC Mission Services Evolution Center (GMSEC) to ensure that the mission services infrastructure is kept current, and that technology development and infusion efforts are integrated with mission needs**
 - SMEX is actively working to implement GMSEC architecture to reengineer to a fleet operations concept
- **Some missions of particular interest:**
 - Swift – University based operations/DAS user – May 2004
 - Stereo – 2 satellites operated at APL – '05
 - THEMIS – 5 satellites, UCB operations – '06
 - GLAST and SDO – GSFC-based operations - '06-'08 timeframe
 - MMS – constellation operations - '09



Space Link Extension (SLE)

- **Agreed to eliminate use of 4800 Bit Block communications with DSN**
- **DSN and ESA currently use SLE (Ex: Integral, Mars Global Surveyor) to facilitate interoperability**
- **SOHO actively pursuing SLE demonstration for telemetry and command**
 - **Initial demonstration will be with DSN in Spring to Early Summer 2004**
 - **Second phase with ESA antenna at New Norcia, Australia**
 - **Additional implementations for WIND, POLAR, and ACE anticipated**
- **WIRE was used as an on-orbit asset to evaluate Avtec system at Wallops**
 - **Successful commanding was performed from Houston**
 - **SSMO and GMSEC have migrated equipment to GSFC**
 - **Follow on activity to be defined**



Areas for More Work



- **Continue to Work CSOC to Mission Operations and Mission Services (MOMS) transition to minimize mission risk and CSOC closeout issues**
- **Monitor and communicate status of SNOE reentry, coordinate efforts with GN and DSMC scheduling**
- **Reduced Wind/Polar operations from 24/7 to 12/7. Continue along path of increased automation (Wind/Polar/ACE).**
- **Establish Svalbard as a SMEX (particularly TRACE) GN resource**
- **Request support for external review of USN performance in support of GALEX**
- **Initiate a systematic review of PTP designs in light of findings in Avtec implementation in USN systems and subsequent discussions with DSN personnel**



Acronym List

ACE	Advanced Composition Explorer	NISN	NASA Integrated Services Network
APL	Applied Physics Laboratory (JHU)	OSS	NASA's Office of Space Science
CDHF	Central Data Handling Facility	PACOR II	Packet Processor
CHIPS	Cosmic Hot Interstellar Plasma Spectrometer	PI	Principal Investigator
CSOC	Consolidated Spacecraft Operations Contract	Polar	Polar Plasma Laboratory
DPU	Data Processing Unit	PSLA	Project Service Level Agreement
DSN	Deep Space Network	RHESSI	Reuven Ramaty High-Energy Solar Spectroscopic Imager
ESA	European Space Agency	RXTE	Rossi X-Ray Timing Explorer
ESTEC	European Space Research & Technology Centre, Noordwijk, Holland	SAMPEX	Solar Anomalous Magnetospheric Particle Explorer
FAST	Fast Auroral Snapshot Explorer	SDP	Science Data Processing
FDF	Flight Dynamics Facility	SEC	Sun-Earth Connection
FOT	Flight Operations Team	SMEX	Small Explorers
FUSE	Far-Ultraviolet Spectroscopic Explorer	SODA	Space Operations Development Activity
Geotail	Geomagnetic Tail Laboratory	SOHO	Solar Heliospheric Observatory
HETE	High Energy Transient Explorer	SOMO	Space Operations Management Office
IMAGE	Imager for Magnetopause-to-Aurora Global Exploration	SOW	Statement of Work
IMP	Interplanetary Monitoring Platform	SSMO	Space Science Mission Operations
IRU	Inertial Reference Unit	SWAS	Submillimeter Wave Astronomy Satellite
JHU	Johns Hopkins University	TDRSS	Tracking and Data Relay Satellite System
LASP	Laboratory for Atmospheric and Space Physics	TRACE	Transition Region and Coronal Explorer
MAP	Microwave Anisotropy Probe	UCB	University of California at Berkeley
		Wind	Interplanetary Physics Laboratory



Human Spaceflight Enterprise Update

B. Schneck



Human Spaceflight



Agenda

- **Return to Flight Re-validation of the Integrated Network Elements**
- **150 Mbps Testing**
- **ISS Downlink Enhancement Architecture (IDEA)**
- **Automated Transfer Vehicle (ATV)/H-II Transfer Vehicle (HTV) Activities**



Human Spaceflight



Return to Flight Re-Validation for the Integrated Network Elements

- **All Network sites and supporting elements are teamed to re-validate the Integrated Network: WSC, NISN, FDF, AFSCN RTS, DFRC WATR, WFF, MILA/PDL, and the NIC**
- **The team has developed an Integrated Network test program to be implemented by GSFC focusing on critical path support activities such as ascent, orbital, entry, and landing**
- **This plan was presented to the GSFC Mission Services Program Office, JSC Shuttle Ops Support Team, the Flight Director's Office, and the KSC Shuttle Integration Team in the early fall. It was favorably received by all these key organizations.**
- **The re-validation process encompasses verification and validation of new program requirements, significant network changes and anomalies, as well as any safety and security concerns**
- **An Integrated Network Operations Readiness Review (ORR) will be conducted approximately 30 days prior to launch currently scheduled for Sept. 2004.**
- **Participation in the Mission Operations Directorate (MOD) and Level I/II Flight Readiness Reviews (FRR) will provide the Integrated Network readiness status to the Space Shuttle Program (SSP).**



Return to Flight Re-Validation for the Integrated Network Elements

- **Integrated Networks Test Plan**
 - **Provides direction of testing for re-validation of the Integrated Network and Return to Flight of Space Shuttle missions**
 - **Verification/validation tests, Integrated Network joint simulations, Terminal Countdown Demonstration Test [TCDT], and Range Safety TLM verification tests will be conducted**
 - **Scripts and test scenarios will be provided by briefing message for launch, on-orbit, and landing support simulations**
 - **Special testing for mission and payload related activities will be outlined in the Test Plan**
 - **New Integrated Network requirements will be tested such as External Tank Television (ET TV)**
 - **Existing STS-112 ET TV system will be reverified for debris monitoring during launch**
 - **Testing for optional second link is being analyzed**



Return to Flight Re-Validation for the Integrated Network Elements

- **Completed Return To Flight Activities**
 - **Emergency Mission Control Center (EMCC) Full-up Simulation was conducted in October 2003. The purpose of the test was to implement the EMCC voice/data interfaces and procedures for all the supporting entities in support the the EMCC activation at KSC. All significant objectives of the test were met.**
 - **FDF Proficiency Simulations were conducted successfully in October 2003. These tests are planned to be run monthly and exercise the same functions as SN Vector Verification, however, may not exercise specific TDRSs or tracking services. Simulations will include GN participants as required.**
 - **GN IP Commanding was conducted in October 2003. Tests were not totally successful, and will be rescheduled, as necessary.**



Human Spaceflight



Schedule of Events

Date: November 11, 2003

Task	Start	End	2003										2004												
			APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP					
1 Kick off meeting with team	4/14/03	4/14/03	▼																						
2 Weekly meetings for return to flight	4/15/03	9/30/04	▼	▶																	▼				
3 Identify test requirements	4/15/05	2/15/04	▼	▶																	▼				
4 Develop test plan*	5/15/03	11/14/03		▼	▶										▼										
5 Internal and external reviews	9/16/03	9/2/04							▼	▶										▼					
6 Plan published	7/31/03	7/1/04																		▼					
7 Testing with stations	8/1/03	9/3/04					▼	▶																	▼
8 Aircraft flybys at MILA and DFRC	8/12/03	1/15/04					▼		▼			▼	▼												
9 Preliminary ORR	2/15/04	7/9/04												▼	▶				▼						
10 Network ORR	2/15/04	8/5/04												▼	▶					▼					
11 STS return to flight launch	3/16/04	9/16/04													▼	▶					▼				

Notes: *Plan assumes that new Network Requirements have been provided by JSC in a timely manner.

▼▶ Planned

gsfc-2376001.dsf



150 Mbps On-Orbit Testing

- **ISS Ku-Band High Data Rate (HDR 50-75-150 Mbps) was tested during TDRSS Compatibility testing ('95/'98). To date, the 50 Mbps capability has been successfully tested and used on-orbit for transport of ISS science data. However, the 75-150 Mbps rates had not been tested on-board.**
- **A plan was developed to test the higher data rates on-orbit. The testing evaluated signal level performance of the higher rates.**
- **The test was successfully conducted in August 2003.**
- **The test was led by JSC with support from GSFC and WSC.**



ISS Downlink Enhancement Architecture (IDEA)

- **IDEA is a ground systems infrastructure that will provide the ISS program the ability to enhance its science return from 50mbps to 150mbps over the Ku band downlink and reduce operations, NISN communications link, and sustaining engineering costs**
- **The main objective of IDEA is to replace the existing DOMSAT commercial link and implement common FEP architecture at WSC and feed JSC and MSFC unique components at ISS downlink rates up to 150 mbps. This will be done in two phases**
 - **Phase 1 is to replace the existing DOMSAT commercial satellite transponder service with a fiber terrestrial communications network for data distribution**
 - **Phase 2 is to reconfigure the IDEA system at WSC to perform data extraction and distribution to JSC and MSFC. The system reconfiguration will move the front end processing of the Ku-band downlink from JSC and MSFC to WSC**
- **Current Activities**
 - **Integration and testing of the new infrastructure is progressing for Phase 1 readiness by the end of December 2003.**
 - **Phase I planned completion date is December 31, 2003, after 30 days of parallel operations.**
 - **Phase II planned completion date is December 2004**



ATV/HTV Activities

- **ESA Automated Transfer Vehicle (ATV) and NASDA H-II Transfer Vehicle (HTV) are logistics modules which will be used to re-supply the International Space Station (ISS)**
- **ATV**
 - **Launch Date: April 2005**
 - **Final series of Compatibility Testing remains on schedule for April 2004.**
- **HTV**
 - **Launch Date: December 2007**
 - **Initial compatibility testing (Category I: engineering-level vehicle equipment) is planned for June 2004**
 - **Follow-on Testing (Category II HTV Integrated Avionic Flight Equipment) is planned for September 2005**