



# Space Communications Customer Forum



# Space Communications Customer Forum (SCCF)

*(formerly Mission Services Customer Forum)*

<http://scp.gsfc.nasa.gov/sccf/>

**December 9, 2004**

**Building 3 Goett Auditorium  
NASA/Goddard Space Flight Center  
Greenbelt, Maryland**

*Sponsored by:*

**Customer Commitment Office, Code 451  
(Space Communications Program, Code 450)  
NASA/Goddard Space Flight Center  
Greenbelt, Maryland**



# Agenda



<u>Timeline (approx.)</u>	<u>Subject / Topic</u>	<u>Speaker / Presenter</u>
1:00pm	WELCOME & INTRODUCTIONS	Allen J. Levine/GSFC/451
1:05pm	OPENING REMARKS	Roger J. Flaherty/GSFC/Code 450
1:20pm	GENERAL NOTES / ACTION ITEMS STATUS	Allen J. Levine/GSFC/451
1:30pm	FEATURED TOPICS	
	• Mission Operations Mission Services (MOMS)	Shuby P. Ambardekar/HTSI/MOMS
	• Near Earth Networks Services (NENS)	John Grassel/HTSI/NENS
2:00pm	MISSION/PROJECT UPDATES <i>(Organizational Overviews; Current/Future Missions; Issues &amp; Selected Items of Interest; Areas for More Work)</i>	
	• Earth Science Missions	Ed J. Macie/GSFC/428
	• Space Science Missions	Leslie L. Ambrose/GSFC/451
	• Human Space Flight Missions	Melvin K. Calhoun/HTSI/NENS
2:30pm	STATUS UPDATES <i>- Significant Activity in Space Communications Program (SCP) Offices and Our Partners -</i>	
	• NASA Integrated Services Network (NISN) (Code 291)	Jerry R. Zgonc/GSFC/291
	• Flight Dynamics Facility (Code 595)	Sue L. Hoge/GSFC/595
	• Ground Network (GN) Project (Code 453)	Christine M. Hinkle/GSFC/453
	• Space Network (SN) Project (Code 452)	Keiji K. Tasaki/GSFC/452
3:15pm	NETWORK LOADING	Allen J. Levine/GSFC/451
3:20pm	OPEN FLOOR	Allen J. Levine/GSFC/451
3:30pm	CLOSING REMARKS	Allen J. Levine/GSFC/451



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## Welcome / Introductions

**Allen J. Levine**  
**Customer Commitment Office**  
**Code 451**  
**NASA/Goddard Space Flight Center**



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## WELCOME / INTRODUCTIONS

- **LOGISTICS**
- **ATTENDANCE** *(please sign attendance sheet)*
- **SCCF SURVEY** *(how are we doing?)*
  - (web access @ <http://scp.gsfc/nasa.gov/sccf/>)
  - Included in 'Briefing Book'
  - Input used to generate metrics
- **SCCF Future Plans**
  - Next meeting: March 31, 2005 (same location)
  - Splinter group meetings may be incorporated
    - Operations Interfaces, Requirements Documentation, Scheduling, Communications, SCP project offices, etc.



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## Opening Remarks

**Roger J. Flaherty**  
**Space Communications Program**  
**Code 450**  
**NASA/Goddard Space Flight Center**



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## Action Item



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REQUEST FOR ACTION (RFA)		
1. Review Type SCCF#9	2. RFA No. 01	3. Review Date 8/12/04
4. Title Critical Support Documentation		
5. Action Publish the document that contains the procedure for determining critical support.		
Reference SCCF #9 Presentation, page 11/comment from audience		
6. Originator/Organization/Telephone No./E-mail Al Levine/NASA/GSFC/451/301 286 9436/Allen.J.Levine@nasa.gov		
7. Assigned To/Organization/Telephone No./E-mail Al Levine/NASA/GSFC/451/301 286 9436/Allen.J.Levine@nasa.gov		Due Date 12/09/04
8. Response Procedures for determining 'critical support' are documented in the priority lists, <b>451-List-SN/Priority</b> and <b>451-List-GN/Priority</b> , which are posted to the Centralized Configuration Management System (CCMS) at <a href="http://gdms.gsfc.nasa.gov/gdms/pls/appmenu">http://gdms.gsfc.nasa.gov/gdms/pls/appmenu</a> .		
9. Response By/Organization/Telephone No./E-mail Al Levine/NASA/GSFC/451/301 286 9436/Allen.J.Levine@nasa.gov		Date Prepared 12/01/04
10. Originator Contacted	<input type="checkbox"/> No <input type="checkbox"/> Yes	Date
11. Disposition	<input type="checkbox"/> Open <input type="checkbox"/> Deferred <input type="checkbox"/> Closed <input type="checkbox"/> Withdrawn	
12. Comments		
13. Approval		
_____ Al Levine Service and Planning Manager/Code 451		_____ Date



# Space Communications Customer Forum



## Mission Operations Mission Services (MOMS)

Shuby P. Ambardekar  
Honeywell Technology Solutions, Inc.  
MOMS



# Space Communications Customer Forum



## MOMS Program Overview

- **Name:** Mission Operations Mission Services (MOMS)
- **Customer:** NASA/Goddard Space Flight Center
- **Description of Work:** Mission Operations and Systems support for Earth Science, Space Science, and the office of Human Spaceflight customers at the Goddard Spaceflight Center. The scope encompasses all mission phases, including formulation, development, and operations during the mission life through decommissioning. Services include Flight Operations, Mission Data Collection and Distribution, Flight Dynamics support, Mission Systems Integration support, and NASA Communication Support.
- **Location:** Goddard Space Flight Center, Greenbelt MD.
- **Contract Type:** CPAF / Task Order Based
- **Term:** 5-year base period plus two 1-year options
- **Population:** 500

**Honeywell**

Space Mission Communications and Data Services  
**Mission Operations & Mission Support**  
RFP No.: 03-HAW-001

**MOMS**

Volume 1 - Contract  
Volume 2 - Technical/Mission Suitability  
Volume 3 - Cost/Price

Honeywell - A Proven Partnership for  
Mission Operations





# MOMS Team

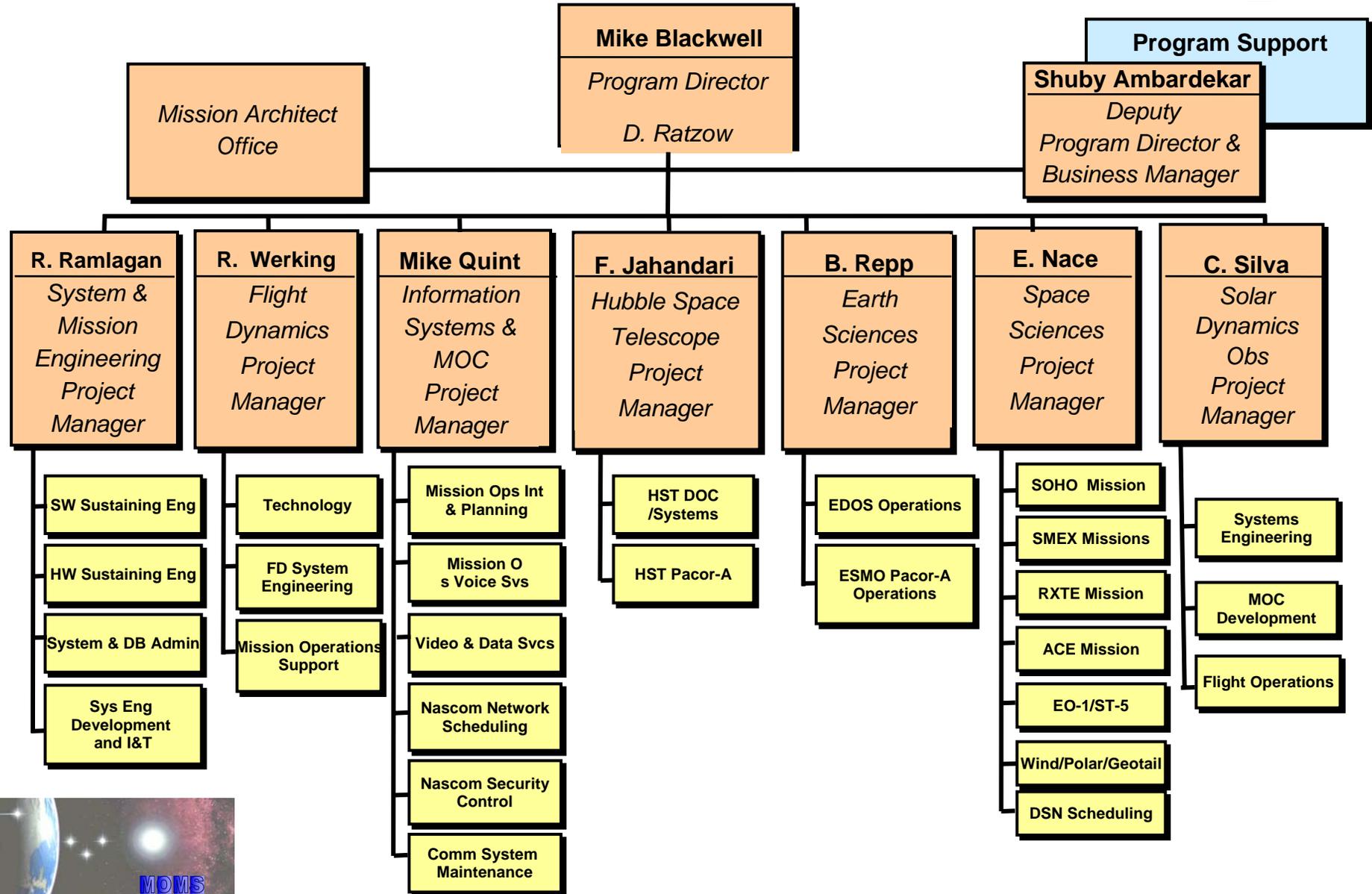


<b>The Honeywell Team</b>	
<b>a.i.solutions</b>	<ul style="list-style-type: none"> <li>• Flight Dynamics</li> <li>• FD System Development</li> <li>• ELV launch Support</li> <li>• Human Spaceflight Support</li> </ul>
<b>Boeing</b>	<ul style="list-style-type: none"> <li>• Flight Dynamics Attitude and Mission Design</li> <li>• Constellation Management</li> <li>• Attitude Determination</li> </ul>
<b>Booz Allen Hamilton</b>	<ul style="list-style-type: none"> <li>• Systems Engineering</li> <li>• End-to-End System Architecture</li> <li>• Mission Formulation</li> <li>• Risk Management</li> </ul>
<b>Caelum Corporation</b>	<ul style="list-style-type: none"> <li>• Technical Training</li> <li>• Instructional Design</li> </ul>
<b>General Dynamics</b>	<ul style="list-style-type: none"> <li>• Engineering of Systems, spacecraft</li> <li>• Network Engineering</li> <li>• IT Security</li> </ul>
<b>the Hammers Company</b>	<ul style="list-style-type: none"> <li>• Flight and ground SW developers.</li> <li>• Systems engineers.</li> </ul>
<b>QSS Group, Inc.</b>	<ul style="list-style-type: none"> <li>• Spacecraft Engineering</li> <li>• I&amp;T</li> <li>• Information Technology</li> </ul>
<b>SAIC</b>	<ul style="list-style-type: none"> <li>• Science Data Processing System Development</li> <li>• Modeling</li> <li>• System Engineering</li> </ul>
<b>SGT, Inc</b>	<ul style="list-style-type: none"> <li>• Systems Engineering</li> <li>• Spacecraft Architecture</li> <li>• Telemetry Trending System Development</li> <li>• Mission Operations</li> </ul>





# MOMS Organization Chart



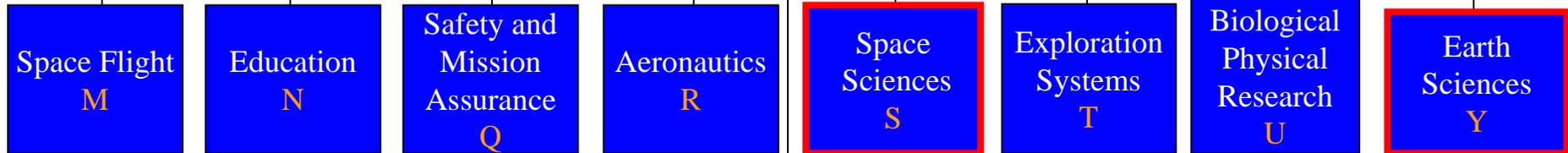


# MOMS Customer Organization



Office of the Administrator

*Offices*

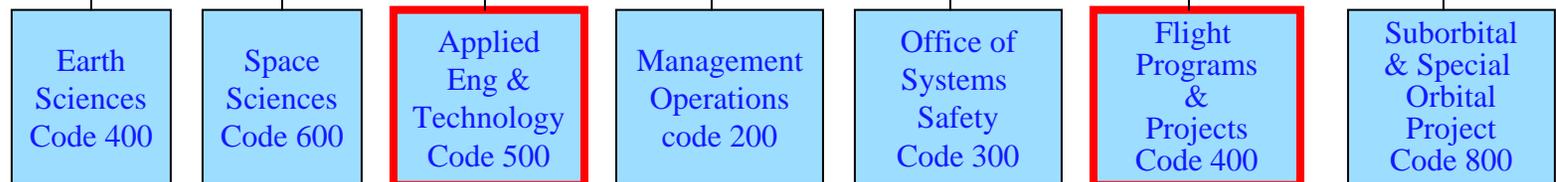


Dr Ghassem Asar

*Centers*



*Flight Programs & Project Directorate*



E. Weiler

EOS Program Office

HST Program Office

ESMO Project Office  
Paul Ondrus

Space Science Project Office  
Ron Mahmot

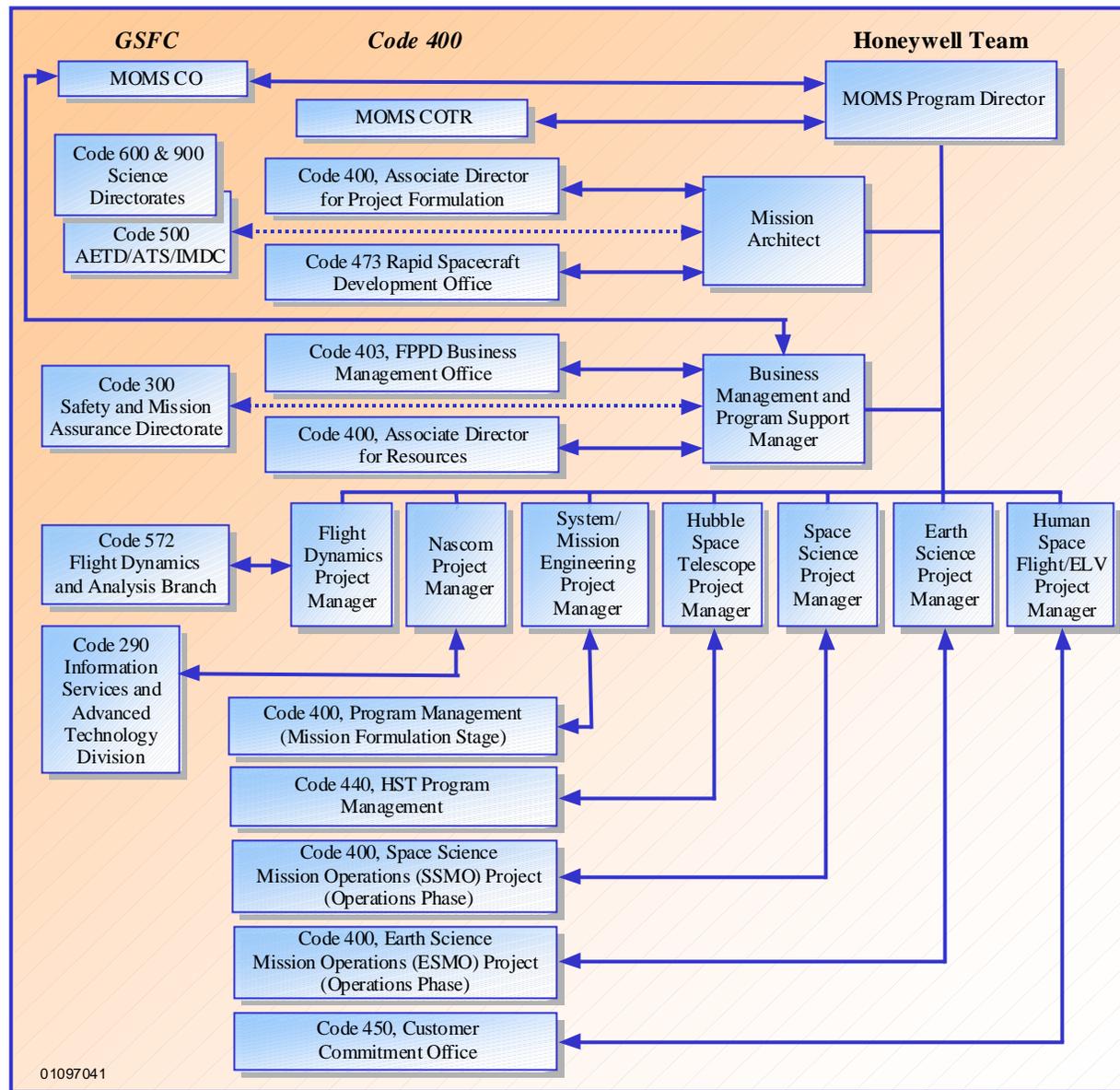
MOMS  
PEB Chair

MOMS  
COTR





# MOMS Customer Interface







# Space Communications Customer Forum



## MOMS Technical Overview

- **Business Management and Program Support Functions**
  - **Business Management**
    - **Finance, Contracts, Sub-Contracts Management**
  - **Quality Assurance and Configuration Management**
    - **No ISO requirement on MOMS. MOMS to comply with GSFC QMS**
    - **CM to be managed at the Task Level. PMO to provide oversight to ensure compliance**
  - **Health Safety and Environment**
    - **Adopt Honeywell program that provides world class results**
  - **Information Technology and Physical Security**
    - **IT Security to be managed at the Task Level. PMO to provide oversight to ensure compliance**
    - **Physical security related to access, clearances, etc. provided by PMO**
  - **Centralized Helpdesk Support**
  - **Property Management and Logistics Support**
  - **Contract Specific Training Support**





# MOMS Technical Overview (cont'd)



## Space Science (Code S) Support

- Sustained stellar performance and knowledge of GSFC managed spacecraft
- Robust console certification process in place.
- Responsible for Flight Control and integrated Data Collection / Data Distribution services for 9 spacecraft in low earth and deep space orbits.
- Coordination with Deep Space Network at JPL for scheduling Tracking, Telemetry, and Commanding (TT&C) services for the deep space orbiting satellites.
- Dependency on the NENS contract for TT&C services for the low earth orbiting satellites.
- Provide pre-mission formulation support for new missions.
- Performance on MOMS above the Standard of Excellence.





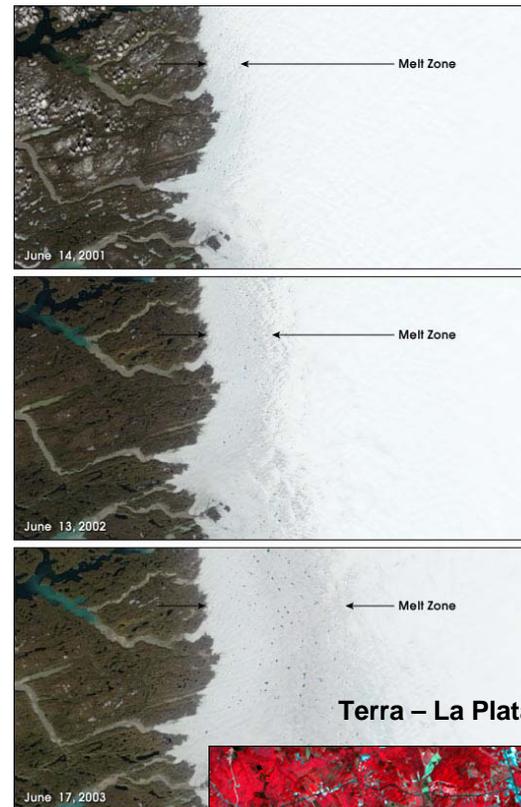
# MOMS Technical Overview (cont'd)



## Earth Science (Code Y) Support

- Operate the Pacor-A level-zero data processing system supporting TRMM, UARS, and ERBS.
- Operate the EDOS level-zero data processing system supporting Terra, Aqua, ICESat, and Aura.
- Perform data analysis, troubleshooting, and problem resolution.
- Maintain the Mission Services Library containing software deliveries, documentation, and data archives for MOMS-operated facilities.
- Provide the full range of engineering services to the Earth Science systems

Terra – Greenland Ice Melting



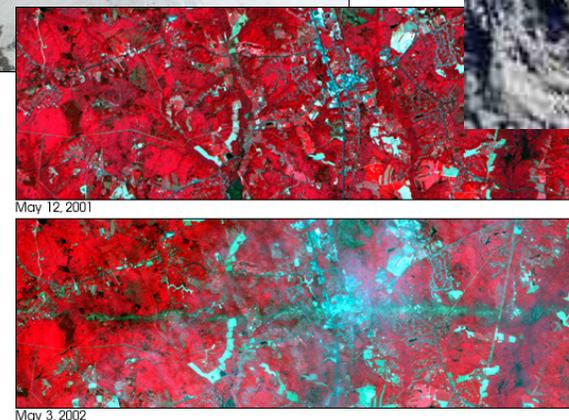
Terra – Florida Algae Bloom



Aqua – Tropical Cyclone



Terra – La Plata Tornado





# MOMS Technical Overview (cont'd)



## Hubble Space Telescope (HST) Support

- Prime contractor in support of the HST Ground Systems
- Providing Systems Engineering and Sustaining Engineering support
- Also providing Data Distribution and Recovery support
- Close coordination with the HST Space Science Institute at John Hopkins, Baltimore
- Direct involvement with the Project and the Human Spaceflight support team during HST Repair missions
- Team cited for innovative Hardware Maintenance and Engineering processes, resulting in significantly improved support and cost avoidance to the Project





# MOMS Technical Overview (cont'd)



## Information Services and Mission

### Operations Communications (NASCOM)

- Integral part of the NASA Communications Infrastructure
- Local and Wide Area Network Components
- Overlap with UNITEs
- Captured incumbent staff (CBA) through a team mate
- Providing the following services:
  - **GSFC Television Support**
  - **IT Security Support**
  - **Circuit Outage Resolution**
  - **Voice Control**
  - **Communications Management and Systems Maintenance for NASA Centers and Projects**
  - **Cable Plant Installation**





# MOMS Technical Overview (cont'd)



## Flight Dynamics Support

- Completed successful Phase-In and continuing to provide exceptional support
- Currently providing Flight Dynamics Services to 25 plus low earth and deep space orbiting satellites, ELVs, Space Shuttle and ISS Programs. Hot backup to JSC for Orbit Determination
- Working very closely with the Flight Dynamics Analysis Branch on developing new tools, supporting re-engineering activities, as well as providing pre-mission formulation support for new missions
- Supporting NENS in the area of Tracking Network performance validation/calibration, satellite acquisition, antenna planning products, and defining FDF requirements for the TDRSS under the SN Expansion Project





# MOMS Achievements



## November 2003 – April 2004 (AFP1)

- Completed the successful transition from CSOC with no operational issues
- Flight Dynamics successfully delivered all products on or ahead of schedule. Successfully supported two Expendable Launch Vehicle (ELV) launches
- Continuity in Flight Operations was maintained with no operational problems
- Science data processing product quality and delivery exceeded quality and latency requirements for both Earth and Space Science Missions
- HST Project received flawless support with no change in staffing
- NASA Communications Support transitioned seamlessly, with new sub-contractors on MOMS while awaiting the onset of the UNITEs Program
- Successfully transitioned Sustaining Engineering support and worked with GSFC to bring on directed sub contractors for critical work in progress requiring special knowledge of systems





# MOMS Achievements (cont'd)



## April 2004 – October 2004 (AFP2)

- Continuing outstanding technical performance in all operations and engineering areas
- Successfully supported 9 launches with no operational problems reported
- Assessing our performance and risk areas and taking appropriate mitigation actions to reduce consequence
- Re-organized at the Program Level to elevate the SDO Project to be a Direct Report to the Program Director given the critical development phase of the SDO Program
- Attrition in critical areas remains below 5%
- Implementing opportunities for achieving cost savings (\$298K) and cost avoidances (\$1.77M) to the Government
- Proactively initiated an internal process for addressing evaluation deficiencies
- Continued to champion University and Community Outreach Programs to include the Maryland Governor's Workforce Investment Board for Aerospace, Capitol College, and Technology Education Alliance with Middle Schools (TEAMS)





# Space Communications Customer Forum



## Near Earth Network Services (NENS)

John E. Grassel  
Honeywell Technology Solutions, Inc.  
NENS



# Space Communications Customer Forum



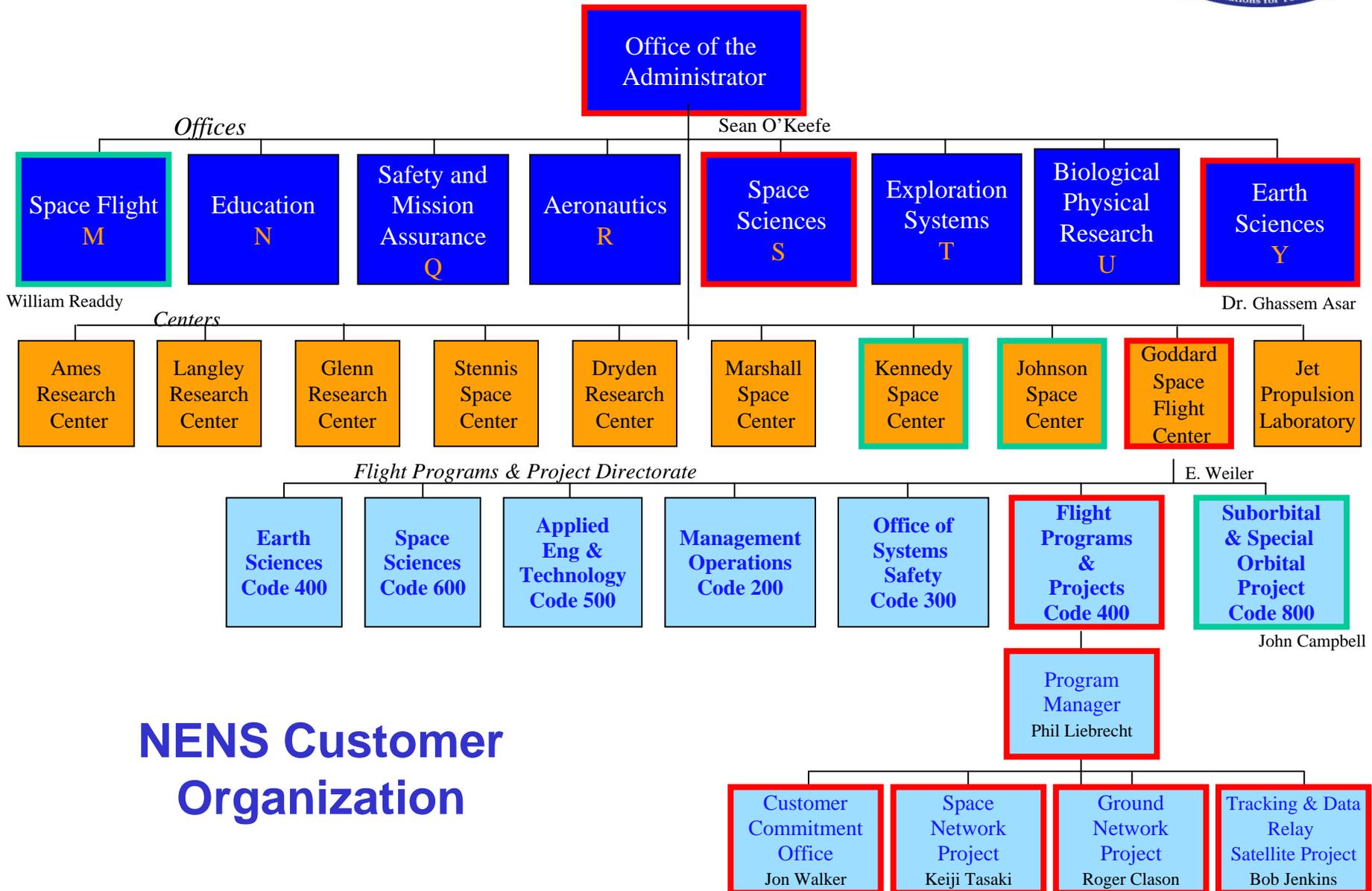
## NENS Program Summary

- Name: **Near Earth Networks Services (NENS)**
- Customer: **NASA/Goddard Space Flight Center**
- Description of Work: **Tracking and data acquisition for near-Earth customer missions, including operations, maintenance, and sustaining engineering for Near Earth Networks Services which includes the Space Network comprised of a fleet of on-orbit Tracking and Data Relay Satellites (TDRS) and the Ground Network consisting of an Orbital Network and Sub-orbital Network Range. Both networks support many customers, including Space Shuttle.**
- Location:
  - **Goddard Space Flight Center, MD**
  - **White Sands Complex, NM**
  - **Wallops Flight Facility, VA**
  - **Merritt Island Tracking Station, FL**
- Contract Type: **Cost Plus Award Fee (single award)**
  - Core requirements are **Program & Business Management and Space Network maintenance and operations. Core requirements are fixed for the length of the contract**
  - **IDIQ for Ground Network (including the WFF Range), development, customer commitment support, etc. Broad SOW which, for example, could deliver a turn-key ground station to an Flight Project.**
    - **Performs sustaining engineering, logistics, facilities management, and hardware and software development**
- Term: **5-year period of performance: October 9, 2003 - October 8, 2008 (No Options)**





# Space Communications Customer Forum



## NENS Customer Organization



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## NENS Team

### The Honeywell Team

Members Chosen for Their Ability to Contribute Key Elements of Our Approach

#### *Intimate Knowledge of NASA's Network Operations and Engineering*

- **Honeywell Technology Solutions**—Unparalleled experience base in both ground and space network operations, maintenance, and sustainment.
- **General Dynamics**—Expert experience in geosynchronous spacecraft operations.

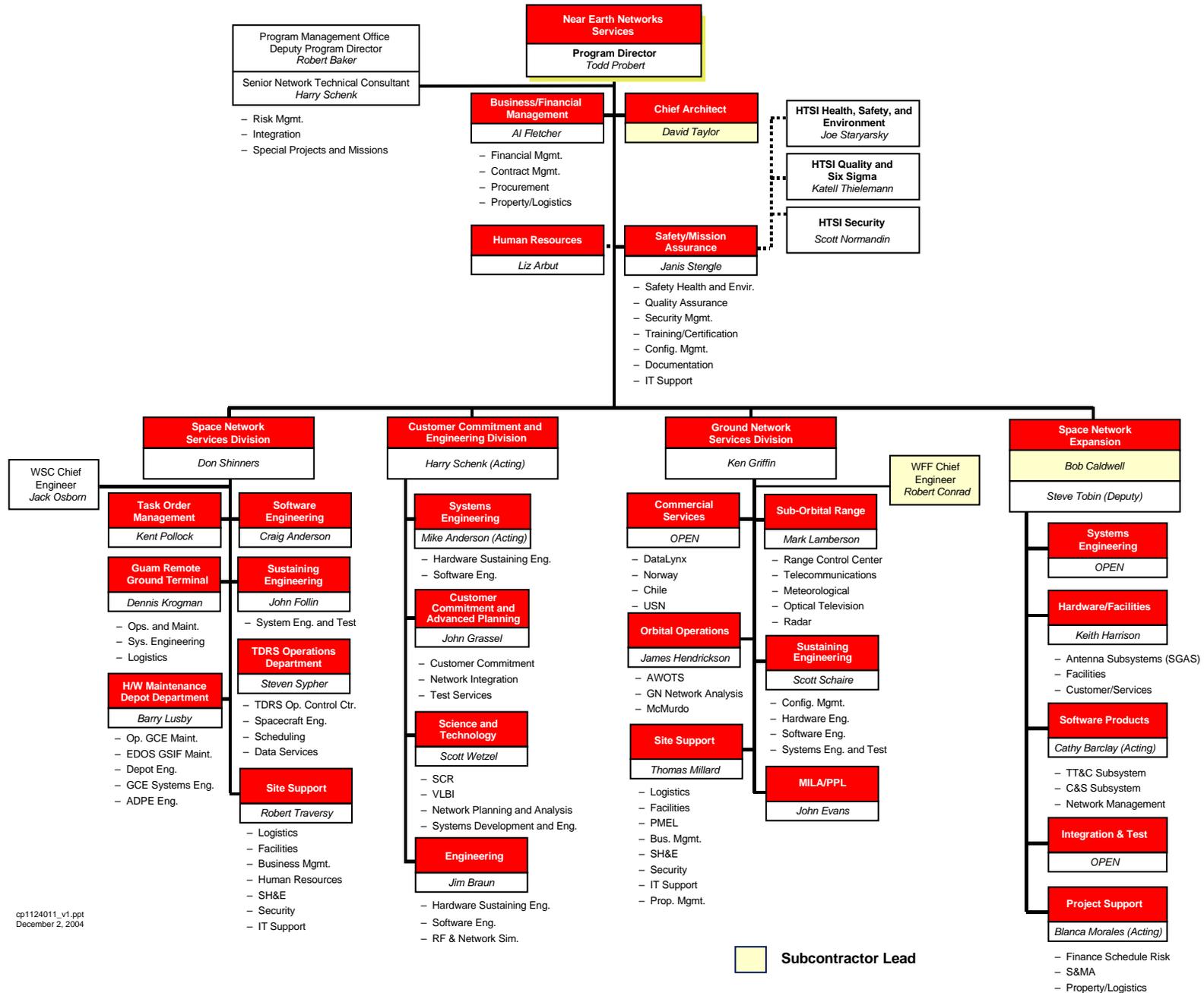
#### *World Class Systems Engineering and Architecture Development*

- **Booz Allen Hamilton**—Recognized industry leader in space architecture development, risk management, and cost benefit analysis.
- **Boeing**—Extensive experience in the development and integration of large and complex systems (Tracking and Data Relay Satellite [TDRS] H/I/J, Geostationary Operational Environmental Satellite [GOES], Iridium, Global Positioning System [GPS])

#### *Innovative Small Businesses*

- **LJT**—Launch range technology and architecture development.
- **The Hammers Company**—Test and monitor and control software solutions.
- **Universal Space Network**—Commercial satellite data services.
- **Caelum Research Corp**—Ground Network (GN) operation, training, and compatibility test environments.
- **SGT**—Documentation and logistics.

# NENS Organization





# Space Communications Customer Forum



## Business Management & Program Support

- **Business Management**
  - Finance, Contracts, Sub-Contracts Management.
- **Quality Assurance and Configuration Management**
  - Contract requirement to be ISO certified within 18 months; on target to beat deadline with certification audit scheduled for August 2004.
- **Health Safety and Environment**
  - Centralized Safety leadership with safety representatives at each remote site to ensure safety focus and compliance.
- **Information Technology and Physical Security**
  - Centralized IT Security Office with site-specific security plans.
  - Physical security related to access, clearances, etc., provided by Security Office.
  - Contract-specific special security concerns.
- **Centralized Helpdesk Support**
- **Property Management and Logistics Support**
- **Contract Specific Training Support**



# Space Network Technical Overview



**TRW TDRS 1-7**

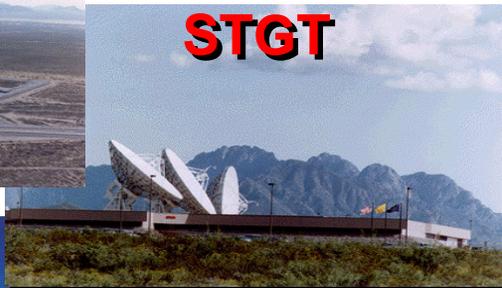
*\* TDRS 2 Lost in Challenger Disaster*



**Boeing TDRS 8-10**



**WSGT**



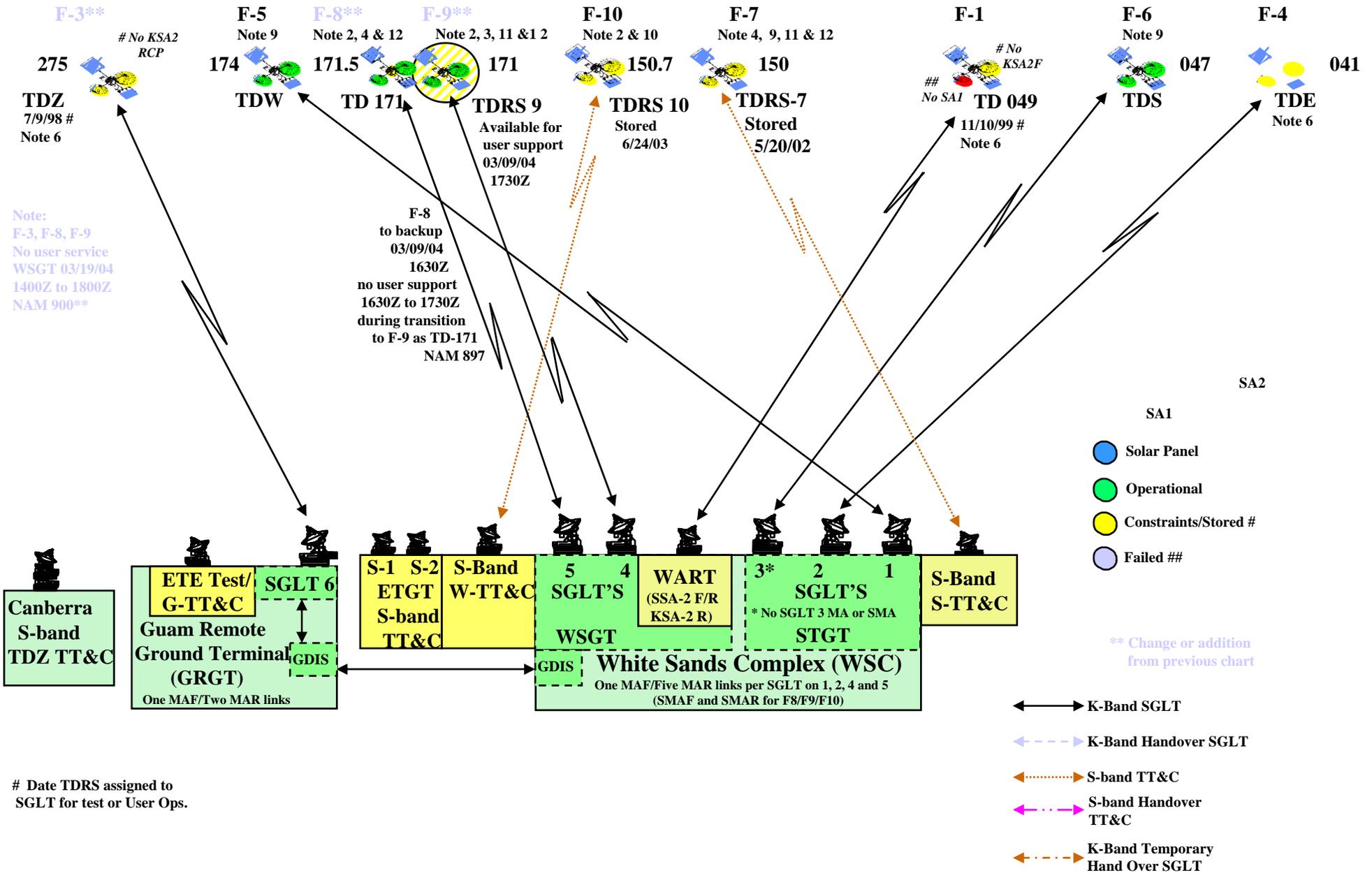
**STGT**



**GRGT**

- Honeywell has been the Lead O&M Contractor for the White Sands Complex since 1992
- SN Architecture
  - Nine On-Orbit NASA Tracking and Data Relay Satellites
  - Two Satellite Ground Stations in Las Cruces, co-located with the NASA White Sands Test Facility
  - One ground station located on the island of Guam
- SN Responsibilities
  - Customer scheduling and Network resource planning
  - Satellite Operations
  - Hardware and Computer Maintenance
  - Sustaining Engineering
  - Facilities and Security
- Total WSC population
  - Contractors..... ~ 300
  - NASA ..... 4

# Space Network Technical Overview (cont)



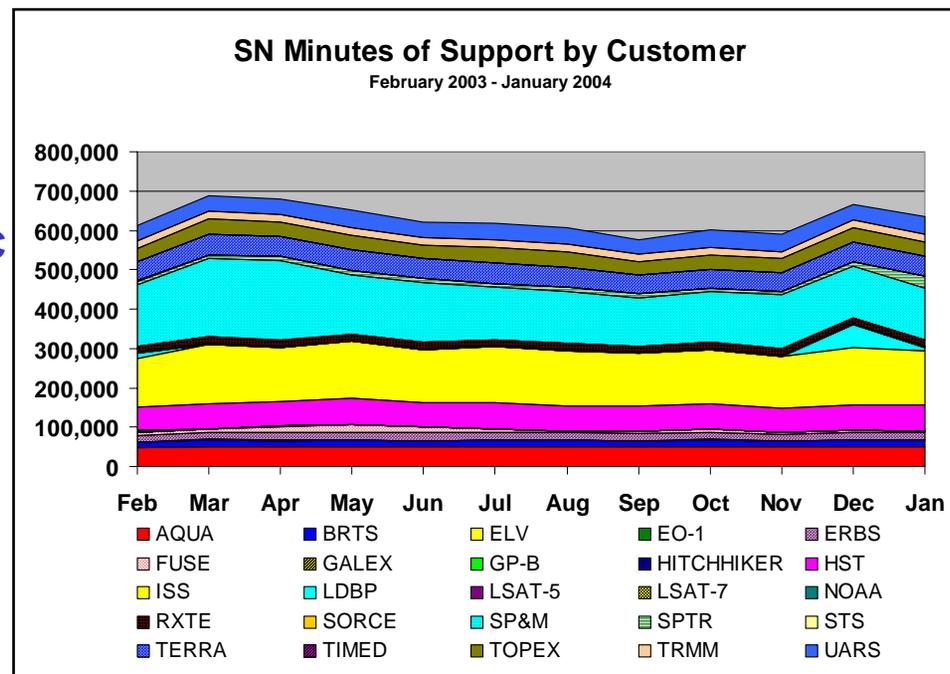


# Space Communications Customer Forum



## Space Network Customers

- Customer Expectations
- System Availability: Minimum Expectation = 97.00%  
Standard Excellence = 98.00%
- Operations Proficiency: Minimum Expectation = 99.90%  
Standard of Excellence = 99.97%
- Customers
- Primary Communications for:
  - Space Shuttle (STS)
  - International Space Station (ISS)
  - Hubble Space Telescope (HST)
  - Earth Observing System (EOS) Multiple S/C
  - Multiple Other NASA S/C Users
  - South Pole TDRS Relay Station (SPTR)
- Critical Short Duration Support for:
  - Launch and Early Orbit Operations
  - S/C Anomaly Operations
  - Expendable Launch Vehicles
  - Balloon Operations





# Ground Network Technical Overview



- GN Architecture
  - Orbital TT&C Ground Network
    - **NASA Owned/NENS Operated**
      - **Wallops Island, Virginia**
      - **McMurdo, Antarctica**
      - **MILA**
    - **Commercial Outsourced**
      - **Fairbanks, Alaska (DataLynx)**
      - **Svalbard, Norway**
      - **Santiago, Chile**
      - **Universal Space Network (Multiple sites)**
  - Wallops Launch Range Network
    - **Telemetry (Fixed and Mobile)**
    - **Radars (Fixed and Mobile)**
    - **Weather (Fixed and Mobile)**
    - **Mission Control (Fixed and Mobile)**
  - Merritt Island Launch Annex - MILA (KSC)
- GN Primary Responsibilities
  - **TT&C Support to Orbital S/C Missions**
  - **Launch Voice and TT&C Support to STS**
  - **Command and Telemetry Support to WFF Launch Operations**

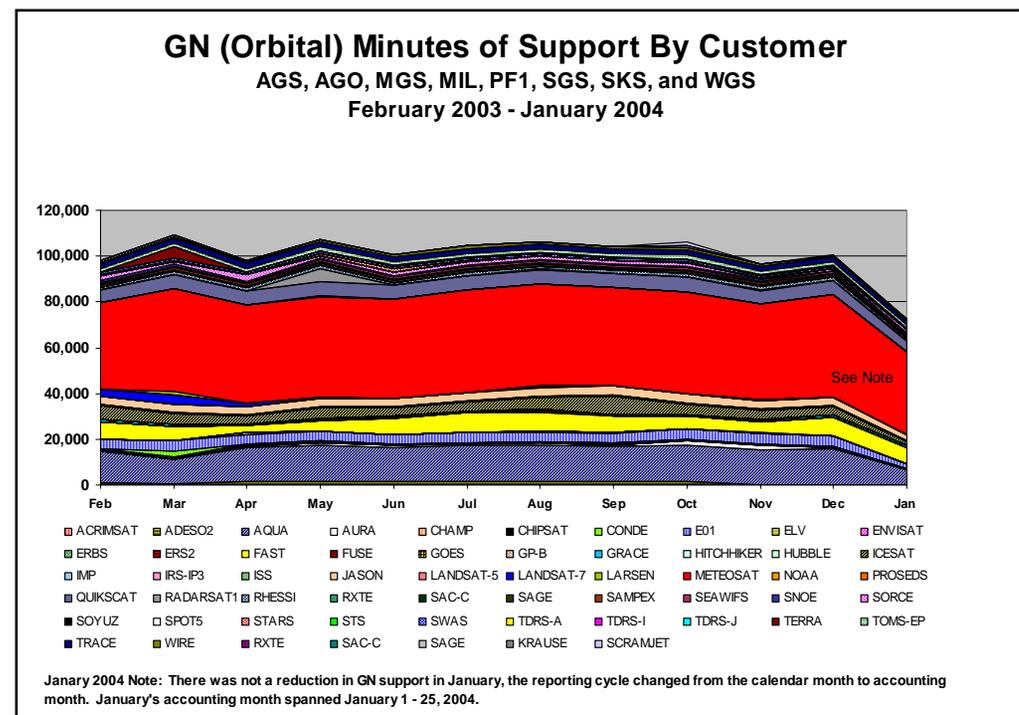


# Space Communications Customer Forum



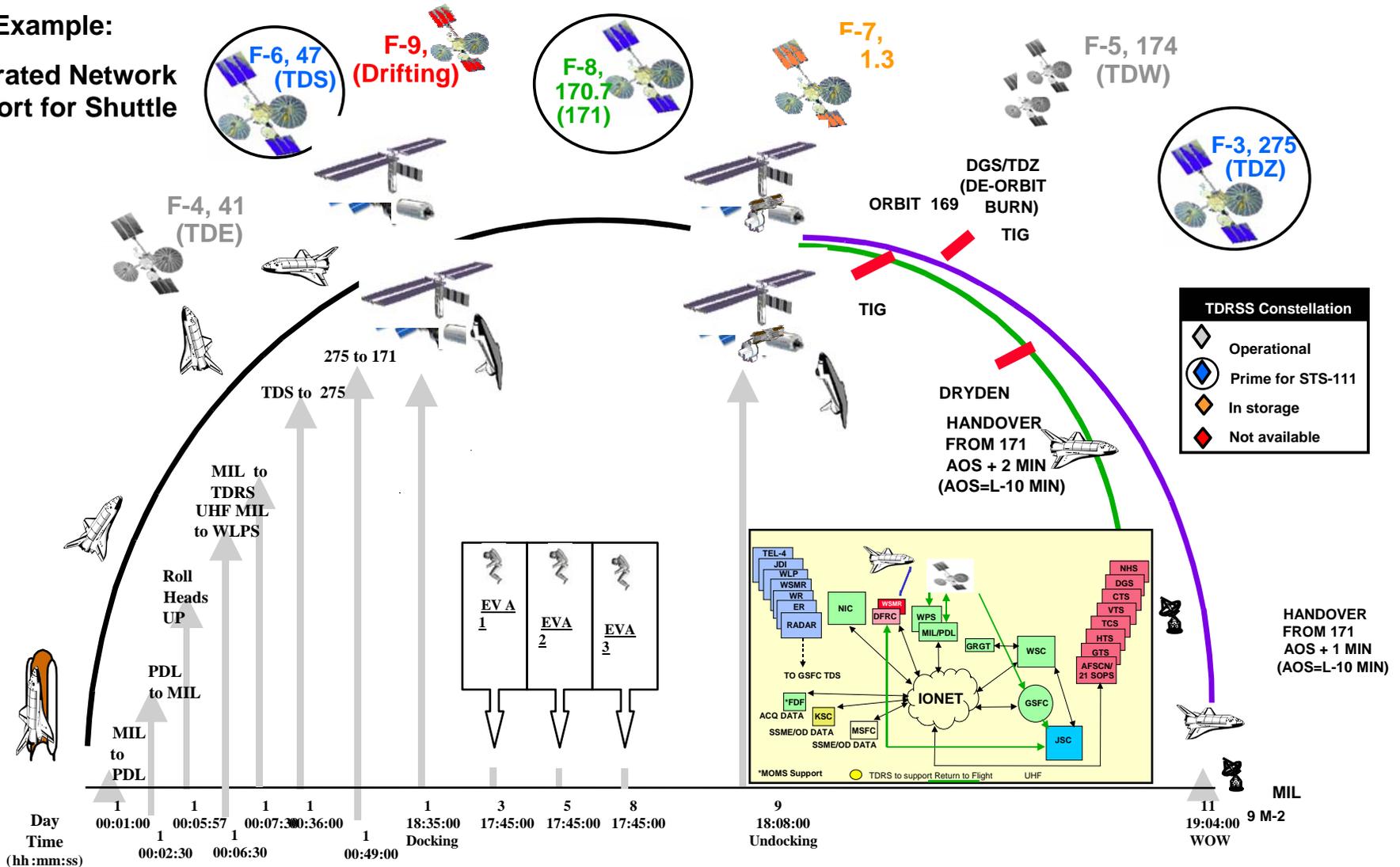
## Ground Network Customers

- Customer Expectations
- Operations Proficiency: Minimum Expectation = 99.10%  
Standard of Excellence = 99.50%
- EPGSS Proficiency: Minimum Expectation = 99.10%  
Standard of Excellence = 99.50%
- Critical Support Proficiency and System Availability : TBD following a minimum 6-month evaluation period
- Customers
- Primary Customers
  - GN Orbital
    - NASA Users (Currently - 41 S/C)
    - Expendable Launch Vehicles
  - GN Sub-Orbital
    - Sub-Orbital Launches
    - Expendable Launch Vehicles
    - Navy Test and Deployment Exercises
    - Airport Operations
    - Balloon Projects
    - Remote Deployments
- High Profile Operations
  - Shuttle Support
    - Launch Assent TT&C/Voice
    - Shuttle/External Tank TV
  - VHF Russian Launch Support



# NENS Customer Commitment Activities

Example:  
Integrated Network  
Support for Shuttle



- Advance Planning capability “markets” SN and GN services to NASA, other agencies, and commercial customers.
- Experienced personnel generate customer requirements and service level agreements.
- Comprehensive project management and test processes support integration of customers and networks.
- The success of critical customer and network operations is ensured using a team of expert personnel at the Network Integration Center and other test resources.



# NENS Engineering Activities

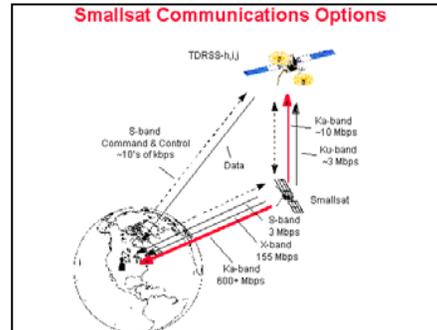


Refined systems engineering and development methodologies for space communications systems with over 43 years of experience in engineering support to NASA

## Second Guam Antenna System

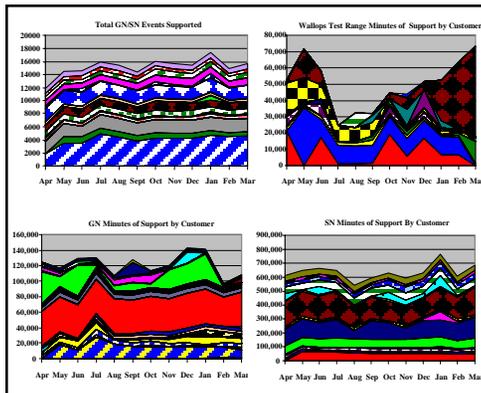


Expanding NASA's antenna assets in remote locations such as Guam



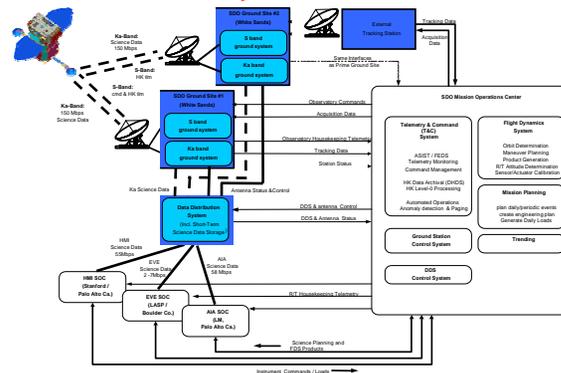
Developing low weight, low cost, high bandwidth transmitters for NASA

## SN, GN, and Range Utilization Statistics



Modeling NASA customer base to ensure adequate capacity exists to maintain customer satisfaction

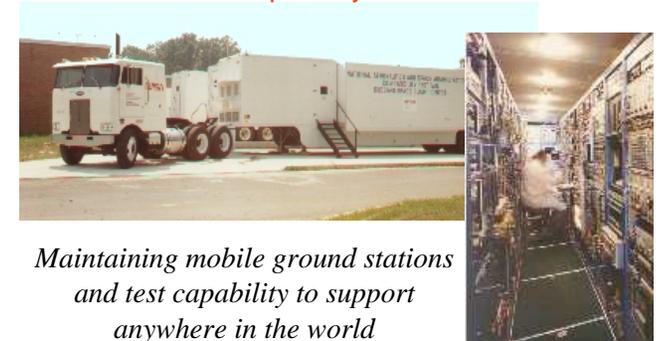
## Solar Dynamics Observatory Ground System Architecture



Designing entire ground stations with cutting edge frequencies, and sustained data rates

Capability	Implementation
Systems Engineering	<ul style="list-style-type: none"> <li>Integrated systems and sustaining engineering approaches.</li> <li>Full life cycle systems engineering services.</li> </ul>
Development	<ul style="list-style-type: none"> <li>Integrate sustaining engineering into design.</li> </ul>
Sustaining Engineering	<ul style="list-style-type: none"> <li>Evaluate the need and impact of system changes.</li> <li>Identify and evaluate risks to services and operations.</li> <li>Tied to Chief Architect function.</li> <li>Promotes active NASA and customer involvement.</li> <li>Proactive identification of obsolescence issues.</li> </ul>
Operations Engineering Methodology	<ul style="list-style-type: none"> <li>Apply best practices across all operations.</li> <li>Apply collaboration/knowledge sharing tools via HIIMS.</li> <li>Involve operations early in development.</li> <li>Continuous improvement.</li> </ul>

## Compatibility Test Van



Maintaining mobile ground stations and test capability to support anywhere in the world



# NENS Achievements



## Achievements from first award fee period include:

### Phase-in:

- **Met aggressive phase-in deadlines through the diligent execution of our phase-in plan.**
- **Established a fully integrated NENS team with key positions and required skills to support the transition and operational objectives of the contract.**
- **Successfully captured 95% of incumbent personnel, and filled over 99% of critical positions prior to 12/25. More than 700 personnel in total signed offer letters committing to NENS support.**
- **Transitioned SP&M without impact in spite of losing 5 of the 9 GSFC-based people; all SP&M customers were adequately supported throughout the transition and 1<sup>st</sup> quarter of 04.**
- **Successfully completed the Task Order (TO) submittal and approval cycle for all key TOs in preparation for phase-in.**
- **Transitioned successfully and seamlessly from the Consolidated Space Operations Contract (CSOC) to the new contract structure under NENS with no impact to ongoing operations.**
- Performance:
  - **Established PM processes, infrastructure, and financial tools to enable visibility into the management and operations data needed to ensure adequate customer insight.**
  - **Assessed our performance and risk areas, and applied consistent corrective actions to items of concern before they develop into problems.**
  - **Exceeded the Standard of Excellence (SOE) for all operations metrics.**
    - GN supported 28 on-orbit customers and ~5,400 operational passes with operations proficiency across the entire orbital GN exceeding the NENS SOE of 99.5%.
    - SN Expectation Level was raised from 99.5% to 99.90%; the SOE was raised from 99.95% to 99.97%. SN performed at Proficiency Standard of Excellence (SOE) of 99.97% for all 3 months
  - **CCE supported 5 scheduled launches; established 14 new customers.**
  - **CCE provided all contract deliverables on time, including 100% of the PSLAs by 2/04.**
  - **Negotiated commercial-provided contracts to save the Government ~\$3M.**
  - **Received 17 awards / letters of commendation from our NASA customers.**



## NENS Achievements (cont'd)



- For the first award fee period, we received the following positive customer feedback:
  - “HTSI’s phase-in management approach was very effective and . . . assured NASA that HTSI was ready to assume full technical responsibility . . . as evidenced by a technically transparent transition to full operations. This accomplishment is a credit to the entire NENS Phase-in team as well as HTSI Management.”
  - “HTSI developed an effective Task Order (TO) response process . . .”
  - “NASA benefited from management synergies resulting from HTSI being awarded both the NENS and Mission Operations and Mission Services (MOMS) contracts and recognizes the value of . . . cost savings initiatives that were not in HTSI’s NENS proposal.”
  - “NENS team performance on Safety and Security matters has been exemplary . . . HTSI is to be commended for the implementation of the deployment of Automatic External Defibrillators at NENS sites . . .”
  - “The technical performance of the NENS Team during this period was commendable, as indicated by the consistent positive responses on the Task Monitor and Performance Monitor evaluations.”
  - “The Center Deputy Director, as well as several major customers of the Space Communications Program made note of the smooth transition, which was transparent to customers and missions.”
  - “NENS . . . met or exceeded the Space Network Proficiency Standard of Excellence (SOE) of 99.97% for all three months . . .”
  - “Ground Network (GN) operations proficiency across the entire orbital GN exceeded the NENS SOE of 99.5% . . .”
  - “The electronic version of the 533 reports . . . contains useful reports and facilitates the financial management of a geographically dispersed program . . . HTSI’s business and technical managers have provided timely and thorough responses to multiple budget and cost questions; this responsiveness to customer needs is commendable.”



# Summary



## Representative NENS Architecture Interfaces

External Interface	Description
MOMS	FDF, MOCs (JSC, HST MOCC for UPS Support), SDP USTRATCOM Interface, LAN, Voice Services
UNITES	NISN and Communications Services
DSN	LEOP and Contingency Mission Support
JSC	HSF Support and Coordination, ESTL System Updates
DFRC	HSF Support
WSTF	SN Calibration
NSF	Coordination for MGS
Univ. Of Alaska	Facilities Support for Fairbanks AGS
US Navy	Facilities Support to GRGT, USNA Logistics
Air Force	LEOP and Contingency Mission Support, BRTS Maintenance (Asc. Is.), GRGT Calibration, etc.
NOAA	(AGS) GSIF coordination
USGS	L7 MOC/SDP
Archiving Facilities	DAAC, PODAAC, EDS, etc. - storage and portal for science data products
PI	Principal Investigators - identify science objectives, etc.
Foreign Agencies	CNES, ESA, NASDA, etc. - provide partnership and resource support
Launch Facilities	Eastern Launch Range, Western Launch Range, etc.
Other Contractors	Spacecraft/ELV Manufacturers, Commercial Service Providers, H/W&S/W developers, etc.

## NENS Key Challenges and Issues

### Overarching:

Achieving metric for Standard of Excellence	Shuttle Return to Flight and other critical events
Agile responsiveness for mission readiness	Quick response to technical requirements
Shorter mission integration timeline	Accommodating changes with no disruption in service
Attracting new customers	Establishing agreements with other contractors
Equipment obsolescence	Maintaining IT security compliance with dynamic requirements
Achieving commonality	Manage dynamic IDIQ workload
Budget constraints	

### Space Network:

- Aging TDRS Fleet
- TDRS ground antenna resource constraints
- Charting path for SN Evolution

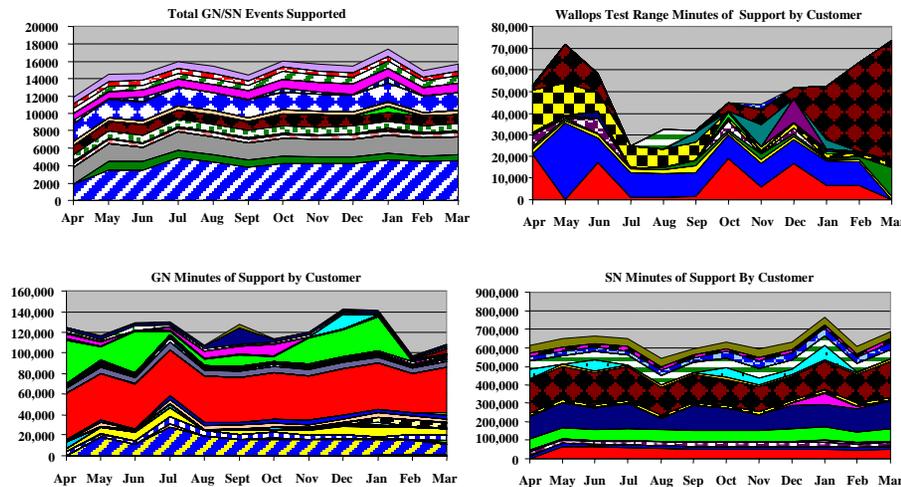
### Ground Network:

- GN robustness
- Charting path for GN Evolution
- Management of commercial assets
- Increasing diverse research range customer base

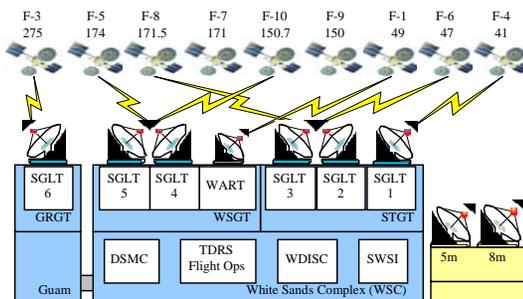
## Representative NENS Mission Customer List (Prime Support)

Mission	Code	Network	Services
CNOFS	S	SN	MA-DAS
GALEX	S	SN	SSA
HST	S	SN	SSA
LDBP	S	SN	MA
TOPEX	S	SN	SSA
Ultra-LDBP	S	SN	MA
ERBS	Y	SN	MA
Terra	Y	SN	SSA/KSA
TRMM	Y	SN	SSA
ELV Support	M	SN	SSA/MA
Hitchhiker	M	SN	SSA
SPM	N/A	SN	N/A
SPTR	N/A	SN	SSA
GLAST	S	GN/SN	S-Band/SSA
GPM	Y	GN/SN	S-Band/MA-DAS
NPP	Y	GN/SN	S-Band/SSA
TOMS-EP	Y	GN/SN	S-Band/MA
ISS	M	GN/SN	S-Band/SSA/KSA
STS	M	GN/SN	S-Band/SSA/KSA
LANDSAT-7	USGS	GN/SN	S-, X-Band/SSA
FAST	S	GN	S-Band
GP-B	S	GN	S-Band
SAMPEX	S	GN	S-Band
TRACE	S	GN	S-Band
ADEOS-II	Y	GN	X-Band
Aqua	Y	GN	S-Band/X-Band
Aura	Y	GN	S-Band/X-Band
EO-1	Y	GN	S-Band/X-Band
GRACE 1&2	Y	GN	S-Band
ICESat	Y	GN	S-Band/X-Band
Jason-1	Y	GN	S-Band
QUIKScat	Y	GN	S-Band
RHESSI	Y	GN	S-Band
SAGE-III	Y	GN	S-Band
SWAS	Y	GN	S-Band
Balloons	R	GN(Range)	S-Band
DoD Support	R	GN(Range)	S-Band
ELV Support	R	GN(Range)	S-Band
Sounding Rockets	R	GN(Range)	S-Band
UAVs	R	GN(Range)	S-Band

## SN, GN, and Range Utilization Statistics (Apr 2002 to Mar 2003)

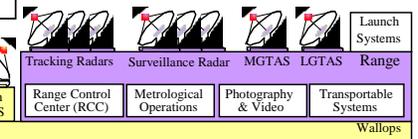


## Worldwide Locations of Major NENS Architecture Assets



01096155

NISN





# Space Communications Customer Forum



## Earth Science Missions

**Ed J. Macie**  
**Earth Science Missions Operations**  
**Code 428**  
**NASA/Goddard Space Flight Center**



# Space Communications Customer Forum



## Space Science Missions

**Leslie L. Ambrose**  
**Customer Commitment Office**  
**Code 451**  
**NASA/Goddard Space Flight Center**



# Space Communications Customer Forum



## Space Science Mission Operations Project (Code 444)

**Ron Mahmot**  
Project Manager

**Patrick Crouse**  
Deputy Project Manager

**Valda Jones**  
Mission Business Manager

**Joseph Fainberg**  
Senior Project Scientist

**December 9, 2004**



# Space Communications Customer Forum



## AGENDA

- Organization overview
- Mission Set
- Highlights/Upcoming Missions



# Space Communications Customer Forum



## Space Science Mission Operations Project Organization Overview

### 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

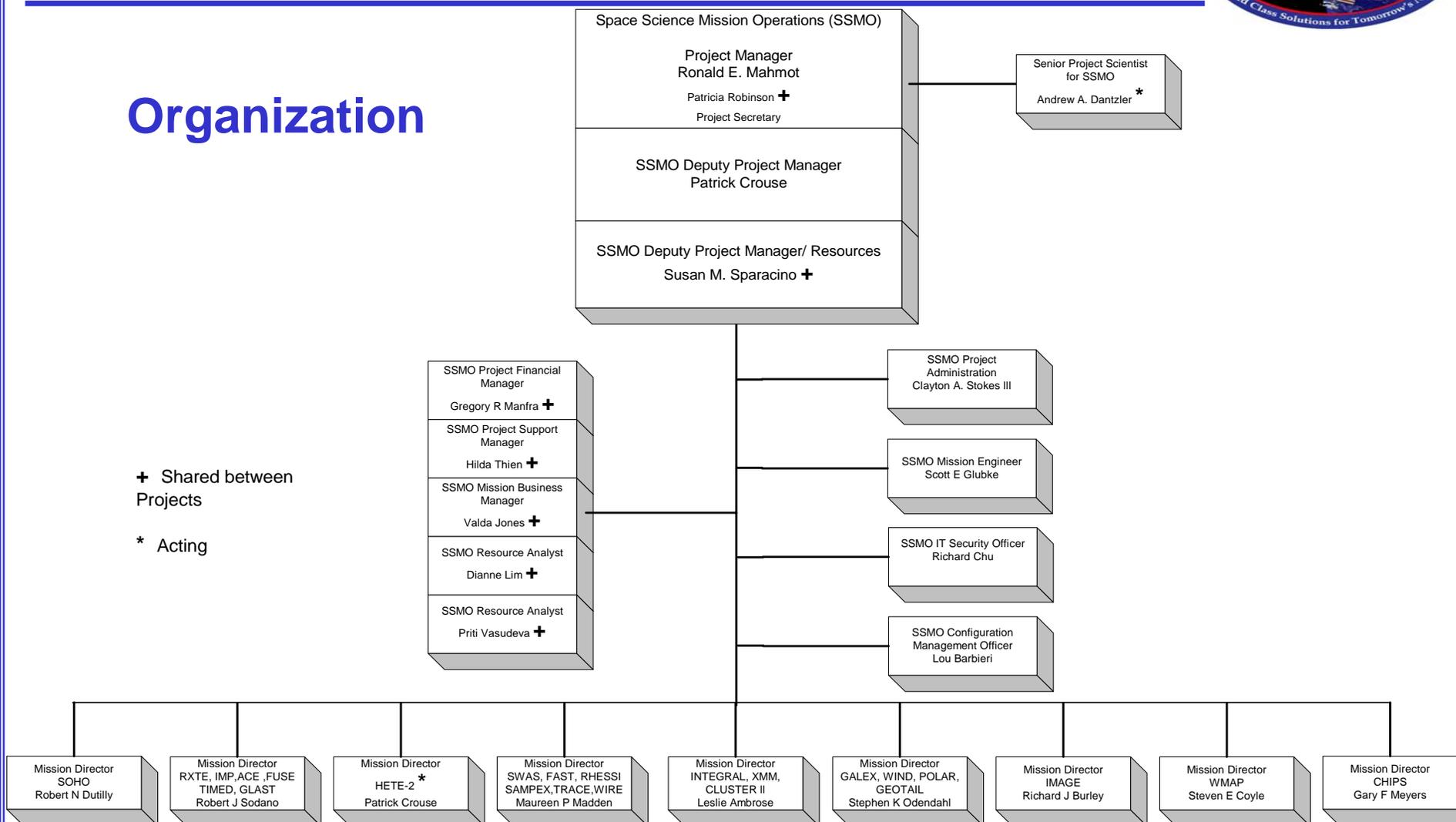
- Mission safety is the number one priority
- Goal is to maximize science data collection within budget and risk constraints



# Space Communications Customer Forum



## Organization



Original signed by

August 7 2003

Ronald E Mahmot, Space Science Mission Operations Project Manager

Date



# Space Communications Customer Forum



MISSION SET PARAMETERS

SPACECRAFT	LAUNCH DATE	BASE/ EXTENDED MISSION	EARLIST REENTRY	Reentry Analysis Completion Date	Would uncontrolled reentry result in greater than <sup>1</sup> in 10,000?	NUMBER OF INSTRUMENTS	NUMBER OF INSTRUMENTS OPERATING	ORBIT
Yohkoh	8/31/1991	Dec-01	Mar-05	Dec-03	TBS	4	0	570 x 730 km @ ?
ROSAT	6/1/1990	Feb-99	Mar-06	Dec-03	TBS	2	0	539 x 554 km @ 53°
WIRE	3/5/1999	Mar. 99	Oct-07	Dec-03	No (5.8 m <sup>2</sup> )	1	0	540 km @ 97°
SAMPEX	7/3/1992	Sept. 95	Jul-09	Dec-03	No (1.4 m <sup>2</sup> )	4	4	550 x 675 km @ 82°
CLUSTER II	7/00 & 8/00	Feb. 01 & Dec. 05	2009/2010	Dec-03	TBD	4 (US)	4 (US)	3 Re x 18.5 Re Orbit @ 90°
RXTE	12/30/1995	Mar. 97	Sep-10	Dec-03	Yes (44.1)	3	3	565 x 583 km @ 23°
CHIPS	1/12/2003	Oct. 03	Nov-10	Dec-03	No (6.1 m <sup>2</sup> )	1	1	600 km @ 94° inclination
RHESSI	1/24/2002	Mar. 04	Apr-11	Dec-03	Yes (18.2)	1	1	600 km @ 38° inclination
TRACE	4/2/1998	Jun. 00	Jul-18	Dec-03	No (6.7 m <sup>2</sup> )	1	1	600 x 650 km @ 97°
TIMED	12/7/2002	Jan. 04	Oct-24	Dec-03	Yes (9.2)	4	4	625 km @ 74.1°
COBE	11/19/1989	N/A	Jul-29	Dec-03	TBS	3	0	874 km @ 99°
FAST	8/21/1996	Oct. 99	Jul-29	Dec-03	No (1.2)	5	5	4150 x 348 km @ 83°
SWAS	12/2/1998	Feb. 00	Jul-29	Dec-03	No (?)	1	1	600 km @ 70° inclination
FUSE	6/24/1999	Mar. 07	Jul-29	Dec-03	No	1	1	775 km @ 25°
HETE-2	10/10/2000	Sept. 03	Jul-29	Dec-03	No (<1 m <sup>2</sup> )	3	3	625 km equatorial orbit
XMM	6/30/2001	?	Jul-29	TBD	TBS	2	2	7000 x 1114000 km @ 40°
GALEX	4/28/2003	Sep. 05	Jul-29	Dec-03	TBS	1	1	690 km equatorial orbit
Geotail	7/24/1992	Sep. 06	Centuries	Dec-03	N/A	7	6.5	8 x 210 Re equatorial
WIND	11/1/1994	Sep. 07	Centuries	Aug-03	N/A	8	7.4	L1 Orbit
POLAR	2/24/1996	Sep. 05	Centuries	Dec-03	N/A	12	10	2 x 9 Re @ 86°
IMAGE	3/25/2000	Sept. 03	Centuries	Dec-03	N/A	6	6	1000 x 45922 km @ 90°
SOHO	12/2/1995	Jan. 99	Never	Aug-03	N/A	12	12	L1 Orbit
ACE	8/25/1997	Sept. 07	Never	Dec-03	N/A	9	8.5	L1 Orbit
WMAP	6/30/2001	Aug. 05	Never	Dec-03	N/A	1	1	L2 Orbit
INTEGRAL	10/17/2002	Oct. 07	?	?	TBS	4	4	9000 x 155000 @ 51.6°

as of 6/8/2004



# Space Communications Customer Forum



## Current Mission Set Guidance

- FY04 Astrophysics Senior Review Results**

<b>SSMO Missions in rank order</b>	<b>Extended through</b>	<b>Proposed funding level accepted?</b>
GALEX	FY08	Yes
FUSE	FY06	Yes
WMAP	FY06	Yes
RXTE	FY06	Reduced funding in FY06
CHIPS	April FY06	Yes
HETE	FY05	Yes

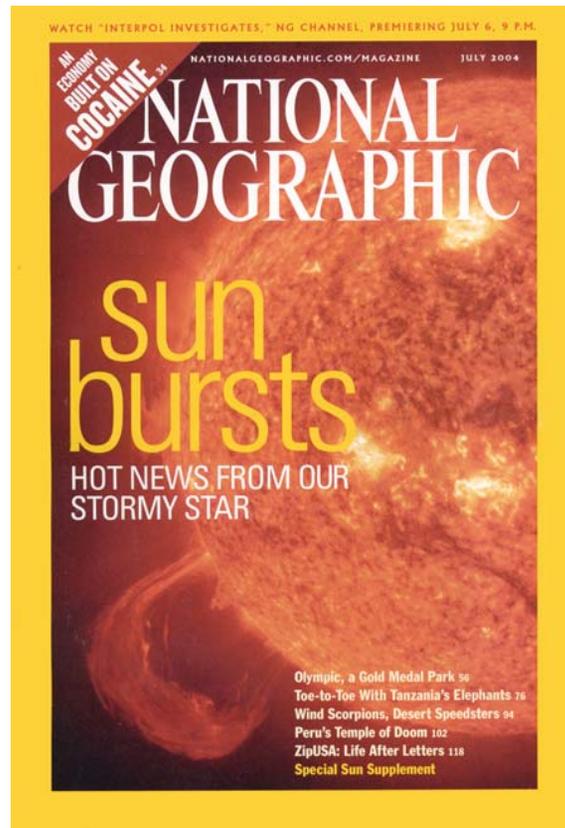


# Space Communications Customer Forum



## Highlights

- Pictures from SOHO and TRACE were prominent in the July issue of National Geographic
  - Featured article: “Sun bursts, Hot News from our Stormy Star”



A fountain of superheated gas called a prominence extends 200,000 miles from the sun

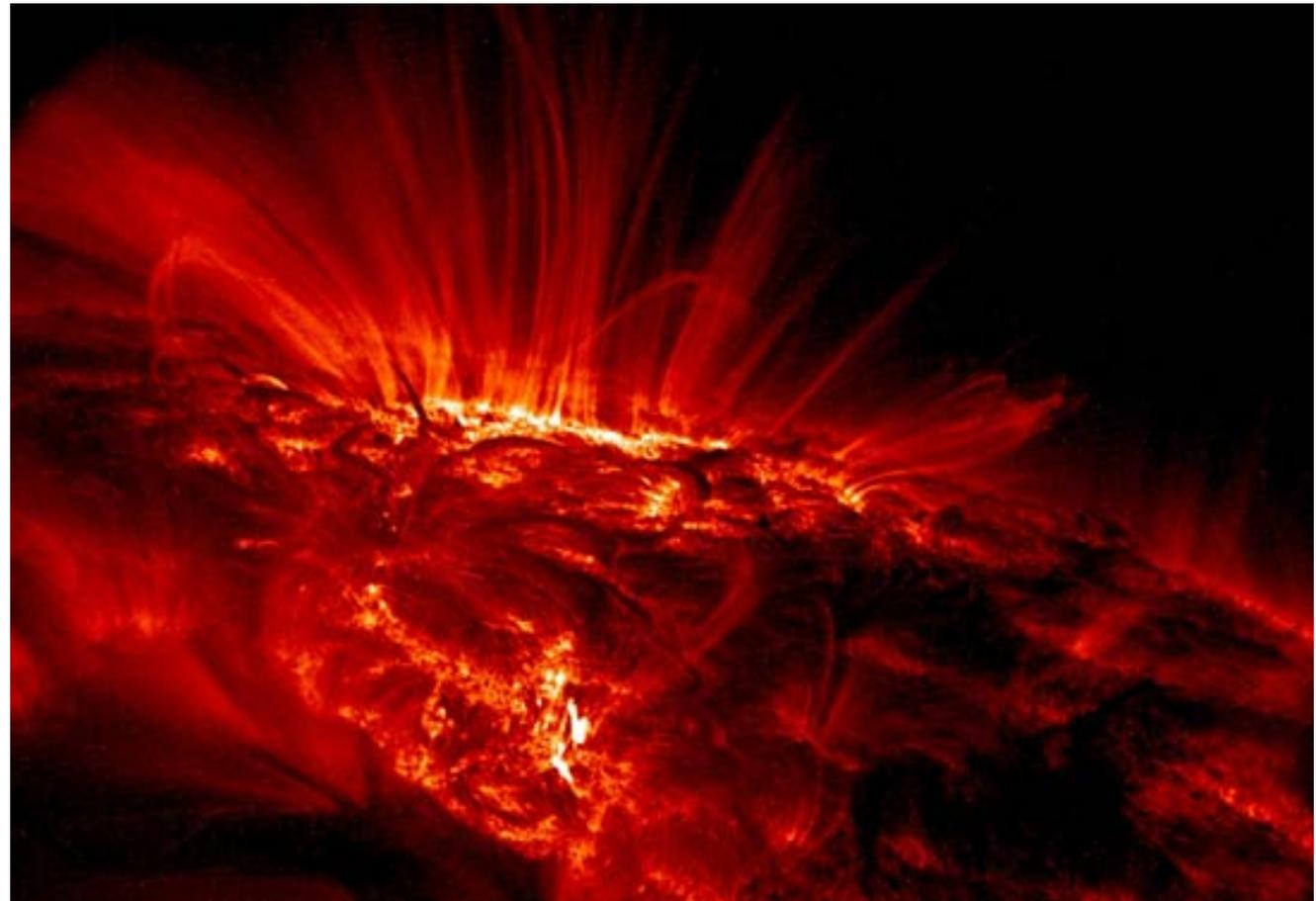
By SOHO/EIT ESA/NASA



## Highlights

### National Geographic July 2004

**Star of Wonder**  
Image by TRACE, NASA



It may look wild, but this image of the solar surface, captured by a NASA satellite called TRACE on September 18, 2000, was described by scientists as "a quiet day on the sun." In other words, spectacular loops but no flares or CMEs. Even as satellites like TRACE and SOHO have brought new understanding of solar dynamics, the sun holds on to many secrets. Our stormy star is, in the words of one solar physicist: "Complicated, mysterious, and beautiful."



# Space Communications Customer Forum



## Upcoming Space Science Missions

- **Long Duration Balloon Project/Ultra Long Duration Balloon Project (LDBP/ULDBP) (Managed by the Balloon Program Office at WPS)**
  - Payloads for the LDBP BESS and the ULDBP CREAM were shipped to Antarctica in Mid-November. On-site testing with the SN has been successful and both missions were declared flight ready. Launch of one of the balloons could be as early as today with a launch attempt of BESS currently planned for 2:00 am Eastern. Due to the possibility of RF interference between CREAM and BESS, the Balloon Program is evaluating delaying the launch of the second balloon by several days.
  - The balloon projects will receive nearly continuous MA return legacy service with commanding through the MA forward
- **The Communication/Navigation Outage Forecasting System (C/NOFS) Program (Managed by the Living With a Star Program at GSFC)**
  - Cooperative effort between NASA Code S and AFRL and SMC/Det 12. The primary objective of C/NOFS is to develop the capability to forecast the onset of equatorial ionospheric irregularities causing scintillations that degrade the performance of communication, navigation, and surveillance systems that rely on Trans-ionospheric radio wave propagation. The C/NOFS payload will investigate the onset of equatorial spread F (ESF) through various in situ and remote sensing techniques from a satellite platform as well as use ground-based scintillation receivers.
  - C/NOFS will utilize the “DAS ALL” MA return service on a 24/7 basis at 20 kbps to receive science data in real-time.
  - Launch is currently scheduled for May 22, 2005



# Space Communications Customer Forum



## Highlights/Upcoming Space Missions

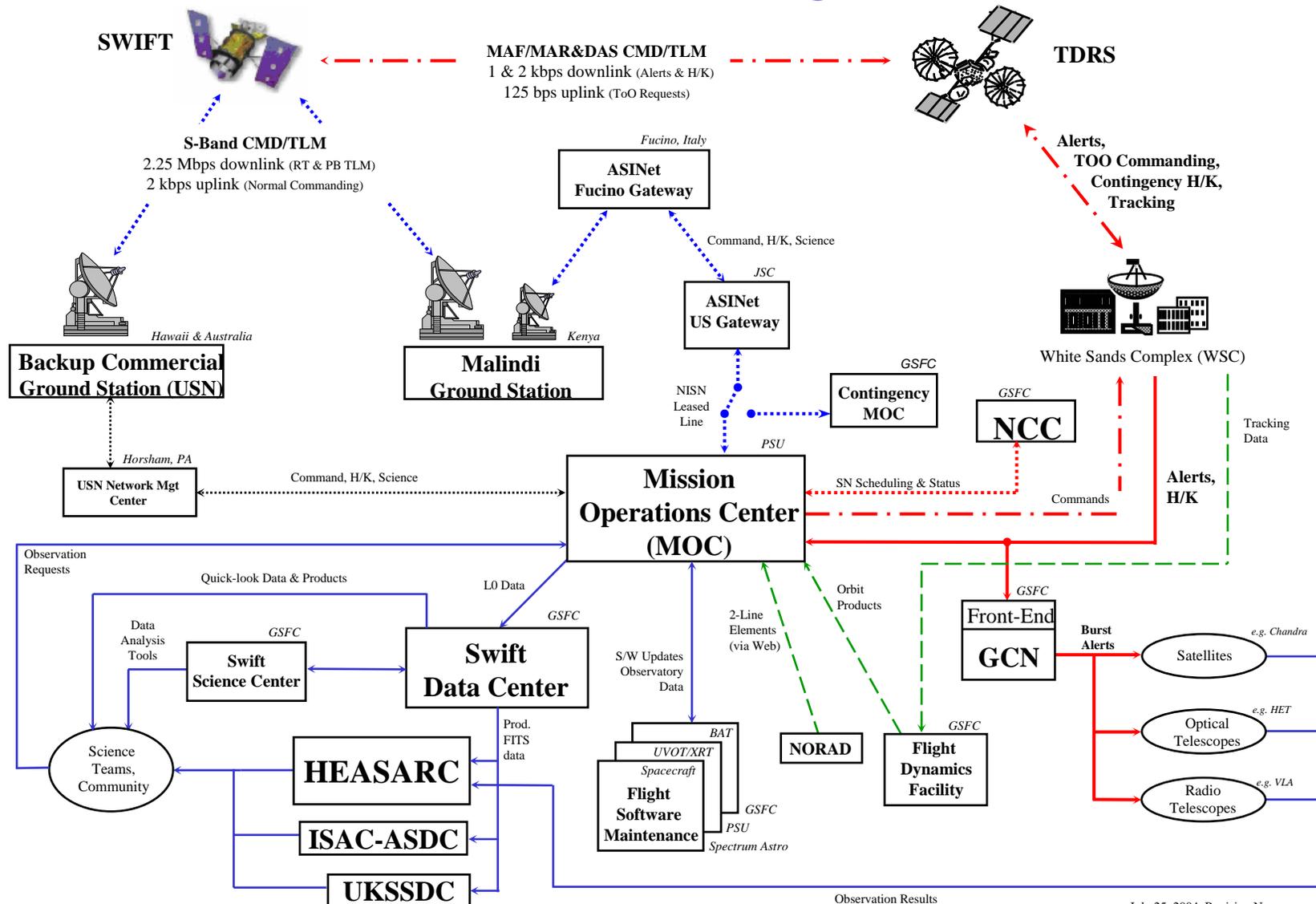
- **Swift**
  - **Swift launched on a Delta from Kennedy at 1716Z on Saturday November 20th. Separation from the second stage was nominal at L+80 minutes. TDRS acquired the spacecraft within minutes after separation.**
  - **Swift is a Medium-class Explorers (MIDEX) mission that will greatly expand our knowledge of Gamma-Ray Bursts (GRBs), their origin and characteristics. The main mission objectives for Swift are to:**
    - **Determine the origin of gamma-ray bursts.**
    - **Classify gamma-ray bursts and search for new types.**
    - **Determine how the blast-wave evolves and interacts with the surroundings.**
    - **Use gamma-ray bursts to study the early universe.**
    - **Perform the first sensitive hard X-ray survey of the sky.**
  - **The Space Network is required to provide 125 and 1000 bps Command data, 1.0 and 2.0 kbps Telemetry data, and Tracking data services for S-band link. This encompasses launch and orbit operations.**
    - **Continuous MA support through DAS to relay Gamma-Ray Burst alerts**
      - **2 kbps support commitment was added to lessen 1 kbps long acquisition time issue**
      - **Additional 4 and 8 kbps data rates will be supported on a best effort basis**
    - **Legacy MAF/MAR support via WDISC during LEOP**
      - **Launch + 7 days**
    - **2 Legacy MAF/MAR passes via WDISC per week (10 mins each average) during normal operations phase**



# Space Communications Customer Forum



## Swift End-to-End Configuration



July 25, 2004, Revision N



## Space Communications Customer Forum



### Swift/SN Issues Since Launch

- **Swift is the first Operational Customer on the DAS System**
- **WSC and GSFC personnel are working closely with the Swift FOT to resolve the discrepancies as quickly as possible**
- **The two most significant discrepancies that are being worked are:**
  - **The DAS East Leg is currently RED**
    - **During a East support that engineering was monitoring, the IF was observed to bounce and then fail completely.**
  - **Loss of Service During TDRS West to East transitions**
  - **DAS hand-over transitions are not consistent from TDRS-West to TDRS-East for Swift support precluding telemetry data from TDRS-East from being transmitted to the MOC**
  - **NAM# 1065 was issued on 11/24/04 to provide temporary scheduling work-around for each occurrence to minimize data loss.**
  - **The DAS team is investigating the problem and possible solutions.**



# Space Communications Customer Forum



## Human Space Flight Missions

**Melvin K. Calhoun**  
**Honeywell Technology Solutions, Inc.**  
**NENS**



# Space Communications Customer Forum



## Agenda

- **HSF Integrated Network Return to Flight (RTF) Status**
- **ISS Status**



## Space Communications Customer Forum



### HSF Integrated Network RTF Status

- **Launch window is currently May 12 through June 3, 2005.**
- **RTF Test Plan is being revised to include new requirements for ET TV, WSSH UHF, and Guam TV.**
- **RTF Mid-point review scheduled for January 11, 2005 at GSFC**
  - **Purpose of the RTF is to ensure each Integrated Network site/element is in compliance and agreement with all requirements, and to assess their overall mission support readiness.**
  - **Elements will present the progress of the Integrated Network's revalidation for Return to Flight.**



## Space Communications Customer Forum



### HSF Integrated Network RTF Status (cont'd)

- **Testing**

- Integrated Network Launch Simulation performed in October 2004, included all mission phases (pre-launch, launch, on-orbit, and landing).
- Space Network Operational Readiness Tests (ORT) are performed once a month and planned for twice a month starting January 2005.
- Vector Proficiency and Vector Verification simulations are performed once a month.
- Shuttle Training Aircraft (STA) Runs
  - STA runs were performed with MILA/PDL in August 2004 and with DFRC in September 2004. Runs are planned with MILA /PDL again in January 2005 and with DFRC in February 2005. The Wallops run (1-day) is projected for either January 18 or 31, February 22 or 25, 2005.



## Space Communications Customer Forum



### HSF Integrated Network RTF Status (cont'd)

- **Testing (cont'd)**
  - **Portable Spacecraft Simulator (PSS) Testing**
    - PSS testing was performed with MILA/PDL in August 2004, DFRC in September 2004, and Wallops in October 2004. Testing is also planned with Wallops and MILA/PDL in December 2004, MILA /PDL in January 2005, and DFRC in February 2005.
  - **JSC Long Duration Simulation is planned for February 28, 2005. This is a 7- day simulation, however, GSFC is only requested to support for two days.**
    - This is a High Profile simulation with the Integrated Network; including the JSC Flight Directors (FD) and the KSC NASA Test Directors (NTD).



## Space Communications Customer Forum



### HSF Integrated Network RTF Status (cont'd)

- **Network Upgrades**
  - **ET TV Status (Implementation planned for March 2005)**
    - Video equipment to the Merritt Island Launch Annex (MILA), Ponce De Leon (PDL), and the Jonathon Dickinson Missile Tracking Arrangement (JDMTA) will be installed during the week of December 6, 2005.
    - Launch minus 30 day End-to-End testing (a 5202 VAL test) with JSC and KSC will be performed.
  - **WSSH UHF A/G pad was installed on December 6, 2004. The tower installation will be completed by the end of December, 2004. The antenna delivery is expected mid-January 2005. The ORR is planned for March 2005.**



## Space Communications Customer Forum



### HSF Integrated Network RTF Status (cont'd)

- **Network Upgrades (cont'd)**
  - **GUAM TV:** TV data will be sent from an encoder at GUAM as a digitized signal to the decoders at the WSGT. The TV data will then be decoded and the analog TV signal transmitted across the satellite link to the JSC. Implementation is scheduled to be completed by January 31, 2005.
  - **Remote Tracking Stations (RTS)**
    - **Control Operations** moved from the Onizuka Air Station (OAS) to the Schriever Air Force Base (SAFB).
    - **Conducting Launch simulations** with SAFB.
    - **Data flows** from the RTS to the Network Integration Center (NIC) are being conducted.



# Space Communications Customer Forum



## International Space Station

- **VHF**
  - Installed the Modular Receiver Transmitters (MRT) at Wallops, DFRC, and WSC in both VHF-1 and VHF-2 equipment chains.
  - Tested VHF-2 link with the ISS crew.
- **Visiting Vehicles**
  - Automated Transfer Vehicle (ATV)
    - Participated in SVT4a and 4b testing with MCC-H and ATV-CC.
  - H-II Transfer Vehicle (HTV)
    - TDRSS Compatibility Transponder Testing is scheduled for no earlier than March 2005.



## Space Communications Customer Forum



### International Space Station (cont'd)

- **ISS Downlink Enhancement Architecture (IDEA) Phase II**
  - Will increase the capacity for the ISS from the current 50 Mbps data rate to a 150 Mbps data rate.
  - Installation at WSC completed on November 4, 2005.
  - The Marshall Space Flight Center (MSFC) Team will return to WSC in January 2005 to perform the remaining Functionally Distributed Processor (FDP) FEP card upgrades and to connect an additional network cable on the other FDP's needed to support the remote imaging procedure.
  - Testing is in progress between the MSFC and the White Sands Complex (WSC).
  - Planned for Operations in mid-June 2005.



# Space Communications Customer Forum



<p><b>Goddard Space Flight Center</b></p> <p>APPVL RESP <u>Jim Bangerter</u></p> <p>ACCOMP RESP <u>Wm. Bruce Schneck</u></p>	<p><b>GSFC Return to Flight Activity Milestone</b></p> <p><b>Level-II</b></p> <p>Page 1 of 1</p>	<p>Last Sched Change: <u>12/3/04</u></p> <p>Status as of: <u>12/3/04</u></p>
<b>Integrated Networks RTF Test Plan</b>	<p>2004</p> <p>J F M A M J J A S O N D</p>	<p>2005</p> <p>J F M A M J J A S O N D</p>
● Mission Planning Meetings/Telecons	[Gantt bar from Jan 2004 to Feb 2005]	
● Mission Documentation	[Gantt bar from Jan 2004 to Feb 2005]	
● Integrated Network Testing	[Gantt bar from Jan 2004 to Feb 2005]	
– ET TV	[Gantt bar from July 2004 to Dec 2004]	
– GN Testing (MILA/PDL/WLPS/DFRC/WSSH)	[Gantt bar from Jan 2004 to Feb 2005]	
– Space Network	[Gantt bar from Jan 2004 to Feb 2005]	
– DoD Radars	[Gantt bar from Jan 2004 to Feb 2005]	
– NASA Radars	[Gantt bar from Jan 2004 to Feb 2005]	
– ASFCN RTS	[Gantt bar from Jan 2004 to Feb 2005]	
– NISN	[Gantt bar from Jan 2004 to Feb 2005]	
– FDF	[Gantt bar from Jan 2004 to Feb 2005]	
– STA/PSS	[Gantt bar from July 2004 to Dec 2004]	
– PSS Only	[Gantt bar from July 2004 to Dec 2004]	
● Flight Readiness Review	[Gantt bar from Jan 2004 to Feb 2005]	
● STS-114 Launch (NET)	[Gantt bar from Jan 2004 to Feb 2005]	
Notes:		

gsfc-2449005.dsf



## Space Communications Customer Forum



# NASA Integrated Services Network (NISN)

**Jerry R. Zgonc**  
**NISN Service Manager**  
**Code 291**  
**NASA/Goddard Space Flight Center**



# Space Communications Customer Forum



## Agenda

### NISN/GSFC Code 290 Status Updates

**NISN Customer Interface Group (CIG) Points-of-Contact**

**NISN Requirement Information & Template**

**Norway Fiber Initiative – Test and Transition Schedule**

**Mission Operations Voice Enhancement (MOVE) Project**

**NSAP Technology Refresh (NTR)**



# Space Communications Customer Forum



## NISN Customer Interface Group (CIG) NISN Service Manager (NSM)

- **Chuck Duignan, 301-286-6342**  
[Charles.M.Duignan@nasa.gov](mailto:Charles.M.Duignan@nasa.gov)  
(Codes R & S) DFRC (Aeronautical), GSFC (Space Science missions) JPL, VAFB (ELVs)
- **Kim Wright, 256-544-0936**  
[Kimberly.A.Wright@nasa.gov](mailto:Kimberly.A.Wright@nasa.gov)  
(Code M) ISS, JSC, KSC, MSFC, MAF, WSTF (Institutional)
- **Seaton Norman, 301-286-8676**  
[Seaton.B.Norman@nasa.gov](mailto:Seaton.B.Norman@nasa.gov)  
(Code M) STS, ISS, JSC, KSC, MAF/WSTF, MSFC, DFRC (Shuttle)
- **Jerry Zgonc, 301-286-7160**  
[Gerald.R.Zgonc@nasa.gov](mailto:Gerald.R.Zgonc@nasa.gov)  
(Code Y) LaRC, GSFC (Earth Science missions and Institutional), VAFB (EOS ELVs)



## Space Communications Customer Forum



### GSFC UNITEs CIG TEAM

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- MICHAEL EDER, 301,805.3076: CODE S michael.j.eder@msfc.nasa.gov
- TRISH PERROTTO, 301.805.5446 & 3106: Code Y  
perrotto\_trish@bah.com

### MSFC UNITEs CIG TEAM

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- JOE FINNEY, DEPUTY, 256.961.9443: joe.finney@msfc.nasa.gov
- MICHAEL BRADLEY, PROJECT LEAD, 256.961.9492: Code S  
michael.j.bradley@msfc.nasa.gov



# Space Communications Customer Forum



## NISN Requirements Process

- NISN is developing a requirements template for new project communication requirements
- Access to the requirements template will be included in existing Project PSLA' & NRD's – moving towards an on-line/electronic submission process
- Projects can complete requirement template or request NISN assistance through the NISN Customer Interface Group (CIG)
- Project Mission requirements must be coordinated with and completed by NISN CIG
- Details of requirements information included in backup slides



# Space Communications Customer Forum



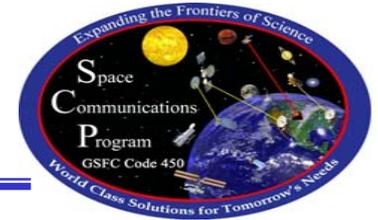
## Norway Fiber Initiative

### Test & Transition Schedule:

- |   |                         |
|---|-------------------------|
| • Site Acceptance Test                                | Completed September 3rd |
| • Began NISN Testing                                  | September 7th           |
| • Complete NISN Testing                               | December 6th            |
| • Begin Customer Testing & E-1/T-1 Circuit Transition | December 6th            |
| • Complete Testing & E-1/T-1 Circuit Transition       | January 31, 2005        |
| • Operational Readiness Review                        | December 16             |
| • Begin Customer Testing & 52MB Circuit Transition    | On-going                |
| • Complete Testing & 52MB Circuit Transition          | January 31, 2005        |



# Space Communications Customer Forum



## MOVE Project Status

The purpose of the Mission Operations Voice Enhancement (MOVE) Project is to replace existing mission voice systems with Commercial Off-the-Shelf (COTS) Products suitable to meet the mission voice conferencing and voice recording requirements at NASA Centers and location.

- **GSFC/Code 291 managed, Funding by NASA Code M**
- **MOVE GSFC Project Manager – Dan Duffy (GSFC/Code 291)**
- **Core Sites: DFRC, GSFC, Hangar AE, JPL, JSC, KSC, MSFC**
- **GSFC MOVE RFP release - MAY 2005**
- **GSFC MOVE Contract award - August 2005**
- **GSFC Switch delivery – September 2006**
- **MOVE project briefings planned for the next MCWG (scheduled 1/24/05 near DFRC) and NISN(2/28/05 – tentative) forums**
- **MOVE website at: <http://move.nasa.gov>**



## Space Communications Customer Forum



### NSAP Technology Refresh (NTR)

- Replacement of existing AT&T equipment in the Mission Network
- Current Paradyne H/W equipment and S/W platforms have reached “end of life”
- Will aggregate the Mission T-1 services into higher speed links and support higher capacity service
- Newer Technology with enhanced network management capability
- A transition from existing carrier equipment to new services will be required for each location
- Site surveys currently being conducted
- Tentative completion date mid-to-late 2006
- NTR project manager: Vicky Stewart (NISN/GSFC Code 291)
- NTR Project Engineer: Scott Douglas (NISN/GSFC Code 291)



# Space Communications Customer Forum



## Backup Slides



# Space Communications Customer Forum



## Requirements Template

- The CIG briefed an initial template for documenting all Customer requirements and indicated that efforts to characterize customer requirements using the template would be made
- The data identified so far for collection is associated with the following requirement parameters:
  1. Requesting/Responsible Project
  2. Location, Source and Destination
  3. Service
  4. Service Performance Requirements
  5. Data Transport Requirements
  6. ViTS Parameters
  7. VoTS Parameters
  8. Mission Voice
  9. Center/Site Long Distance
  10. Broadcast Fax
  11. Service Milestones
  12. Security Requirements
  13. Traceability Information
  14. Point of Contact Information
- The above parameters will be discussed in detail in an effort to establish a solid starting point for NSRS improvement



# Space Communications Customer Forum



- **Data will include information enabling aggregation of requirements and associated costs to the appropriate funding level:**
  - a) **Mission Directorate**
  - b) **Program**
  - c) **Project**
  - d) **Funding Code**
  - e) **Instrument, where applicable**
  - f) **Requesting Project team member**
  - g) **Technical Point of Contact**
  - h) **Funding Point of Contact**
  - i) **User/Customer funded or Core funded \***

**<\* Party responsible for designation of funding source must be identified> <Note, Point of Contact Details are discussed later.>**



# Space Communications Customer Forum



## Required NISN Service Parameters

- Identification of the required NISN service as defined in the NISN Services Document, for example:
  - a) Routed Data
  - b) Video
  - c) Voice
  - d) Custom Data
  - e) ViTS
  - f) VoTS
  - g) Center/Site Long Distance
  - h) Broadcast FAX



# Space Communications Customer Forum



## Location, Source, Destination Requirement Parameters

- **Data will include information identifying the site and/or system details of the requirement:**
  - a) **Site Location (for requirements not between two points, e.g., ViTS, WAN access)**
  - b) **Source Site**
  - c) **Source System**
  - d) **Source Sub-system**
  - e) **Destination Site**
  - f) **Destination System**
  - g) **Destination Sub-system**
  - h) **Site Point of Contact**

**<Note, Site details will include Center or off-Center address, building and room number, and technical point of contact>**



# Space Communications Customer Forum



## Location, Source, Destination Implementation Parameters

- **Data will include information identifying the *site delivery details* of the requirement:**
  - a) **Site Location (for requirements not between two points, e.g., ViTS, WAN access)**
    - a) **Site, Building, Room**
    - b) **Technical Point of Contact**
  - b) **Source Site**
    - a) **Site, Building, Room**
    - b) **Technical Point of Contact**
  - c) **Source Site**
    - a) **Site, Building, Room**
    - b) **Technical Point of Contact**



# Space Communications Customer Forum



## Location Implementation Parameters (cont.)

- Data will include information identifying the *site delivery details* of the requirement (cont.):
  - d) Will racks be required?
    - a) No
    - b) Yes, to be provided by Carrier
    - c) Yes, to be provided by User
  - e) Is diversity required
    - a) For networks?
    - b) For access?
    - c) For end-to-end?
  - f) Who will extend service from NISN delivery point/demarc to end user?
    - a) Site
    - b) Carrier



# Space Communications Customer Forum



## Service Performance Requirement Parameters

- **Details for the service, as applicable for each type of service:**
  - a) **Availability**
  - b) **Restoral Time**
  - c) **Monitoring Coverage**
  - d) **Acceptable Loss (Packet Loss or Bit Error Rate)**
  - e) **Latency (e.g., RTT)**
  - f) **Jitter (Not presently identified as part of the SLA offered by NISN)**
  - g) **Grade of Service (Applicable to switched services and not presently identified as part of the SLA offered by NISN)**
  - h) **Special Requirements (e.g., Performance Tuning Limitations)**

**< Note: stated as such, the CIG hopes to ensure that customers understand and request the performance they require.>**



## Space Communications Customer Forum



### Project vs. “Institutional” Requirements or WAN Access Services

- **Project Data Transport requirements can typically be defined in terms of data transfers between specific sources and destinations**
- **Center SIP access will be identified as a “WAN access service” requirement**
  - **Specific off-Center/non-Access Customer sources and destinations for the flows it’s interface supports are generally not identified in terms of requirements**
  - **Center SIP access sizing will typically be based on past performance on the Center’s SIP interface and the Center’s level of satisfaction with the interface**



# Space Communications Customer Forum



## Data Transport Requirement Parameters

- **Data Transport Requirement: identification of the volume of data to be transferred and the associated delivery time, or for requirements such as commanding, the serial rate to be supported**
  1. **Data Volume**
  2. **Volume Units**
  3. **Delivery Time**
  4. **Delivery Time Units**

- OR -

  5. **Supported Serial rate <assumed to be kbps>**



# Space Communications Customer Forum



## Data Transport Implementation Constraint Parameters

- **End-user Interface Constraints**
  - **Interface type**
    - Layer 2 (Ethernet, FDDI, etc.)
    - Layer 1 (Copper, Fiber, distance between equipment, etc.)
  - **WAN “Access” Use**
    - Number of users connecting to the user network supporting this requirement
    - Will user provide their own address space
    - Number of servers or non workstation devices connecting to user network
    - Projected number of users that will connect to the customer’s network externally from the Internet or NISN
    - Special applications running across the WAN (drop down values? Free text?)
    - Protocols to be supported (drop down)
  - **Is this requirement replacing an existing requirement (yes/no)**
    - If yes, an ability to identify the requirement it is replacing



# Space Communications Customer Forum



## ViTS Requirement Parameters (1 of 3)

- **Facility information (as applicable)**
  - **Location**
    - **Center or non-Center address, Building, Room number**
  - **New or Existing**
  - **Dedicated or Shared**
  - **Facility room dimensions (Length, Width, Height)**
  - **Existing Equipment to be Integrated (yes/no, if yes, what?)**
- **Participant support requirements:**
  - **Anticipated number of participants**
  - **Total Room Capacity (NASA Rated)**
  - **Presence of a gallery**
    - **Gallery participation (audience or interactive)**
    - **Number of Gallery participants**



## Space Communications Customer Forum



### ViTS Requirement Parameters (2 of 3)

- **Anticipated uses within the room – check all that apply:**
  - ‘Talking heads’
  - Mission Voice
  - Multimedia
  - Mission Video
  - Live or Playback Video
  - Mission Data
  - Wireless Capability– Document Camera
  - Support presentation of materials from near location
  - Integration with PA system, or overhead zoning. (Sound Reinforcement)
  - View presentation material and video conference participants simultaneously



# Space Communications Customer Forum



## ViTS Requirement Parameters (3 of 3)

- **Required interface locations:**
  - **Location**
    - **Center or off-Center address, Building, Room**
  - **ViTS capable (yes/no)**
  - **IP address or ISDN number (if known)**
- **ViTS Type requested**
  - **ViTS room, VRA, or Desktop ViTS Appliance**



# Space Communications Customer Forum



## ViTS Implementation Constraint Parameters

- **Site Survey Information:**
  - Raised floor (Yes/No)
  - Floor Type (Bare/Carpeted)
  - Drop Ceiling (Yes/No)
  - Wall type: (Concrete, Stud, or Modular walls - check all that apply)
  - Adequate Cable Runs/Core Drills available (Yes/No)
  - Power Requirements (details)
  - Facility on a UPS (Yes, Room Specific/Yes, Building specific/No)
  - Is asbestos an issue (Yes/No)
  - Diagram, if available
  - Free text field for additional information
  - Access issues
  - Non-NISN implementation resource POCs



# Space Communications Customer Forum



## VoTS Requirement Parameters

- **Facility information (as applicable)**
  - **Location**
    - **Site, Building, Room number**
  - **New or Existing**
  - **Facility room dimensions (Length, Width, Height)**
  - **Existing Equipment to be Integrated (yes/no)**
- **Participant support requirements:**
  - **Anticipated # of participants**
  - **Total Room Capacity (NASA Rated)**
  - **<User/Customer information tracked with requesting project information>**



# Space Communications Customer Forum



## Mission Voice Requirement Parameters

- Primary origination site
- Number of voice loops
- Sites to be accessed
- Is a digital or analog interface requested/required?
- Is E & M Signaling required?
- Signal to noise ratio, specified only if greater than the NISN standard
- Compression limitations (i.e., maximum level of compression that can be tolerated)



# Space Communications Customer Forum



## Switched Services Requirement Parameters

- **Type of Switched Service**
  - Toll Free number
  - FTS Access
  - Calling Card
- **Location of Toll Free or FTS Access service**
  - Existing telephone number at which service needs to be provided
- **Person or Organization receiving calling card**
  - Name (Person or Organization)
  - NASA Code or Contractor Company
  - Justification



# Space Communications Customer Forum



## Center or Facility Long Distance Requirement Parameters

- Number of telephones
- Number of authorized users
- Suggested busy hour(s), if known
- Grade of Service (i.e., acceptable number of instances per attempted connections that fail)
- Class of Service (i.e., Will any user have requirement for prioritization that will prompt pre-emptive action to ensure connectability?)
- User profile (e.g., types of calls, lengths of calls)
  - <Note, information will require and update to the NSD>



# Space Communications Customer Forum



## Broadcast Fax Parameters

- **Site (Center or non-Center address, building, room #)**
- **Expedited (yes/no)**
- **Other?**



# Space Communications Customer Forum



## Service Milestone Date Requirement Parameters

- Each requirement will be bounded by a start date and a stop date, indicating when the requirement is active
- Start and stop dates will be identified in terms of milestones
- Milestones will be described in terms of events at which point requirements start or stop (e.g., Terra launch, Landsat-7 End of Mission)
- Each Milestone will consist of a name and a date



# Space Communications Customer Forum



## Security Requirement Parameters

- **NASA is presently working towards adopting NIST Security Guidelines, such as FIPS 199**
- **FIPS 199 defines three parameters for characterizing an information's or resource's security level:**
  - **Confidentiality**
  - **Integrity**
  - **Availability**
- **NASA is in the process of defining standards by which resource owners will evaluate security parameter levels in terms of high, medium, low, or not applicable**



## Space Communications Customer Forum



### Requirement Traceability Parameters

- **To the extent possible, reference to a document under configuration control (e.g., Interface Control Document (ICD) , or Network Operations Directive (NOD)) substantiating the requirement should be identified**
- **The reference should consist of**
  - **Document title**
  - **Version number/date**
  - **Paragraph or section title**
- **A decision regarding the use of emails as a reference document must be made, including how to maintain accessible copies of the email**



# Space Communications Customer Forum



## Point of Contact Parameters

- A number of different points of contact should be identified for requirements and associated information, including requirement technical points of contact, site technical points of contact, requirement funding points of contact
- Generically, information pertaining to any point of contact includes
  - Name (first and last)
  - Email address
  - Telephone number
  - Address
  - Title or Position



# Space Communications Customer Forum



## Flight Dynamics Facility (FDF)

Sue L. Hoge  
Flight Dynamics Facility  
Code 595  
NASA/Goddard Space Flight Center



# Space Communications Customer Forum



## FDF Changes in 2004/Recent Activities

- **FDF changes in 2004**
  - **Flight Dynamics Analysis Branch management of FDF**
    - Under MOMS work package
    - Technical and programmatic management of facility
- **FDF Recent Activities**
  - Supported GPB, AURA and SWIFT launches
  - Several commercial launches
  - Began development of plan for facility hardware upgrade
  - Includes connection to Open IO/NET
  - Developed requirements for FDF backup functions



# Space Communications Customer Forum



## Upcoming FDF Activities

- **Continued support of missions**
  - ELV support for DDI, NOAA, and GOES
- **Continue upgrading system hardware**
- **Develop implementation plan for FDF backup functions**
  - Based on requirements
- **Look at support processes**
  - Process improvement and cost savings



# Space Communications Customer Forum



## Ground Network (GN) Project

**Christine M. Hinkle**  
**Ground Network Project**  
**Code 453**  
**NASA/Goddard Space Flight Center**



# Space Communications Customer Forum



## Ground Network Independent Assessment

- **The Science Mission Directorate (SMD) chartered an Independent Assessment of the Ground Network on October 2, 2004, to “provide observations and findings to achieve significant and realistic efficiencies to help us guide strategic and management decisions”**
- **The following items are specifically identified for critical assessment:**
  - **The effectiveness of the current GN and its ability to meet current mission commitments**
  - **The investment required in the GN to meet mission needs throughout this decade**
  - **The organization, policies, structure, and architecture of the GN Program**
- **An eighteen member Panel was assembled with membership from five NASA Centers, NASA HQ, NOAA, and Aerospace**
- **Jim Costrell of the Space Operations Mission Directorate chairs the panel**



# Space Communications Customer Forum



## Ground Network Independent Assessment (cont'd)

- The GN Project provided a comprehensive series of briefings and tours to the Panel on November 8, 9, and 10 at Wallops
- The GN Project also provided tours on the MILA ground station on November 16 and 30
- The Panel Chair provided initial feedback (a list of topics to be included in the final report) to the GN Project on November 23
- The Panel will submit its final report to the SMD Program Management Council in early January in time to impact the FY05 budget cycle
- The GN Project held a working session on December 2 to kick-off development of an action plan to respond to the Panel's findings
- Topics include:
  - Orbital tracking and communications services performance and capacity
  - System Engineering
  - Preventative Maintenance
  - MILA/PDL Replacement



# Space Communications Customer Forum



## Space Network (SN) Project

Keiji K. Tasaki  
Space Network Project  
Code 452  
NASA/Goddard Space Flight Center

# TDRS Operational Constellation Health (As of 11/03/04)

F-3 Launch 09/88 ZOE <small>Note 9</small>				
SA1 S	SA2 S	MA	BUS	TTC
<small>Note 1</small> Ku	<small>Note 2</small> Ku			

F-4 Launch 03/89 East 41°W <small>Note 9</small>				
SA1 S	SA2 S	MA	BUS	TTC
Ku	Ku			

F-5 Launch 08/91 West 171°W				
SA1 S	SA2 S	MA	BUS	TTC
<small>Note 3</small> Ku	<small>Note 6</small> Ku			

F-6 Launch 01/93 East 47°W				
SA1 S	SA2 S	MA	BUS	TTC
Ku	Ku			

F-7 Launch 07/95 150°W Stored				
SA1 S	SA2 S	MA	BUS	TTC
Ku	Ku			

F-8 Launch 06/00 West 174°W				
SA1 S	SA2 S	MA	BUS	TTC
Ka	Ka			

F-9 Launch 03/02 Relocating to 79°W				
SA1 S	SA2 S	MA	BUS	TTC
Ku	<small>Note 8</small> Ku			

F-10 Launch 12/02 Relocating to 41°W				
S	SA2 S	MA	BUS	TTC
Ku	Ku			

## Notes:

1. F-3 KSA2 polarization restricted to LCP, KSAR2 low performance. Redundant paramp selected
2. S-Band TWTA failed on F-3 (SSAF2), F-5 (SSAF1)
3. Both Ku-Band TWTA units on F-5 failed (KSAF1)
4. F-8 MAR shortfall
5. F-9 propulsion anomaly A-3, W-2 thrusters
6. SSAR2 parametric amplifier failure on F-5
7. F-4 ESA and MFG LO failures
8. F-9 LO failure KSAR2
9. KSA Polarization services restricted.
10. F-3 Coarse Sun Sensor Failure\*\*

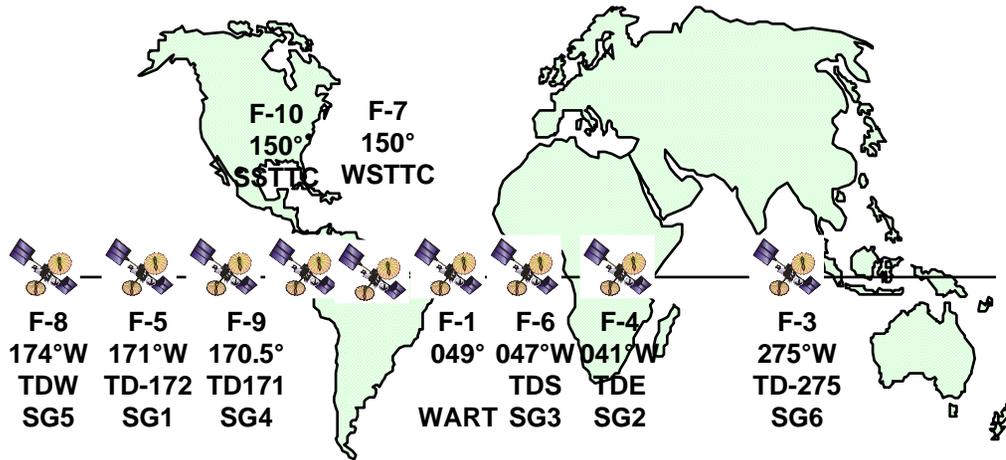
## General Notes:

- One spare SGL TWTA on F-3 & F-4
- F-1 SA2 SSAR & SSAF, KuSAR operational using WART
- Ten-year design life for F-1 - F-7, 11 years for F-8 - F-10 and four years for on-orbit storage

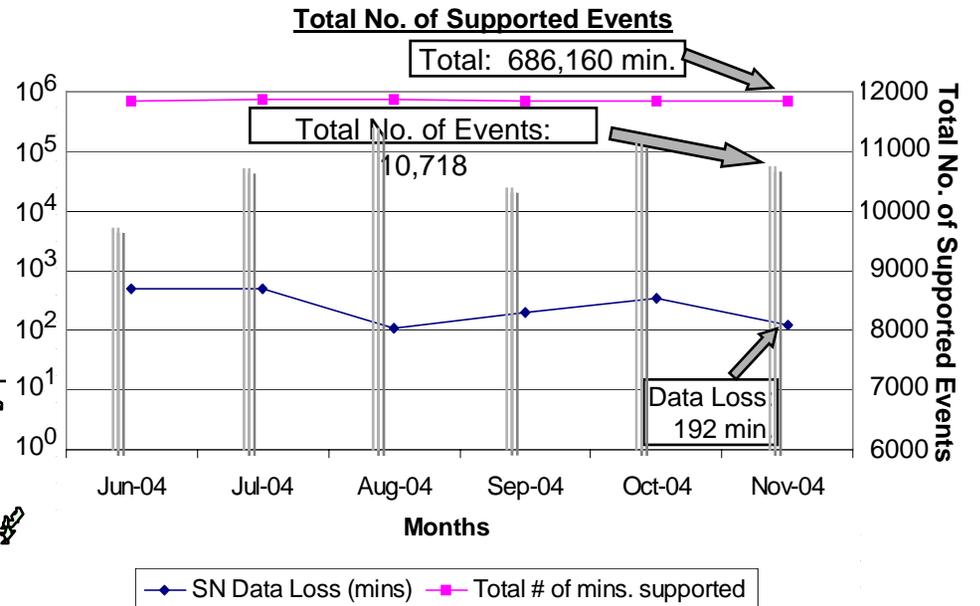
	Indicates fully operational
	Indicates backup string in use
	Indicates failed service/system

\*\* Indicates updates and changes

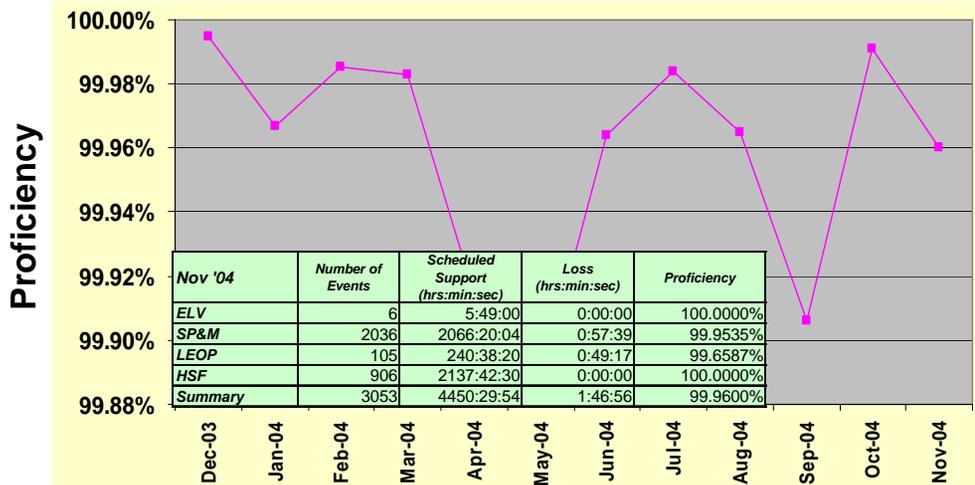
Space Network at a Glance



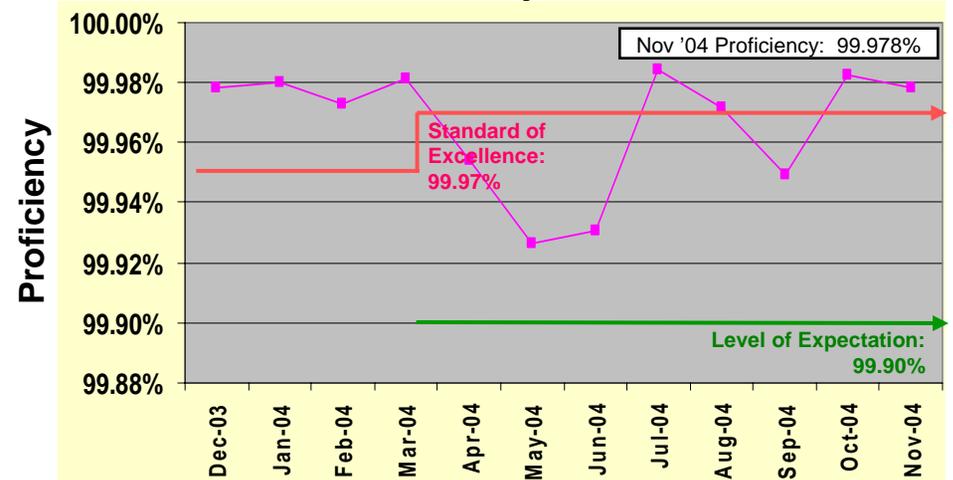
Minutes of Support and Minutes of Data Loss



SN Critical Support Proficiency Trend



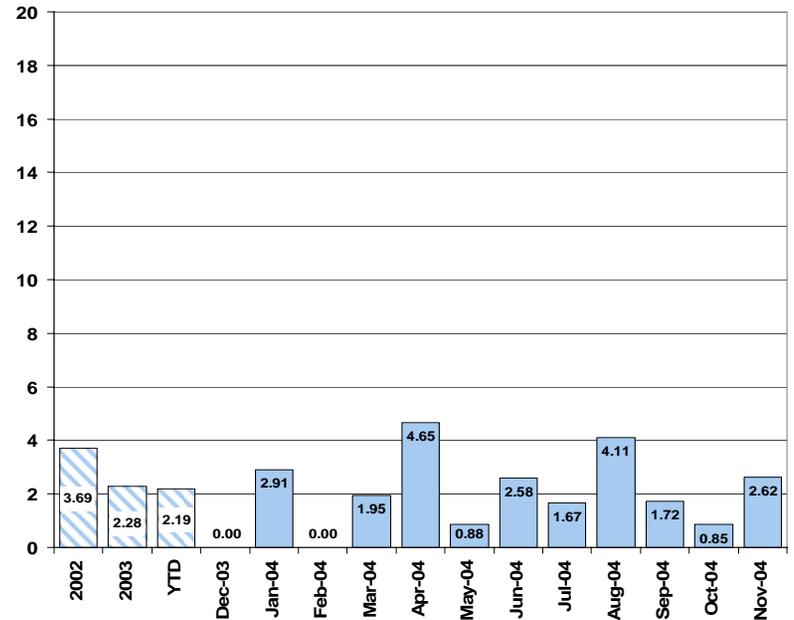
SN Proficiency Trend



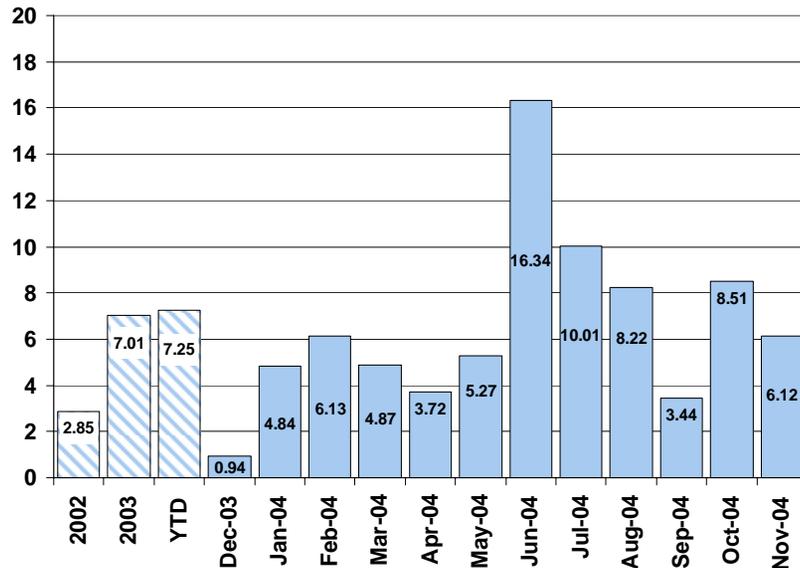
Missions	Total No. of Supported Events	Service Stat.	Proficiency (%)	Standard of Excellence (%)
Aqua, Aura, EO-1, ERBS, FUSE, GP-B, HST, ISS, L-7, SP&M, SPTR, TERRA, TOPEX, TRMM, UARS, XTE	10,718	11,439 hrs. sched 11,436 hrs. actual 2 hrs. 32 min. lost	99.978%	99.97%

- **Space Network Error/Anomaly Trends**
  - **Data loss errors only**
  - **Only three error/anomaly types used**
    - **Operator error**
    - **Software anomaly**
    - **Hardware anomaly**
  - **Normalized to 10,000 hours of support**
  - **Metrics applicable to historical data**
  - **The first two bars are for 2002 and 2003, respectively**

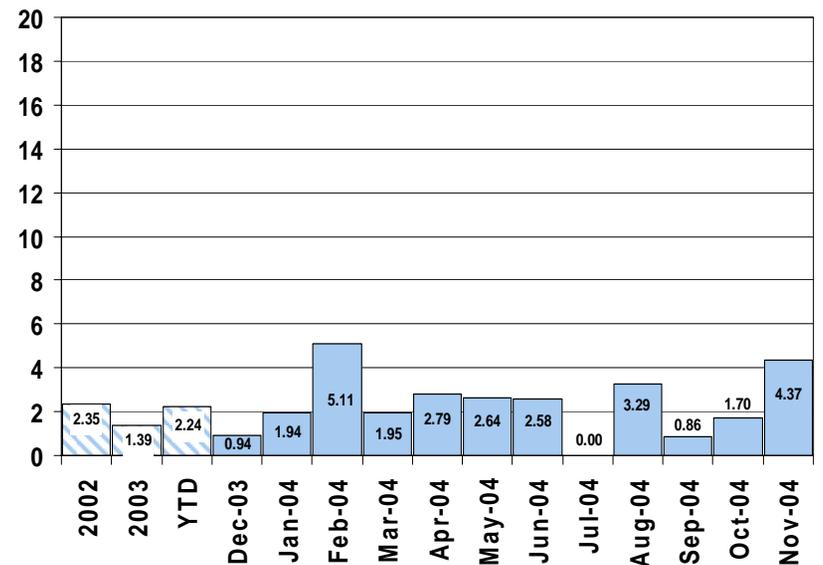
Operator Errors per 10,000 Hours of Support



Hardware Anomalies per 10,000 Hours of Support



Software Anomalies per 10,000 Hours of Support





# Space Communications Customer Forum



## TDRS KSAR Upgrade Project (TKUP) Status

- Enhance the TDRSS KSA 225 MHz Return data service by adding the capability to process bandwidth efficient signal designs
    - OQPSK/TPC or LDPC - 150 Mbps to 410 Mbps
    - 8PSK/TPC or LDPC - 410 Mbps to 625 Mbps
    - Single Access Antenna Autotrack for new signal designs
  - Enhance the KSAR service by adding the capability to process Col-T and JEM signal designs
  - Replace Equipment nearing obsolescence
    - KSAR High Rate Equipment and High Rate Switches
- 
1. A new Product Development Lead selected.
  2. Project will pick up soon, as the new PDL continues to become familiar the project.
  3. Funding has been allocated.



# Space Communications Customer Forum



## BRTS Enhancement Status/Schedule

- **Status**
  - Requirements review conducted on 3/3/04
  - All RFAs closed
  - QSS analysis tasks completed
- **Schedule**
  - System Requirements Review March 2004
  - QSS Study Tasks Completed November 2004
  - NENS Task Start 1/2005
  - Preliminary Design Review 4/2005
  - Critical Design Review 6/2005
  - Test Readiness Review 2/2006
  - Operations Readiness Review 6/2006



# Space Communications Customer Forum



## Second Guam Antenna System (SGAS) Status

- **Recent design changes include:**
  - Incorporate SNE requirements for antennas and facilities.
  - Increasing SGL antenna size to 16.5 meters (originally 11-meters) for future growth/higher data rate customers
- **Schedule**
  - Phase 1 Facilities Design Review (100%)      **Sept. 29, 2004**
  - Phase 2 Facilities Design Review (100%)      **Jan. 26, 2005**
  - Phase 1 mods complete      **April 2005**
  - Phase 2 mods complete      **July 2005**
  - Installation begins      **June 2005**
  - SGAS ORR      **Oct 2005**



# Space Communications Customer Forum



## SNAS Status

- **SNAS implementation has been on hold pending the appointment of a Product Design Lead.**
- **A PDL has been selected, and the handover of work will begin next week (Week of 12/13/04).**
- **Funding has been allocated.**
- **The new PDL will review the products to date, and will schedule a delta SRR in early 2005.**



# Space Communications Customer Forum



## Guam DS3 Status

- **Purpose**
  - Increase the bandwidth available SN Customer support through GRGT.
  - Upgrade the current 3-T1 circuit configuration (aggregate of ~4.6 Mbps) to a DS3 circuit (~45 Mbps).
- **Status**
  - Both DS3 circuits (prime and redundant) are installed and have been made operational.
  - The T1 circuits have been released (except for two).
  - Installation of bulk encryption devices in work.
  - Timeplex interface required re-work; Timeplex remains on T1 circuits.



# Space Communications Customer Forum



## SNIS & Fast Forward Status

- **Space Network IP Services (SNIS) Product**
  - Systems Requirements Review (SRR) Feb/Mar '05
  - Target Operational Date: March 2007
  - <http://snis.gsfc.nasa.gov>
- **MA Fast Forward**
  - Concept Review February 2005
  - Target Operational Date: FY06
  - <http://fastforward.gsfc.nasa.gov>



# Space Communications Customer Forum



## OIG Current Status

- **GSFC currently fulfilling NASA obligation per the Space Act of 1958**
- **FY04 DoD Authorization bill has language enabling USSTRATCOM to provide these services to Commercial and Foreign Entities  
NLT 180 days after the bill is signed (5/22/04)**
- **Delegation of authority from the DEPSECDEF to SECAF letter signed 10/18/04**
- **Delegation of authority letter from the SECAF to AFSPC signed 11/8/04**
- **Still awaiting General Lord's permission to go live with the Space Track web site**
  - **Once signed, explanation of transition to be posted on the OIG and AF websites**
  - **Concurrent operations for at least 90 days**
  - **OIG shutdown still 1/1/05 if no funding from AF**



# Space Communications Customer Forum



## Demand Access System (DAS) Status

- 1. East to West Transition:** SWIFT MOCC reported not seeing data, even though the UPD indicated a good lock on the DMU. For now a NAM is in place to minimize data loss.  
**Corrective Action:** We are installing a Software ETN on DAS this afternoon, which will hopefully minimize this problem. 24 hours of testing will be needed to see if this corrects the problem. Since we have the downtime we will also install the Sleeping DMU Firmware fix in Guam.
- 2. The DAS is dropping receiver lock** during TDW passes for SWIFT Operations and during LDBP testing. David Casteel and Manny Rios at WSC are assigned this problem.  
**Corrective Action:** It appears a loose fiber optic cable was causing the problem. Since all fiber optic cables were reseated this morning the problem has not reoccurred. Investigation will stay open until we are positive this was the root cause of the problem. As of this time the MOC has not reported back if the problem has been corrected.
- 3. Dropouts on 275 to TDW transitions:** While The SWIFT MOCC have reported having problems on a couple of these transitions since launch. WSC as not seen this problem, and none of have been reported by the MOC since last Friday.
- 4. (New) PTP Losing Socket Connections** during service event: During the last 24 hours occurrences on both legacy and DAS have occurred. Problem being investigated by Manny Rios and Dave Casteel.



# Space Communications Customer Forum



## TDRS Constellation Status/Plans

1. Currently working on the TDRS-10, TDRS-9, TDRS-6, TDRS-4 transition plan.
2. Many factors are considered for this near-term plan.
  - CREAM/BESS LDBP
  - STS RTF schedule
  - Swift DAS continuous operation
  - ELV schedule
  - Ground and S/C resources, constraints, etc.
3. Main objective is the operational check out of TDRS-10.



## Space Communications Customer Forum



# Space Network and Ground Network Loading Overview

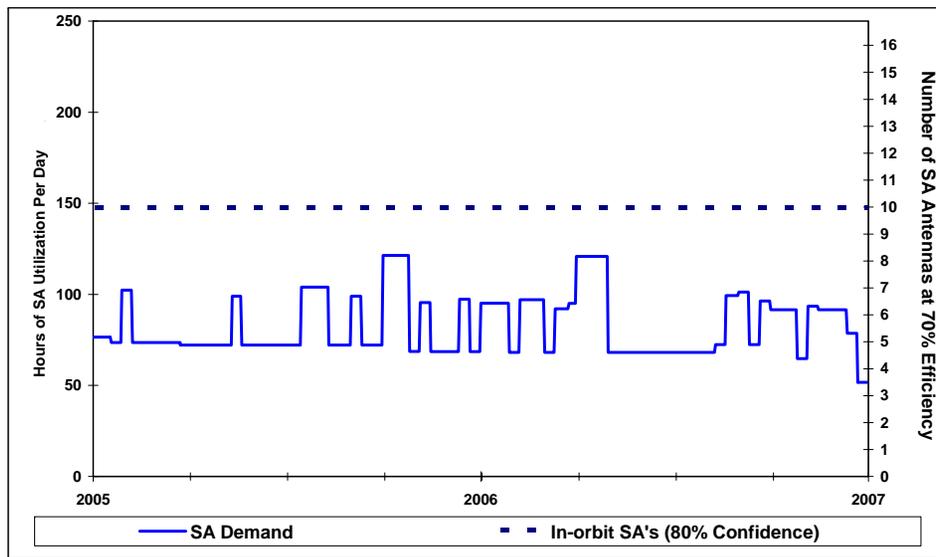
Allen J. Levine  
Service Planning Manager  
Code 451  
NASA/Goddard Space Flight Center



# Space Communications Customer Forum

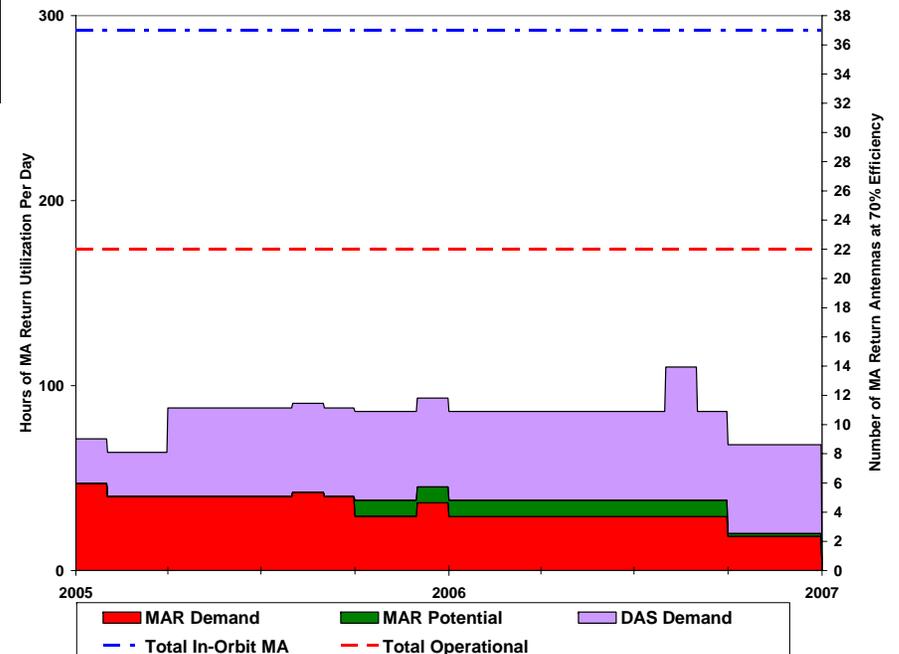


## SN Demand Versus TDRSS On-Orbit Capacity



## SN Single Access On-Orbit Capacity

## SN Multiple Access Return On-Orbit Capacity





## Space Communications Customer Forum



### SN Single Access Forecast Loading Observations

- **Nominal Loading (without Shuttle In-orbit or Critical Support).**
  - All users receive at least 90% of the customer service requirements with lower priority missions receiving at least 95% due to flexibility and/or use of SMA.
  - Maximum loading is 58% in 2006.
- **Loading with Shuttle “Return to Flight”.**
  - All users receive over 90% of the customer service satisfaction.
  - Starting in 2006, ISS and STS will have only limited support from TDZ which will reduce support by ~ 7% (on average between the 2 S/C).
    - Recommendation for “Virtual S/C” whenever possible during docked ops
  - Maximum loading is 69% in 2006.



## Space Communications Customer Forum



### SN Single Access Forecast Loading Observations (Continued)

- **Peak Loading (launches/LEOP/critical support).**
  - Most users can expect some launch day impacts to their support commitments.
    - STS/ISS support will drop below 90% without Virtual S/C.
    - Terra support will drop to ~ 80% .
      - May require periodic off-loading to the GN X-band resources.
  - Maximum loading is 76% (on a daily basis) in 2006.
- **Ground communications capacity is sufficient to meet current customer data flow and latency requirements.**



## Space Communications Customer Forum



### SN MA/DAS Forecast Loading Observations

- **Nominal MA users forecast to receive at least 99% of their telecommunications requirements.**
  - Issues with sufficient MAR capacity in ZOE if Aqua and Aura remain on MAR (do not migrate to DAS).
- **MA return loading utilization peaks at 16% in 2004/05.**
- **MA Forward loading utilization peaks at 23% in 2006.**
- **Demand Access Service (DAS) loading utilization peaks at 38% in 2006.**
  - Assumes current DAS ground configuration.
  - Includes dual balloons (LDBP & ULDBP).
- **All DAS users forecasted to receive their telecommunications requirements.**
  - There is a risk of DAS capacity issues during balloon campaigns based on their number and geographic locations. Will need to keep an eye on these requirements.

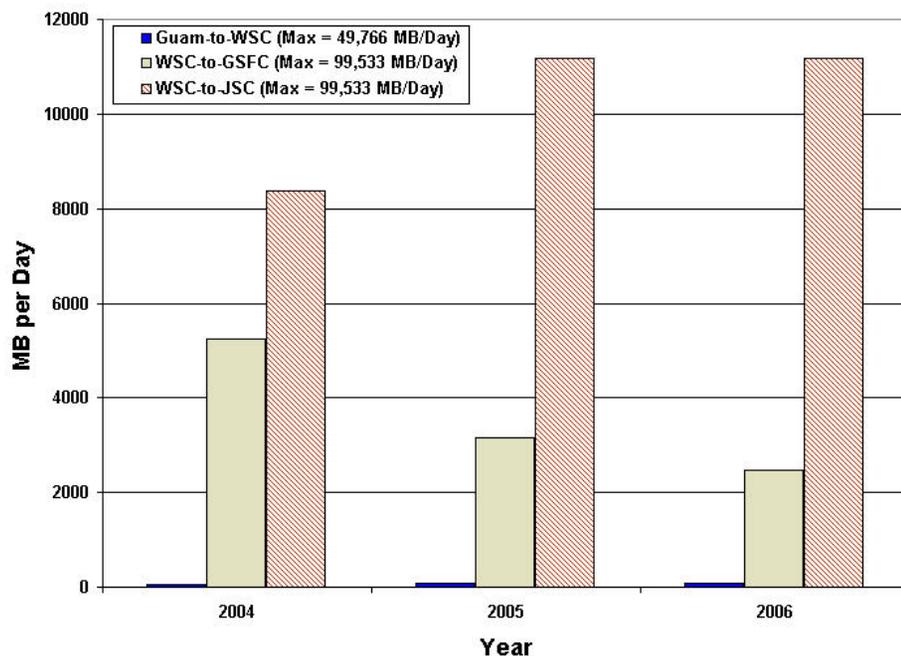


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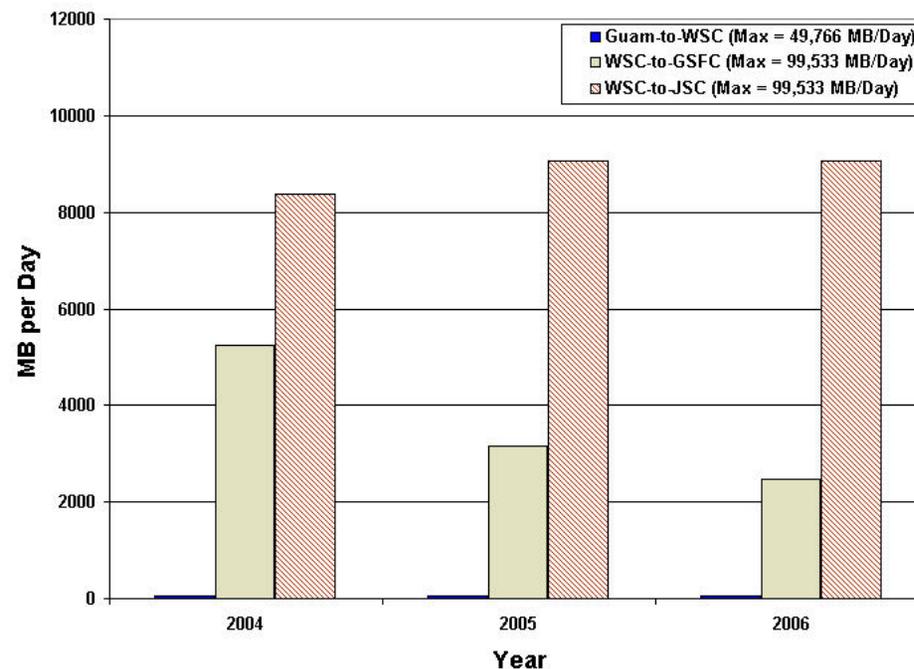


## SN Closed IOnet Forecast \*

Closed IONet Loading Forecast with Shuttle



Closed IONet Loading Forecast with No Shuttle



Site	Destination	Network	Services	Total Circuit Throughput (kbps)
GUAM	WSC	Closed IONet	3 x T1	4608
WSC	JSC	Closed IONet	6 x T1	9216
WSC	GSFC	Closed IONet	6 x T1	9216
WSGT	GSFC	EBNet	T1	1536
STGT	GSFC	EBNet	T1	1536
WSC	GSFC	HR EBNet	T3	44000

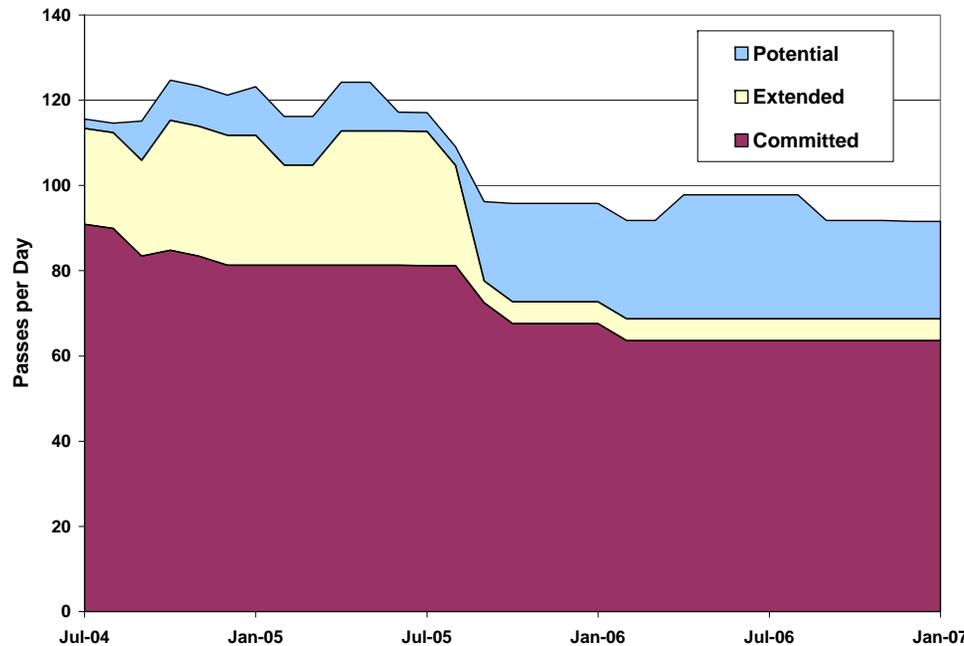
\* Closed EBNet loading not shown as Terra is the only customer



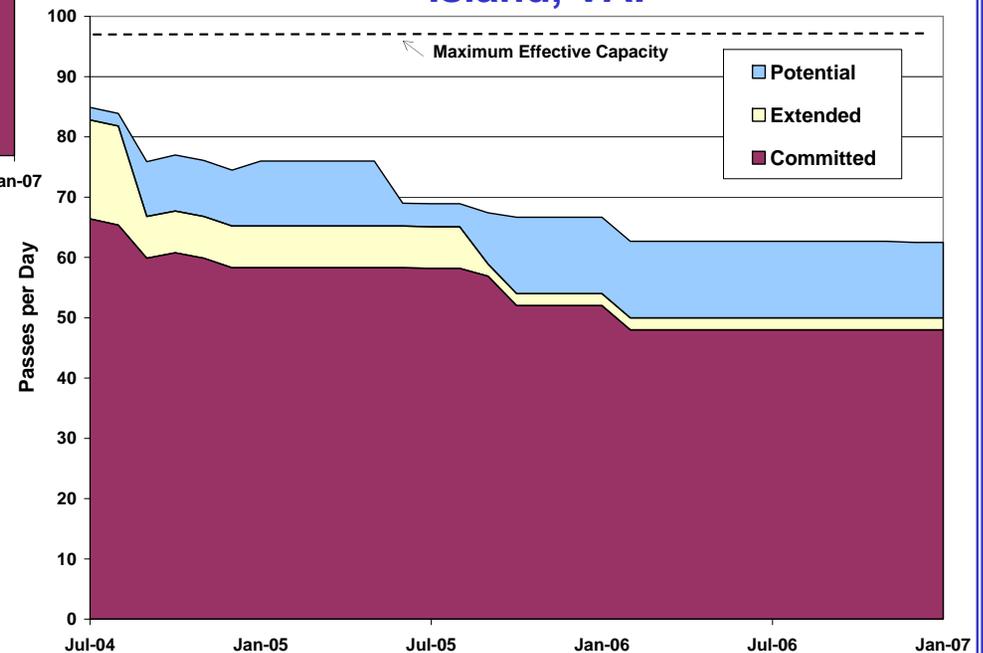
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## GN Load Forecast Through 2006



**GN 11 Meter Load Forecast**  
Covers 5 primary 11 meter apertures with 2 at each of Poker Flat, Alaska, and Svalbard, Norway, and 1 at Wallops Island, VA.



## GN Load Forecast

Covers 16 primary apertures at Poker Flat, Alaska, Svalbard, Norway, Wallops Island, VA, McMurdo, Antarctica, Merritt Island, Florida, and Santiago, Chili.



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## GN Forecast Loading Observations

- **Analyses indicate most support commitments can be met through 2006.**
  - **SG3 at Svalbard will be required to 'easily' resolve occasional support conflicts particularly during any ELV/LEOP situations TBD.**
  - **Under limited resource availability situations, some Aqua hand-overs may not be supported.**
- **Meeting commercial service provider targets for FY '05 at both Poker Flat and Svalbard is an operational issue.**
  - **Movement of customer support between sites (including Wallops) may be required by GN schedulers during both Forecast Schedule and Active Schedule generation.**
  - **Some customers may be required to periodically reduce support to approved levels.**
- **Ground communications capacity is sufficient to meet current customer data flow and latency requirements.**
  - **While total daily network loading is far below the daily maximum effective capacity of the network, on a per pass basis, there may be instances where particular circuits are 100% utilized.**

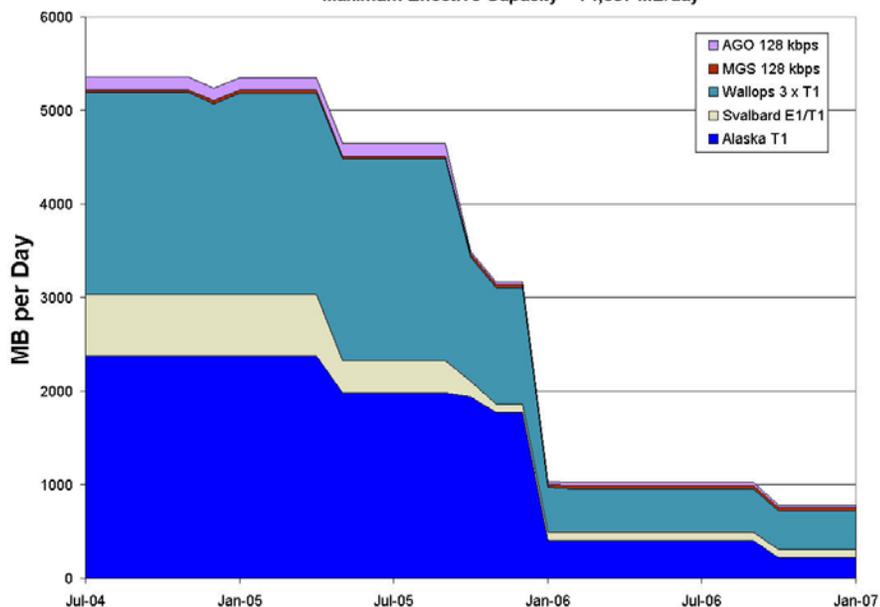


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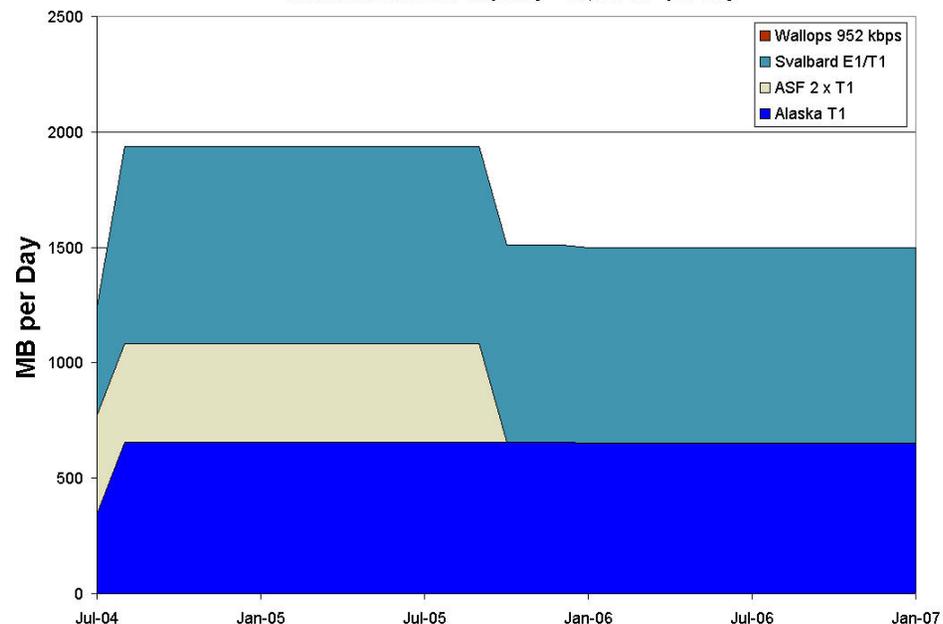


## GN WAN Forecast \*

**Closed IONet Loading Forecast**  
Maximum Effective Capacity = 74,097 MB/day



**Closed EBNet Loading Forecast**  
Maximum Effective Capacity = 69,725 MB per Day



Antenna Site	Destination	Network	Services	Total Circuit Throughput (kbps)
AGS	GSFC	Closed IONet	T1	1536
		Closed EBNet	T1	1536
		EBNet HR	DOMSAT	52000
PF1	GSFC	Open IONet	1/2 T1	768
		EBNet HR	DOMSAT	52000
SGS	GSFC	Closed IONet	E-1/T-1 (Channelized)	460.8
		Closed EBNet		896
SKS	GSFC	Open IONet		460.8
WPS	GSFC	Closed IONet	3 x T1	4608
		Closed EBNet		952
MGS	GSFC	Closed IONet		128
MIL	GSFC	Closed IONet	T1	1536
ASF	JPL	Closed EBNet	2 x T1	1536
AGO	GSFC	Closed IONet		128

\* In addition to looking at geographic constraints when selecting potential GN apertures/stations for support, new customers need to be aware of any network limitations that could affect [timely] data delivery.



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## Open Floor



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## Closing Remarks

**Allen J. Levine**  
**Customer Commitment Office**  
**Code 451**  
**NASA/Goddard Space Flight Center**