DATE: April 18, 2012

SUBJECT: SN Status

LOCATION: JSC, Regents Park III

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INTRODUCTION

Mr. Jim Bangerter convened the April 18, 2012, Network Support Group (NSG) Space Network (SN) status splinter meetings to provide a status of the Tracking and Data Relay Satellite (TDRS)-K and ongoing and future work at the SN White Sands Complex (WSC) (refer to the presentations, *TDRS-K Overview for Users Participating in Level 6 End-to-End Services On-Orbit Testing, SGSS Introduction for the NSG, and SN Status – USS CR*).

MEETING

A. Tracking and Data Relay Satellite (TDRS)-K Overview (this presentation is available by request). Ms. Cheryl Gramling provided the TDRS-K overview.
   1. Ms. Gramling provided an overview of the system elements. There will be three new satellites (K/L/M). The new satellites will include H/I/J heritage capabilities with updates of hardware for obsolescence, improved communications, and incorporated ground based beam forming in the Multiple Access Return (MAR). The Demand Access Service (DAS) will be available on TDRS-K/L/M.
   2. Modifications will be made to WSC. Upgrades will be made to five Space-to-Ground Link Terminals (SGLT) of which four will have MAR capability. The Network Control Center Data System (NCCDS) will be updated. The Flight Dynamics Facility (FDF) will be updated for TDRS user Orbit Determination (OD) services.
   3. Ms. Gramling stated that elements in Blue on the TDRSS System Elements diagram illustrate changes at WSC.
   4. Ms. Gramling outlined TDRS-K improved communications performance. TDRS-K will have higher effective Isotropic Radiated Power (EIRP), return channel improved spurious levels, Autotrack acquisition enhancements, and improved MAR performance.
   5. Ms. Gramling reviewed TDRS-K requirement Deltas from TDRS H/I/J. Slightly higher data rates will be available. The Space Network User's Guide (SNUG) will be updated. Mr. Bob Marriott asked if legacy users such as the Automated Transfer Vehicle (ATV), H-II transfer Vehicle (HTV), etc. will be able to use more MA service than in the past. Mr. Bangerter responded that link margin analyses will need to be performed. The analyses will be performed once the new series of satellites is on orbit.
   6. Ms. Gramling reviewed the TDRS-K return frequency plan. There is no change from H/I/J for all return frequency plans except that MAR reverts back to the TDRS 1 – 7 plan.
   7. Ms. Gramling provided a current status for TDRS-K and –L. The TDRS-K Pack and Ship Readiness Review is scheduled for July. TDRS-L is scheduled for thermal vac in May.
   8. TDRS-K will be launched on an Atlas V 401 from the Kennedy Space Center (KSC). The TDRS-K target launch date is December 2012. The TDRS-L launch date is slipping. The last two weeks of onorbit testing starts at approximately Launch plus 50 days and the project is looking for user community assistance in level-6 testing.
   9. Ms. Gramling reviewed the operational timeline. The TDRS-K spacecraft will have a mission life of 15 years after the In Orbit Test Phase (IOT). Level-6 testing will require 2 weeks. TDRS-K will go into operations as soon as it is accepted. By the time Level-6 testing has been reached, the spacecraft, bus, and payload components

will have been tested. Level-6 testing will prove out externally generated Scheduling Orders (SHO) onorbit external interfaces.

10. Mr. Gramling provided a level-6 testing summary overview. DAS users may have to go on scheduled services during testing. The project would like to engage Ka-band users to demonstrate the capability. Ka-band users can schedule services during disturbance testing. The project anticipates using vectors from the launch to simulate vector interfaces and slewing. The project will want all Single Access (SA) and MA users for testing both SA antennas. Navigation acceptance testing will be integrated into this testing.
11. Ms. Gramling reviewed the ground track diagram. The diagram illustrated the overlap visibility between TDRS-171 and TDRS-K for Level-6 testing.
12. Mr. Bangerter asked when the project wants to engage the customers to setup a test plan. Ms. Gramling stated that the project would like to start getting users set up. Mr. Jim Bangerter accepted an action item to work with the GCs to provide customer Points-of-contact (POC) for TDRS-K level 6 testing (action item 0412-NSG SN Status-01).
13. Mr. Joe Whitney stated that the Johnson Space Center (JSC) has a team ready to go. Test plans are ready. Testing will be conducted during International Space Station (ISS) crew sleep periods when possible.

B. SN Ground Segment Sustainment (SGSS) Status. Mr. Tom Gitlin provided an SGSS status.

1. SGSS will provide a flexible, extensible, scalable, and sustainable SN ground segment. SGSS will dramatically decrease Maintenance and Operations (M&O). SGSS is approaching its Preliminary Design Review (PDR) and currently, element PDRs are being conducted.
2. SGSS will replace the existing SN ground terminals in Las Cruces and Guam and build a new terminal at Blossom Point, MD. Elements of SGSS include data distribution over 10-Gb Local Access Networks (LAN), lossless signal replication, pooled vice string architecture (allowing easier scalability), integrated security, improved maintainability, and controlled life cycle costs.
3. Mr. Gitlin provided an SN Ground Segment (SNGS) versus SGSS architecture comparison. The basic functionality will remain the same. How data is distributed will be very different. The SGSS architecture will provide improved fault tolerance, move away from dedicated VAXs, and use current application codes.
4. SGSS is comprised of seven principal elements. The elements are the Space-Ground Link (SGL), Digital Signal Processing (DSP), User Services Gateway (USG), Service Management (SM), Fleet and Ground Management (FGM), Enterprise Infrastructure (EI), and Maintenance and Training (MT). Mr. Gitlin provided a high-level definition of the elements (e.g., SGL [the Radio Frequency front end that talks to TDRS], DSP [the equipment and software to digitize the Radio Frequency downlink], USG [the interface to the users], FGM [a key element – TT&C - to manage GS control and user segment], and EI [software services and platform provider]).
5. Mr. Scott Douglas asked that the project call him to discuss ways to eliminate the 4800-Bit Block. Mr. Gitlin stated that the SN has tried some things.
6. Mr. Gitlin provided an SGSS system context. The SGSS must live within a context characterized by existing SNGS-internal and external physical and functional

interfaces. The SGSS will modernize a major portion of the existing SNGS, but not all the SNGS.

7. Mr. Gitlin provided an SGSS functional view. Lower elements on the diagram are the customer user path and upper elements are the TDRS path.
8. Mr. Gitlin provided an SGSS global perspective. SGSS consists of multiple ground terminals; Guam and Blossom Point will not have operations centers. If one terminal is disconnected from the SN Operations Center (SNOC), it can operate for 30 days but cannot transmit schedules. Schedules could be received via the phone. Data could be transmitted out on recordings. SGSS can be extended easily.
9. Mr. Gitlin provided a physical architecture perspective.
10. Mr. Gitlin reviewed the SGSS service redundancy strategy.
11. Mr. Gitlin reviewed the User Mission Operations Center (MOC) management and control interfaces. The strategy is consistent with the existing SN Access System (SNAS).
12. Mr. Gitlin described the user interfaces. The SN is moving to packet transport wherever possible.
13. Mr. Gitlin reviewed the SGSS improvements (new flexibilities, new interfaces, new support resources, and new system operations and management features.
14. Mr. Gitlin provided a high-level schedule. Operations reviews start in November 2014 and continue for a year.
15. Mr. Mike Marsh asked if SGSS will be housed in the existing buildings. Mr. Gitlin replied existing facilities will be used. He commented that the amount of miniaturization is phenomenal. SGSS will reduce the 24 DSP racks at the Second TDRSS Ground Terminal (STGT) to 1.5 racks. No relocation of current equipment will be required.
16. Mr. Marsh asked what the intended use for Blossom Point will be. Mr. Gitlin replied that that Blossom point will be used for non-NASA use. Space Communications and Navigation (SCaN) is looking at NASA use. The architecture will support NASA use.

C. USS CR Status. Mr. Pat Boldosser provided a USS CR status

1. Mr. Boldosser reviewed the SN ground system state of health diagram. The state of health is reviewed monthly and quarterly. The diagram helps to illustrate what needs to be done to get to SGSS. The focus in on the KSA/SSA. The SN wants to ‘Green’ up these services.
2. The purpose of the USS CR effort is to mitigate obsolescence and extend the WSC ground terminals until the SGSS IOC.
3. Mr. Boldosser reviewed a series of SGLT block diagrams for the various services (SSAF, SSAR, KSAF, and KSAR). He noted that the KSAR is the most complex of the services.
4. Mr. Boldosser reviewed the USS Legacy M&C architecture.
5. Mr. Boldosser reviewed the detailed USS CR CMS architecture. The MCSs will have new M&C functionality.
6. Mr. Boldosser provided a USS CR service support overview. The project will have as little impact as possible. There will be no changes to the scheduling process, the sequence of events for service support, the overall command and control logic and timing, the NCCDS software. There will be new equipment and M&C interfaces.

There will be no changes to the USS service monitoring process. GCMRs will be processed as before. Status and performance data from the new GCEs will be collected in the MCS.

7. Mr. Boldosser provided a project status. The Critical Design Review (CDR) was conducted in April 2011. Narrow and wide band modems and the PTE have completed Factory Acceptance Testing (FAT). The up and down converters have completed FAT. All switches have completed FAT. Hardware Level-3 testing is underway. ADPE software modifications are completed and have been delivered to WSC for code analysis and review. Level-4 system test dry runs will begin in the Development Test and Training Facility (DTTF).
8. Mr. Boldosser provided a DTTF block diagram. A test system is being built at a facility at GSFC.
9. Mr. Boldosser reviewed a high-level test schedule. SGLTs will be brought back up as soon as testing is complete.
10. The user community is being requested to participate in Level-5 testing.
11. Mr. Mark Severance has asked to speak to the SN in regards to getting narrow band modems for the Electronic Systems Test Laboratory (ESTL).

ACTION ITEM REVIEW

The following action item was assigned at the April 18, 2012, NSG SN Status splinter meeting.

AI No.	Assignee	Action	Due Date	Status
0412-NSG SN Status-01	Jim Bangerter/ GSFC/ NASA/ HSF ND	Work with the GCs to provide customer POCs for TDRS-K level 6 testing.		**Open**

(Original Approved By)
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