

Clause J.1 Attachment A
STATEMENT OF WORK
FOR
SPACE COMMUNICATIONS NETWORK SERVICES

October 2008

1.0 Space Communications Networks Services Contract

NASA Goddard Space Flight Center's (GSFC) goal for the Space Communications Networks Services Contract (SCNS) is to enable mission success for every customer using SCNS services. Key objectives of the SCNS contract are to decrease cost and maintain or improve operational efficiency and reliability, while maintaining an acceptable level of risk and providing for safe operation of the missions. The Contractor shall implement a safety, health, and mission assurance program that provides a safe and healthy work environment, minimizes program risk, and maximizes NASA mission success.

This contract is performance-based. The Statement of Work (SOW) and Core Requirements and Indefinite Delivery, Indefinite Quantity (IDIQ) Task Orders will describe the work to be performed by the Contractor in terms of NASA-required outcomes and/or results. The Contractor shall be responsible and accountable for achieving the required results.

1.1 The Statement Of Work Structure

The Core SOW is defined in Sections 1.0 and 2.0. The Indefinite Delivery, Indefinite Quantity (IDIQ) requirements are outlined in the Statement of Work Section 3.0. Core requirement functions, such as configuration management, quality assurance, etc. are required to support IDIQ Task Orders.

The Space Network (SN) is comprised of a fleet of on-orbit Tracking and Data Relay Satellites (TDRS) and associated ground systems that provide telecommunications services. The nature of the SN architecture, i.e., extremely large capital investment, contractor operated facilities, continuous 24x7 requirements, etc., lends itself to a core requirements approach.

The Ground Network (GN) consists of an Orbital Tracking Network and the Satellite Laser Ranging Network. The nature of the Ground Network architecture, i.e., diverse mix of commercial and Government assets, evolving geographic and technical customer requirements, and legacy systems, etc. lends itself to an IDIQ approach.

Other activities, i.e., Very Long Baseline Interferometry Network operations and maintenance (O&M), Electronic System Test Laboratory, requirements development, hardware and software development, etc. are best suited to an IDIQ approach in the resource-constrained environment that NASA operates in.

1.1.1 On-Site/Off Site

For this Statement of Work on-site refers to work being performed on government owned facilities and off-site means work performed on Contractor facilities.

The Contractor's program management function shall be performed off-site. Support under Section 2.0 (Core) of the SOW shall be performed on-site. Support under Section 3.0 (IDIQ) of the SOW, including supporting functions under Section 1.0, may be performed either on-site, at off-site Contractor facilities, or a mixture of on-site and off-site locations as agreed to in the individual IDIQ Task Orders.

1.2 Work Breakdown Structure

The Contractor shall provide the contract Work Breakdown Structure (WBS) and WBS dictionary in accordance with DRD 1.2-a. This WBS shall serve as the framework for contract planning, budgeting, cost reporting, and schedule reporting to NASA.

1.3 Program and Network Management

The Contractor shall maintain a qualified work force as demonstrated by: training and skills certification, engineering and operations workforce experience, educational attainments and security clearances. The Contractor shall maintain training and certification records, as appropriate, for each employee. The Contractor shall maintain training and certification plans for designated critical positions.

The Contractor shall employ proven and efficient management systems for the planning, organization, control, and reporting of all activities required by this contract. These systems shall assure accomplishment of program technical and schedule requirements, and meeting cost objectives. The Contractor shall detect, document, track, report, isolate, and resolve anomalies in SCNS services and systems with minimal/no interruption to ongoing services. The Contractor shall provide on-line access for all documentation as specified by the Contracting Officer (CO).

The Contractor shall provide, implement, and maintain a program management approach to be thoroughly described in an Integrated Management Plan in accordance with DRD 1.3-a. The Contractor shall provide, implement, and maintain processes to ensure that the networks and services are available and operating to the required performance and security levels.

The Contractor shall develop, maintain, and report technical performance metrics which effectively measure the level of performance in execution of the SOW and IDIQ Task Orders. A subset of these metrics shall correlate to the Space Network Proficiency and Availability for the Space Network as identified in Appendix A of the SCNS SOW, operations anomaly counts, forecast of equipment trends and those metrics identified in IDIQ Task Orders.

The Contractor shall implement a compliant Information Technology Security (ITS) program, which meets at least the minimum requirements of the NASA ITS program as specified in the most current editions of NPD 2810.1 Security of Information Technology, and NPR 2810.1A, Security of Information Technology, and NFS 1852.204-76. The Contractor shall implement Information Technology (IT) security requirements (compliance reviews, contingency plans, incident reporting and handling, risk assessment, security plan, physical security, vulnerability scanning, audit trails, network and systems access controls, and annual self assessments).

All Contractor employees with NASA issued PIV Cards (badges) whose computer systems are normally directly connected to a NASA network using NASA Internet Protocol (IP) address space shall participate in the NASA Operational Messaging and Directory Service (NOMAD). NOMAD accounts shall be furnished by the Government.

All SCNS contractor personnel shall complete NASA provided on-line training as directed by the Contracting Officer, including but not limited to the following: annual IT Security, Sensitive But Unclassified Information, Property Management.

Contract No. NNG09DA01C

In order to comply with the Section 508 Standards for Electronic and Information Technology, the contractor shall perform all software application development, including the development of code, in compliance with the technical standards delineated in 36 Code of Federal Regulations (CFR) Part 1194.21 Software Applications and Operating Systems. Also, the contractor shall perform all web development in compliance with the technical standards delineated in 36 CFR Part 1194.22 Web-based Intranet and Internet Information and Applications.

The Contractor shall provide the Government insight (the common Websters Dictionary definition) into all SCNS activities sufficient to allow the Government to understand and manage Government risk. The Contractor shall provide and implement a Risk Management Plan and maintain a Risk List in accordance with DRD 1.3.b.

The Contractor shall demonstrate to NASA a readiness to provide new services and support new missions as specified in each customer's mission requirements documentation (see SOW Section 3.1.2). "New Services" are defined as those services, existing or modified, similar to existing communications services provided, that will meet the requirements of new missions and projects as each are established. The Contractor shall prepare and present to NASA for approval a Mission Operations Readiness Review for each mission to describe the Contractor's operations readiness for support of launch, early orbit, operational support, and end of mission, including nominal and contingency/emergency support in accordance with DRD 1.3-c. NASA will utilize the Engineering Peer Review process described in Goddard Procedural Requirements (GPR) 8700.6 to conduct the Mission Operations Readiness Reviews.

The Contractor shall develop, implement, and maintain Emergency Preparedness and Disaster Recovery Plans for the facilities in accordance with DRD 1.3-d. The Contractor's obligation may include resolution of unusual or emergency situations. The Contractor may be required to assist NASA, within the general scope of work, but in currently unidentified ways, in preparation for, or in response to emergencies. Obligations under this requirement shall only arise when one or more of the criteria at FAR 18.001, enabling NASA to utilize "Emergency Acquisition Flexibilities", are met. If the emergency preparedness and response requirements result in changes to the contract, all contract adjustments will be processed in accordance with the Changes clause of this contract.

The Contractor shall develop, implement, and maintain a Reliability, Maintainability and Sustaining Plan to ensure that the preventive maintenance and readiness procedures are accomplished at the appropriate intervals (daily, weekly, monthly, semi-annual, annual, etc.) in accordance with DRD 1.3-e. The Contractor shall utilize Maximo ® version 5.2, or later, to perform reliability centered maintenance data management.

The Contractor shall coordinate replacement of aging/obsolete systems/components, in accordance with DRD 1.3-e. NASA will review all proposed candidate replacements and retain approval authority.

The Contractor shall provide, implement, and maintain a systems engineering management approach to be thoroughly described in a Systems Engineering Management Plan in accordance

with DRD 1.3-f. The Contractor shall provide, implement, and maintain sound systems engineering practices for all new development and sustaining engineering activities required by this contract.

1.4 Planning

The Contractor shall perform all necessary program management functions in order to plan, implement, track, report, and deliver the required services described in this SOW. The Contractor shall provide all personnel and other resources, except as otherwise specified in the contract, necessary to accomplish these services.

The Contractor shall develop processes to respond to mission requirements changes (see SOW Section 3.1.2). Specifically, the Contractor shall maintain mechanisms to provide new services, support existing services more efficiently, and to reduce costs as requirements are eliminated.

IDIQ Task Orders will be issued through NASA's Task Order Management System (TOMS). The Contractor shall employ a responsive and efficient process to respond to IDIQ Task Orders, as issued by the Contracting Officer, and submit a Task Implementation Plan (TIP) and Cost Estimate for review and approval by the Government, in accordance with DRD 1.4-a.

The Contractor shall provide, maintain and implement a Phase-in Plan to transition all the SOW and Task Orders activities from the Near Earth Networks Services contractor to ensure a seamless transition. The Government will hold a Phase-in Operations Readiness Review prior to the SCNS contractor assumption of full technical performance.

The Contractor shall provide, maintain and implement a Phase-out Plan to transition all the SOW activities from the SCNS Contractor to follow-on Contractor(s) in accordance with DRD 1.4-b.

The Contractor shall enter into Associate Contractor Agreements (ACA) for any portion of the contract requiring joint participation in the accomplishment of the Government's requirement. The agreements shall include the basis for sharing information, data, technical knowledge, expertise, and/or resources essential to the integration of the Networks, which shall ensure the greatest degree of cooperation to achieve NASA mission objectives and the contractor to meet the terms of the contract.

1.5 Management Reporting/Reviews

The Contractor shall prepare and submit reports in accordance with DRD 1.5-a and DRD 1.5-b. The Contractor shall support NASA management reviews in accordance with DRD 1.5-a, and those specified in individual IDIQ Task Orders.

The Contractor shall present root cause and corrective action, failure investigation, and mishap investigation reviews to the Government and respond to Action Items.

1.6 Financial Management

The Contractor shall provide and maintain a financial management system for planning, tracking, accumulating, and reporting contract costs and providing other financial support required to meet

the cost reporting, billing, and disclosure requirements of the contract. All financial systems shall support NASA's agency-wide Integrated Enterprise Management System. At a minimum, financial systems shall support monthly cost reporting by elements of cost and by at least Level 3 of the contract Work Breakdown Structure (WBS); some elements may require monthly cost reporting at Level 4 of the WBS. In addition, financial systems shall support cost reporting by IDIQ Task Order, customer and mission. This shall include Contractor reporting of cost at a customer/mission level by 3 digit WBS level and/or the provision of technical and usage metrics to support government charge-back allocations. The Contractor's financial system shall also be capable of allocation of cost to customers based on government approved allocation methodologies.

Contractor financial management systems shall support periodic reporting of Contractor staffing levels and cost by labor category and WBS element. The system shall support occasional ad hoc requests for data by geographic location and WBS element. The Contractor shall provide periodic financial planning and information as may be requested to support the government budget process and to support special requests for impacts to budget challenges. NASA shall specify the format and content of the Contractor's inputs and supporting rationale in the special request guidance.

The Contractor shall utilize an Earned Value Management System (EVMS) that shall comply with the guidelines in ANSI/EIA-748 for cost control and reporting for IDIQ Task Orders for Hardware and/or Software developments with an estimated total contract value of greater or equal to \$20 million. For IDIQ Task Orders for Hardware and/or Software developments with an estimated total contract value of greater or equal to valued at \$50 million or more, the contractor EVMS shall be formally determined compliant with ANSI/ EIA-748 by the cognizant Federal contract management agency. The Contractor shall provide EVMS documentation in accordance with DRD 1.6-a,b,c as part of Task Order deliverables for Tasks that require EVMS..

1.7 Export Control

Since some of the SCNS systems are to be delivered and installed, and some Tracking and Data Acquisition services obtained from locations outside the United States, the Contractor shall be required to perform all activities necessary for the export of these systems. In order to protect the national security and to further U.S. foreign policy objectives, export control laws regulate such transfer activities. Relevant export control laws and regulations include the Export Administration Regulations (EAR), 15 CFR 730-774, and the International Traffic in Arms Regulations (ITAR) 22 CFR 120-130 that are administered by the Departments of Commerce and State, respectively. The Contractor shall be responsible for the all aspects of the export process, including but not limited to the following:

- The Contractor shall be responsible for the all aspects of the export process, including but not limited to the following:
- Determining what items (equipment, software, documentation, information, etc.) require an export license
- Coordinating with the proper government agencies to ensure compliance with the appropriate US export control laws and/or regulations

- Obtaining the required export licenses and Technical Assistance Agreements
- Retaining all required export documentation for the required period of time after exportation

1.8 Property and Logistics Management

The Contractor shall employ a property management system in place, which is approved by a delegated NASA property administrator. The Contractor shall perform property management of all property owned, leased, or acquired by the Government under the terms of the contract. The Contractor shall develop and document an Integrated Logistic Support regimen which addresses at a minimum hardware maintenance; supply support, including re-supply and return; spares re-procurement; technical data and documentation; maintenance tools, test, and support equipment; material transportation and handling; maintenance training; and logistic support performance measurements for the life of the contract. The Contractor shall utilize Maximo ® version 5.2, or later, to perform Property and Logistics Management data management.

The Contractor shall provide, implement, and maintain a Government Property & Logistics Management Plan in accordance with DRD 1.8-a.

1.9 Configuration Management and Control

The Contractor shall perform configuration management and shall provide, implement, and maintain a Configuration Management Plan in accordance with DRD 1.9-a that addresses identification, control, verification, and accounting for facilities, systems, interfaces, and mission reconfiguration products. The Contractor shall facilitate NASA insight into the Contractor configuration management process.

The Contractor design drawings shall bear the entity's name, address, federal code identification, contract number and drawing number.

NASA Configuration Control Board approval is required for changes that affect SCNS networks capabilities and external interfaces.

1.10 Security Management

For all of the locations at which this contract is performed, the Contractor shall comply with all applicable Federal, agency, and site security requirements, and for submitting to the appropriate security organization any required official correspondence (e.g., applications, registrations, waivers, permits, negotiated agreements, requests for information from/to regulatory agencies).

The Contractor shall establish effective and comprehensive industrial, information, and communications security programs. These programs shall be in accordance with the National Industrial Security Program Operating Manual; the most current edition of NASA Procedural Requirements (NPR) 1600.1, NASA Security Program Procedural Requirements; NASA site specific regulations; SN Security requirements in SCNS SOW section 2.3.2; Security Management Plan in accordance with DRD 1.10-a, which shall address security at all involved sites; and DD Form 254. The Contractor shall provide protection/safeguarding of personnel, facilities, assets, equipment, and classified information and materials; and unclassified sensitive,

technological data and information. The Contractor shall support secure flight, engineering and operations of secure facilities and systems through the implementation and adherence to SCNS requirements, in accordance with NASA, Department of Defense (DoD) and Federal regulations governing NASA Mission Essential Infrastructure, National Security and Critical Infrastructure. These functions require the application of, communications, information, and personnel security, and configuration management. The Contractor shall provide Communications Security (COMSEC) controlling authority for encrypted communications, and provide technicians certified to perform limited cryptographic maintenance and operations.

Mission Critical Space System Personnel Reliability Program personnel positions are identified in the DD-254. The Contractor shall maintain a list of individuals in covered mission critical positions and submit NASA Form 1734 to GSFC Security for those personnel.

The Contractor shall provide Security Reports and Records in accordance with DRD 1.10-b.

1.11 Safety and Health Management

The Contractor shall develop, maintain, and implement an approach to ensure the protection of personnel, property, and equipment. Contractor facilities and activities in support of institutional and space flight program objectives shall comply with pertinent premises clauses, NASA policies and requirements and Federal, state, and local regulations for safety, health, and emergency preparedness.

The Contractor shall implement a system safety approach in which testing, flight support, ground operations, and maintenance activities are assessed for hazards. The Contractor shall institute a risk management process for assuring personnel and property will be protected from injury or harm as a result of exposure to these hazards in accordance with NASA policies and requirements for hazard reduction.

The Contractor shall develop motivation, awareness, training, and certification programs for their employees in safety matters. This will include regularly scheduled safety meetings for supervisors, foremen, and employees. Contractors shall document safety-related training in accordance with Occupational Safety and Health Administration (OSHA) requirements.

The Contractor shall report safety data on mishaps, close calls, and lessons learned as required in the most current versions of GPR 1700.1, Occupational Safety Program at Goddard Space Flight Center, NPR 8621.1, Reporting of Mishaps and Close Calls, and in accordance with OSHA requirements. The Contractor shall conduct root cause and corrective actions for all mishaps in accordance with investigation procedures as specified in the Contractor's safety plan.

The Contractor shall monitor and self-evaluate activities for compliance with the safety provisions or requirements of the contract, and conduct program reviews to identify and correct any potential safety problems at an early stage.

The contractors shall provide NASA with access to their activities to determine the adequacy of safety measures. Contractors shall also provide access for NASA Headquarters and Center safety program review teams for them to conduct selected announced and unannounced reviews of Contractor operations.

Contractor personnel located on NASA facilities shall comply with the applicable Center safety and emergency planning requirements. The Contractor shall document their emergency points of contact and safety responsibilities for all operations with safety implications.

The Contractor shall include safety responsibilities in subcontracts.

The Contractor shall assess all Government-Furnished Property and Facilities associated with the contract and advise the Contracting Officer (CO) and Contracting Officer Technical Representative (COTR) of areas not in compliance with OSHA standards.

The Contractor shall enter Material Safety Data Sheets (MSDS) into the Center's MSDS Inventory System for all hazardous materials brought onsite or where requested by the Safety Office. The Contractor's hazard analyses/safety risk assessment shall be developed and provided to GSFC for approval before the start of any hazardous deliverable work or support operations as directed by the CO or the COTR.

The Contractor shall comply with the most recent version of GPR 8715.1, Processing of NASA Safety Reporting System (NSRS) Incident Reports; NASA-STD-8719.9, Standard For Lifting Devices And Equipment; and NASA-STD-8719.11 with change 3, NASA Safety Standard for Fire Protection.

1.12 Quality Assurance

The Contractor shall establish, maintain, and implement a Quality Assurance Plan (QAP) to ensure compliance to the Quality Management System (QMS) requirements.

The Contractor shall establish and maintain a QMS on the effective date of the contract that, as a minimum, adheres to the requirements of AS9100, Quality Management Systems – Aerospace – Requirements. An ANSI-ASQ National Accreditation Board certified third party registration body shall register the Contractor's QMS no later than 15 months after the start of Phase-in.

The work activities, operations, and documentation performed by the Contractor or his suppliers are subject to evaluation, review, audit and inspection by the government designated representatives. The Government quality assurance representatives shall be provided documents, records, and equipment needed to perform their assurance and safety related surveillance activities.

The Contractor shall comply with the requirements of the most current edition of NPR 7150.2, NASA Software Engineering Requirements and NASA-STD-8719.13, Software Safety Standard. The Contractor shall establish and maintain software engineering management processes on the effective date of the contract that, as a minimum, adhere to the requirements of CMMI®-SE/SW Capability Level 2, or higher, as measured by a Software Engineering Institute (SEI), in the following Process Areas: Requirements, Management, Configuration Management, Process and Product Quality Assurance, Measurement and Analysis, Project Planning, Project Monitoring and Control, and Supplier Agreement Management. A SEI authorized lead appraiser from an external organization shall register the Contractor's software engineering management processes

to CMMI®-SE/SW Capability Level 2, or higher, no later than 15 months after the start of Phase-in.

The Contractor shall incorporate in their QMS appropriate metrology and calibration requirements as per the most current edition of NASA Policy Directive (NPD) 8730.1. The Contractor shall comply with the requirements of the most current edition of NPD 8730.2 NASA Parts Policy.

All hazardous operations as well as the procedures to control them shall be identified.

The contractor shall comply with the following technical standards:

- a. NASA-STD-8739.1, Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies
- b. NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology
- c. NASA-STD-8739.3 with/change 2, Soldered Electrical Connections
- d. NASA-STD-8739.4 with/change 3, Crimping, Interconnecting Cables, Harnesses, and Wiring
- e. NASA-STD-8739.5, Fiber Optic Terminations, Cable Assemblies, and Installation
- f. IPC-D-2221A, Generic Standard on Printed Board Design
- g. ANSI/ESD S20.20-1999, Electrostatic Discharge Association Standard for the Development of an Electrostatic Discharge Control Program for – Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)

1.13 Environmental Management

For all of the locations at which this contract is performed, the Contractor shall comply with all applicable international, Federal, state, and local environmental requirements, environmental Executive Orders, NASA Procedural Requirements, and GSFC environmental directives, procedures, and policies. The contractor shall submit to the appropriate environmental regulatory agencies any required official correspondence (e.g., permits/permit applications, negotiated agreements, and requests for information from/to regulatory agencies).

2.0 Space Network (SN)

The SN is comprised of a fleet of on-orbit TDRS and associated ground systems that provide space communications services for a variety of customers. SN ground systems are located primarily at White Sands, NM; with some systems at Guam; American Samoa; Ascension Island; and Alice Springs and Yatharagga, Australia.

The operational ground systems at White Sands include five Space-to-Ground Link Terminals (SGLT) with integrated end-to-end test systems, two S-Band Tracking, Telemetry, and Command Systems (STTCS), two Data Interface Systems (DIS), two TDRSS Operations Control Centers (TOCC), one White Sands Alternate Relay Terminal (WART), one Extended TDRSS Ground Terminal (ETGT), one Network Control Center Data System (NCCDS), and one SN Web Services Interface (SWSI). The White Sands Complex (WSC) also contains a Hardware Maintenance Depot (HMD) and a Software Maintenance and Training Facility (SMTF). The WSC Transmission Control Protocol (TCP)/Internet Protocol (IP) Data Interface Service Capability (WDISC) service equipment is located at White Sands.

The Guam Remote Ground Terminal (GRGT) contains two SGLTs and associated equipment, including an Uninterruptible Power Supply (UPS), located in Guam. The US Navy is the host of the GRGT. Navy facilities support to the GRGT is documented in 450-AGMT-0031-2.

Scheduling and scheduling interface are performed with the NCCDS, User Planning System (UPS), and SWSI systems. The future Space Network Access System (SNAS) will take on the functionality of both the SWSI and UPS, and be available to replace those systems on the customer side of the scheduling interface.

There are Bilateral Ranging Transponder Systems (BRTS) located at White Sands, American Samoa, Ascension Island, and Alice Springs. BRTS corrective maintenance and sustaining engineering is currently performed at GSFC.

The automated Australian TDRSS Facility (ATF) in Yatharagga, Australia provides S-band tracking, telemetry and command (TT&C) coverage for a TDRS drift; diverse S-band backup TT&C to the Guam tracking station; S-band TT&C for general reconfiguration of the TDRS Constellation and ground systems (e.g., antenna preventive maintenance); and diverse tracking geometry for expeditious orbit determination for TDRS anomaly recovery. No TDRS customer services capability can be provided by the ATF – it only supports the health and safety of TDRS

The Demand Access System (DAS) is distributed between White Sands and Guam. It allows unscheduled access to the TDRSS Multiple Access system.

The SN operates in an automated fashion, in response to electronic inputs (schedule requests from customers, service change requests from customers, and TDRS and customer state vectors from the Flight Dynamics Facility or customers).

The White Sands Test Facility (WSTF) is the host of the White Sands Complex. The WSTF provides test equipment calibration, property excess services, refuse collection, water supply, sewer service, natural gas service, environmental protection services, fire protection services, and emergency services. This support is documented in 450-AGMT-0045.

2.1 Space Network Operations

The Contractor shall provide round-the-clock (24x7) operations of the SN, monitoring SN systems and external interfaces, detecting, reporting, isolating, and resolving anomalies in SN systems, interfaces, and services. The Contractor shall perform subsystem and system testing, as needed, to identify and diagnose problems. The Contractor shall provide reporting of SN operations in accordance with DRD 1.3-a, DRD 1.3-e, DRD 1.5-a, and DRD 1.5-b.

The Contractor shall meet or exceed proficiency of SN services as defined in Appendix A.

2.1.1 TDRS Flight Operations

The Contractor shall safely and efficiently operate the TDRS spacecraft in accordance with WSC Local Operating Procedures.

NASA will provide direction or approval to the Contractor for all non-routine operations such as TDRS on-board redundancy management, TDRS relocation, and TDRS retirement/disposal. NASA, through the Contractor, will communicate with the Department of Defense's Joint Space Operations Center (JSpOC) prior to significant spacecraft operational or end-of-mission maneuvers, per the most current edition of NPD 8710.3 NASA Policy for Limiting Orbital Debris Generation.

2.1.1.1 TDRS Console Operations

The Contractor shall provide TDRS console operations, which consists of monitoring TDRS telemetry on TOCC workstation displays and responding to out-of-limits conditions, sending commands for routine and non-routine spacecraft operations, performing ground antenna handovers and frequency switches, preventing, if possible, and recovering from Emergency Time Outs (ETOs) and losses of attitude control, and scheduling TDRS tracking to provide the Flight Dynamics Facility (FDF) with data to use for TDRS orbit determination.

2.1.1.2 TDRS Spacecraft Engineering Support

The Contractor shall provide TDRS spacecraft engineering support, which consists of generating command plans for routine spacecraft bus operations, maintaining telemetry limit databases, generating command plans for non-routine spacecraft operations, monitoring TDRS performance via long term telemetry trending and periodic payload performance testing, and directing ETO recovery, attitude recovery, and other non-routine operations. TDRS spacecraft performance trends shall be reported and presented to NASA in accordance with DRD 1.5-a.

2.1.2 SN Customer Support

The Contractor shall operate the SN to provide customer services as specified in each customer's mission requirements documentation (see SOW Section 3.1.2).

2.1.2.1 Space Communications Services

The Contractor shall operate the SN to provide space communications services to customers. SN services include forward (command) and return (telemetry) services, TDRS tracking services, and line outage recording/playback services. The Contractor shall monitor SN systems and external interfaces. The Contractor shall detect, report, isolate, and resolve anomalies in SN services.

The Contractor shall participate and support integrated mission simulations and rehearsals. At formal NASA reviews the Contractor shall present the results of the Contractor's performance during the integrated mission simulations and rehearsals and the status of SN systems and subsystems.

A description of SN services is included in the Space Network Users Guide, 450-SNUG.

2.1.2.2 Scheduling/Control/Status

The Contractor shall provide SN scheduling, control, and status. NASA will maintain a support priority scheme and maintain authority to direct changing support priority to missions based on mission phase, special events and spacecraft contingency operations.

2.1.2.2.1 NCCDS Operations

The Contractor shall operate the NCCDS to provide scheduling, control, and status for SN customer services. When automated support systems are unavailable, the Contractor shall provide scheduling, control, and status for SN customer services by directly interfacing with WSC systems. NASA will provide scheduling priorities for SN supported missions.

2.1.2.2.2 Scheduling of Non-customer Activities

The Contractor shall provide scheduling for TDRS spacecraft operations and SN maintenance, engineering, and test activities, coordinating service outages with customer support activities to ensure mission success. The Contractor shall meet or exceed availability of SN services as defined in Appendix A.

2.1.2.2.3 BRTS Scheduling

The Contractor shall schedule BRTS contacts to provide the FDF with tracking data to use for TDRS orbit determination.

2.1.2.2.4 Service Accounting

The Contractor shall provide service accounting reports by mission in accordance with DRD 1.5-a, for the purposes of customer billing, audit and investigation, trending, and cost reporting.

2.1.2.3 WSC Alternate Relay Terminal (WART)

The Contractor shall provide support to National Science Foundation personnel at the South Pole via the WART. The WART interfaces with TDRS-1 to provide SN service connectivity to the South Pole TDRS Relay (SPTR). The Contractor shall provide operations, maintenance, and sustaining engineering for the WART system, and for the SPTR file server (hardware and software), all located at WSC.

2.1.2.4 Australian TDRSS Facility (ATF)

The Contractor shall operate the ATF remotely from WSC to provide backup S-band TT&C coverage for scheduled TDRS spacecraft. The Contractor shall work with the host agency staff in Australia to advise them to perform occasional hardware resets or line replaceable unit change out, as needed. The Contractor shall provide corrective maintenance and sustaining engineering for the ATF system and its components.

2.2 Space Network Engineering and Maintenance

2.2.1 Sustaining Engineering

The Contractor shall provide sustaining engineering for SN ground systems hardware, software, and firmware. The Contractor shall perform software maintenance of systems. Software maintenance activities may include: arranging vendor maintenance agreements for commercial off-the-shelf (COTS) products, corrective maintenance of operational custom software systems, modifications to existing operational custom software systems, supporting test and integration of new or modified software, installation of software products and patches, maintaining currency of software licenses, documenting software changes and problems, maintenance of operational parameter databases, and control of software system configurations.

The Contractor shall maintain the capabilities necessary to modify and enhance SN systems. The Contractor shall modify, test, and replace SN subsystem components as necessary to ensure operability and maintainability while meeting or exceeding all system performance specification requirements. The Contractor shall periodically review the systems and procedures, and identify candidates for reengineering, where changes could reduce the cost and/or risk in operations or maintenance, or improve operations services in accordance with DRD 1.3-e and DRD 1.3-f. Ground equipment availability shall be reported and presented to NASA in accordance with DRD 1.5-b.

2.2.2 Engineering Configuration Management and Documentation

2.2.2.1 Engineering Configuration Management

The Contractor shall provide configuration management for SN systems. The Contractor shall provide informational copies of all changes that affect SN equipment duplicated at the Compatibility Test Van (CTV) and at the Johnson Space Center Electronic Systems Test Laboratory (ESTL) to CTV and ESTL personnel.

The Contractor shall maintain a discrepancy reporting system, which shall prioritize and describe operational, hardware, software and firmware problems along with problem resolution history descriptions.

2.2.2.2 Documentation Maintenance

The Contractor shall maintain SN documentation for systems and subsystems functional and performance requirements, interface specifications, system design, as-built implementations,

operations procedures, maintenance documentation, and SN process documentation in WSC Local Operating Procedures, in accordance with DRD 1.9-a.

2.2.3 Maintenance

The Contractor shall provide preventive and corrective maintenance for SN ground systems hardware and associated special test equipment. The Contractor shall meet or exceed availability of SN services as defined in Appendix A. Preventive maintenance for the BRTS equipment located at American Samoa, Ascension Island, and Alice Springs; and for the Australian TDRSS Facility in Yatharagga is performed by the host agencies. The Contractor shall submit WSC general-purpose test equipment to the WSTF support contractor for calibration. The Contractor shall submit GRGT general-purpose test equipment to Andersen Air Force Base for calibration, per 450-AGMT-0020. The Contractor shall repair and return failed SN unique equipment sent from the CTV and ESTL and failed Statistical Multiplexers from GSFC and JSC. The Contractor shall perform limited cryptographic maintenance (see 1.10, 2.3.2).

2.3 Space Network Support Functions

2.3.1 Facilities

2.3.1.1 Facilities Operations and Maintenance

The Contractor shall provide round-the-clock facilities operations and maintenance at the WSC, including buildings, grounds, antennas, HVAC, electrical power plant, vehicles, mechanical, plumbing, environmental, lighting, security, and fire protection systems. The Contractor shall provide preventive and corrective maintenance for the GRGT UPS, including on-site staffing with vendor trained personnel, appropriate on-site spare parts, and securing vendor support contracts to ensure continuous operations of the GRGT UPS system. The Contractor shall comply with the requirements of the most current edition of NPR 8831.2, Facilities Maintenance Management and NASA STD 8719.7, Facility System Safety Guidebook.

The contractor shall deliver an environmental management plan that describes how the contractor will manage environmental requirements at the White Sands Complex in accordance with DRD 1.13-a that describes how the contractor plans to manage environmental requirements at the WSC. At a minimum, the Plan shall address how the contractor will meet the requirements set forth in the most recent version of Goddard Policy Directive (GPD) 8500.1.

2.3.1.2 Custodial

The Contractor shall provide custodial maintenance for the WSC and keep the facilities in a clean condition. Custodial maintenance shall include, but not be limited to, such services as floor care, emptying waste containers, cleaning restrooms, etc.

2.3.1.3 Facilities Configuration Management and Documentation

The Contractor shall provide configuration management for SN facilities. The Contractor shall maintain documentation for SN facilities systems requirements, designs, as-built implementations, operations procedures, and maintenance documentation.

2.3.2 SN Security

The Contractor at a minimum must have a Secret security clearance for the personnel working at the WSC in accordance with the National Industrial Security Program Operating Manual (NISPOM).

The Contractor shall provide security protection for the WSC per the most current editions of NPR 1600.1 and NPR 1620.3. The Contractor shall comply with NASA Force Protection Condition (FPC) program requirements. The Contractor shall provide security support services, e.g., electronic security, classified document control, material destruction, security container (safe) tracking, identification services, key and keycard control, analyses of security, personnel security support, and other such related duties. The Contractor shall protect the WSC in accordance with NASA regulations relative to the Critical Infrastructure Protection Program (in compliance with Presidential Decision Directive-63).

The Contractor shall maintain and control COMSEC equipment in accordance with the DD-254.

The contractor shall maintain and annually update the TDRS Protection Plan in accordance with DRD 2.3.2-a. The plan shall identify security control procedures that can be exercised on a routine basis to ensure protection strategies are satisfied and TDRS space system vulnerabilities are mitigated. The TDRS Protection Plan and all relevant documents will be provided to the successful Offer following the award of the SCNS contract.

The Contractor shall furnish equipment, materials, and supplies necessary to provide the routine and emergency protective and security support services required; including, but not limited to, cleared escorts; locksmith services; electronic security services; classified material control, tracking, and destruction; and personnel security services

The Contractor shall maintain files of visitor requests, all logs, and records in an orderly and consistent manner and provide contact after hours taking messages or paging personnel as required. The Contractor shall provide Security Reports and Records in accordance with DRD 1.10-b.

The Contractor shall provide daily pick-up and destruction of classified and sensitive waste. The Contractor shall provide courier service of classified material in the local area as directed by the NASA Station Director.

Note: Armed guards for the WSC will be provided by the Consolidated Protective Services Contract.

2.3.3 SN Logistics

The Contractor shall provide inventory control, requisitioning, local procurement, shipping and receiving, pickup and delivery of mail, and property management (real and controlled). Logistics and property management shall be performed in accordance with DRD 1-8-a. The Contractor shall submit excess property to WSTF for disposition. The Contractor shall maintain all government furnished resources to ensure continued service delivery at required performance levels and reasonable retention of government property value.

2.3.4 WSC Administrative Computing, Networking, and Telecommunications

The Contractor shall provide administrative computing, networking, and telecommunications services for the WSC.

3.0 IDIQ Support

The Contractor shall perform IDIQ Task Orders as issued by the CO to provide and support engineering and operations. The contractor shall provide Task specific Technical Management and supporting functions as described in SOW Section 1.0 for each IDIQ Task Order. Contract-wide Program Management provided under WBS 1.x shall not be charged to IDIQ task orders.

Qualified personnel with security clearances with a SECRET level, and in some cases higher (as defined in the IDIQ Task Order), may be required by the Contractor to support certain IDIQ Task Orders.

NASA will utilize the review processes described in the most current versions of GPR 8700.6 Engineering Peer Reviews and NPR 7123.1, NASA Systems Engineering Processes and Requirements, at predetermined points in the IDIQ Task Orders for Hardware and Software developments.

3.1 System Engineering and Development

The Contractor shall perform studies, develop systems, integrate and test systems, and provide system engineering and technology expertise in accordance with DRD 1.3-f. Procurement of hardware and other materials may be required. Systems engineering services shall include as a minimum: Requirement Development and Analysis; Design; Plan; Schedule; Cost Estimation and Control; Configuration Management; Test; Verification and Validation; Implementation; and Documentation.

The Contractor shall develop detailed design plans describing the various elements and systems proposed. The Contractor shall provide technical project management services. The Contractor shall maintain and provide detailed schedules at review meetings, and as required in Task Orders.

3.1.1 Engineering Studies

The Contractor shall provide engineering analysis and studies for operations concept definition, systems engineering, trade studies, and system analysis in support of the ground stations, networks, missions and projects in the formulation, implementation, or operations phase. The Contractor shall provide Radio Frequency and Optical communications engineering support for evaluating customer mission end-to-end communications architectures, designs, and concepts. IDIQ Task Orders may cover a broad range of network operations, systems engineering and development domain areas.

3.1.2 Mission Requirements Development

The Contractor shall support development, evaluation, alternatives analysis, documentation, and maintenance of mission requirements to assist NASA in defining missions' requirements. Requirements development occurs in all stages of mission lifecycle: Pre-Formulation, Formulation, Implementation, pre-Launch and Launch, and Operations through end of mission.

The Contractor shall document customer requirements in accordance with NASA and GSFC procedures, per the Task Orders. Requirements development, evaluation, maintenance, and coordinated response for requirements and commitments in support of Human Space Flight mission Program Requirements Document shall be accomplished via the Universal Documentation System (UDS) and the Kennedy Space Center (KSC) Automated Support Requirements System (ASRS).

3.1.3 Networks Loading, Modeling and Analysis

The Contractor shall provide SN and GN loading assessments, network architecture assessments, mission requirements feasibility assessments, telecommunications analyses to characterize RF and geometric performance, maintenance and updates to the mission set, modeling and capability studies using the Network Planning and Analysis System (NPAS) and/or other tools to support the networks and customer missions. The Contractor shall provide quick reaction and comprehensive analyses, under government direction, of mission feasibility or networks architecture assessments leading to NASA commitments for Space and Ground Network resources. These efforts require the development of unique dynamic modeling solutions, both for analysis and presentation of results, based on perceived customer telecommunications service requirements and/or new network services. The scope of these studies may vary in size from complex coverage definition analyses to full GN and SN loading studies, and trade-off studies designed to answer particular customer or network management requests. Mission feasibility assessments will analyze and assess the ability to support potential, new, and/or unique missions with the SN and GN, and make recommendations to NASA. Any of the above studies and analyses may include non-NASA network resources such as commercial ground stations.

3.1.4 Testing, Simulations, and Integration

The Contractor shall coordinate and implement the testing and integration of new systems as well as customer missions with the supporting networks (including NASA and non-NASA providers); and participate in internal and external reviews as required. Integration services shall encompass the full life cycle of Networks, missions and projects.

The Contractor shall verify that the integrated systems are capable of supporting Network operations. The Contractor shall provide engineering interface testing with other SCNS elements and customers based upon changes to their systems or upon change to the Networks. The Contractor shall provide test development services, coordination of training and documentation updates required for each delivery, operational transition support, and development liaison program support. The Contractor shall conform to facility, project, network, and security interfaces.

The Contractor shall segregate test and simulated data from operational data. The Contractor shall provide the capability to ingest test data from customer provided media.

The Contractor shall provide test services to customers for interface and function verification. For all items delivered for operational usage, the Contractor shall perform operational acceptance tests to verify and validate requirements. The test results shall be available in reviews and reports.

The Contractor shall provide simulation services to ensure proper system performance and readiness for operational and maintenance requirements. Simulation services are critical for establishing readiness for mission operations. The Contractor shall configure and operate systems necessary to support mission simulations and rehearsals.

The Contractor shall perform element level simulations and testing, for the systems requirements covered under this contract, in order to verify proposed system configurations and designs meet mission requirements and to advance operational proficiency. These element level simulations and tests shall be successfully accomplished prior to scheduled integrated simulation and test events.

The Contractor shall present the results of simulations and tests at various NASA reviews.

3.1.5 Hardware and Software Development

The Contractor shall provide for the design, implementation, integration, test, and transfer into operations of hardware and software systems for network services, missions, and projects. The Contractor shall provide the capabilities and skills necessary to modify, enhance and replace systems. The Contractor shall provide the ongoing development of selected service components and systems and to support current and future missions for both radio frequency and optical services. The Contractor shall provide for the design and development of advanced technology concepts and the advancement of their associated Technology Readiness Level (TRL).

3.1.6 Facilities Engineering

The Contractor shall provide Architect-Engineer services in support of Network Construction of Facilities projects that may include Preliminary Engineering Reports, design packages, minor and major construction, modification/rehabilitation construction, and repair construction. These services shall include as a minimum, engineering, project management, construction, supervision, inspection, documentation, and activation and validation. The Contractor shall comply with the requirements of the most current edition of NPD 8820.2, Design and Construction of Facilities and NPR 8820.2, Facilities Project Implementation Guide. The Contractor shall comply with the requirements of the most current edition of NPR 8831.2, Facilities Maintenance Management and NASA STD 8719.7, Facility System Safety Guidebook. Note: This IDIQ element is estimated to be less than 5% of the IDIQ contract value and will be located only in non-hostile countries.

3.2 Sustaining Engineering

The Contractor shall provide sustaining engineering for hardware, software, and firmware. The Contractor shall provide the capabilities necessary to calibrate, evaluate, and replace subsystems. The Contractor shall configure, modify and replace subsystem components as necessary to ensure operability and maintainability. The Contractor shall periodically review the systems and procedures, and identify candidates for reengineering, where changes could reduce the cost

and/or risk in operations or maintenance, or improve operations services in accordance with DRD 1.3-e.

3.2.1 Software Maintenance

The Contractor shall perform software and firmware maintenance of systems. Software maintenance activities may include: arranging vendor maintenance agreements for COTS products, corrective maintenance of operational custom software systems, modifications to existing operational custom software systems, supporting test and integration of new or modified software, installation of software products and patches, documenting software changes and problems, maintenance of operational parameter databases, maintaining currency of software licenses, and control of software system configurations.

3.2.2 Hardware Maintenance

The Contractor shall perform hardware and firmware maintenance of systems. The hardware maintenance function includes activities required to maintain the ground systems in a mission support ready status. Hardware maintenance activities may include: re-installation and modification of existing equipment, preventive and corrective maintenance, and replacement of equipment as needed to maintain original hardware configuration functionality, and documentation of equipment architecture and cabling configurations.

The Contractor shall provide on-call maintenance of critical operational mission systems hardware requiring high availability, and low mean time to repair.

3.3 Logistics

The Contractor shall provide logistics services in support of Networks requirements in compliance with DRD 1.8-a. The Contractor shall provide preparation for shipping of support systems, repair parts, equipment and supplies utilizing the NASA facilities when available and advantageous. The Contractor shall maintain all government furnished resources to ensure continued service delivery at required IDIQ Task Order performance levels and reasonable retention of government property value. All shipments shall be accomplished with Commercial Bills of Lading (CBL). For McMurdo Ground Station, National Science Foundation (NSF) handles shipping and receiving to Antarctica by their US Antarctic Program prime contractor.

The Contractor shall provide an efficient spares logistics system, which is required for key component parts. Quick response vendor agreements for some COTS and custom hardware components shall be required for critical hardware.

For shipments as a part of IDIQ Task Orders, the Government may direct the Contractor to obtain preservation, packing, crating, labeling, marking, and transportation and shipping services from the GSFC Transportation Management Office, Code 230

3.4 Ground Network Space Communications Services

The Contractor shall provide space communications services to meet customer requirements covering pre-launch testing, launch, early orbit, and on orbit through end of mission. Customers include robotic spacecraft, expendable launch vehicles and Human Space Flight. The Contractor shall operate the GN to provide customer services as specified in each customer's mission

requirements documentation (see SOW Section 3.1.2). The Contractor shall demonstrate the readiness to provide new services and support new missions prior to service need. The Contractor shall integrate external tracking resources into the GN as necessary to meet mission requirements.

The Contractor shall detect, report, isolate, and resolve anomalies in services.

The Contractor shall provide downlink, uplink, tracking, air/ground voice, orbital scheduling services, and short-term data storage through NASA and non-NASA assets, as described in the Ground Network Users Guide (453-GNUG) and other GN documents in the reference library.

The Contractor shall maintain mechanisms to provide new services, and to reduce costs, such as when requirements are eliminated.

The Contractor shall establish and maintain GN Commercial Service subcontract(s). The resulting GN Commercial Services shall be utilized in conjunction with other assets to provide best value services to the missions.

The Contractor shall provide visibility into their Network support obligations and station loading, both near-term and far-term. The Contractor shall provide information and safeguards to enable external resources to be certified by NASA authorities to process data and interface to NASA systems prior to operational use.

3.5 Satellite Laser Ranging (SLR) Network Operations

The Contractor shall provide SLR services to meet customer requirements. The Contractor shall manage, operate, engineer, maintain, and sustain NASA SLR sites. The Contractor shall provide data operations support, to include data reception, data processing, data analysis, orbit determination, and acquisition generation. The Contractor shall detect, report, isolate, and resolve anomalies in services.

The Contractor shall operate the SLR Network to provide customer services as specified in each customer's mission requirements documentation (see SOW Section 3.1.2). The Contractor shall demonstrate the readiness to provide new services and support new missions prior to service need. The Contractor shall provide a dedicated first order geodetic surveying and surveying analysis capability.

3.6 Very Long Baseline Interferometry (VLBI) Network Operations

The Contractor shall provide VLBI services to meet customer requirements. The Contractor shall manage, operate, engineer, maintain, and sustain NASA VLBI sites, provide sustaining engineering at cooperating sites, support satellite command and control, and support guest activities and equipment. The Contractor shall provide data operations support to include data acquisition and data transmission. The Contractor shall detect, report, isolate, and resolve anomalies in services.

The Contractor shall operate the VLBI Network to provide customer services as specified in each customer's mission requirements documentation (see SOW Section 3.1.2). The Contractor shall

demonstrate the readiness to provide new services and support new missions prior to service need. The Contractor shall provide a dedicated first order geodetic surveying and surveying analysis capability.

3.7 Electronic Systems Test Laboratory (ESTL)

The Contractor shall provide maintenance, operation, configuration management and sustaining engineering to the ESTL Ground Space Tracking and Data Network (GSTDN), Command Telemetry and Recording Area (CT&RA), ESTL Second Tracking and Data Relay Satellite System (TDRSS) Ground Terminal (ESTGT), and Ground Antenna Systems areas at the Johnson Space Center (JSC). The contractor shall provide engineering support for the ESTL GSTDN, CT&RA, ESTGT, and Ground Antenna Systems areas including equipment maintenance, configuration management to maintain fidelity equivalent to the parent Space Network and Ground Network sites. The contractor shall provide ESTL test support for the ESTL GSTDN, CT&RA, ESTGT, and Ground Antenna Systems areas.

The contractor shall provide tracking support for satellites and spacecraft in view of the ESTL facility as required supporting the ESTL test schedule. The contractor shall obtain necessary pointing information for tracking support as required. The contractor shall provide support to ESTL Aircraft Customers as required. This support shall include design, installation, and maintenance of equipment used on board the NASA aircraft fleet, as well as tracking support for aircraft as required.

3.8 Operations Support Services

3.8.1 NASA Integrated Services Network (NISN) Interface

The Contractor shall provide engineering, maintenance, logistics, and operations support to NISN for interfaces to the SCNS (Closed, Restricted and Open IONet). The Contractor shall provide support for activities including reviewing planned upgrades, engineering the SCNS side of the NISN-SCNS interface, development and operational coordination with NISN, installing NISN equipment, replacing failed NISN units with spares, returning failed NISN units for maintenance, rebooting NISN equipment, and reconfiguring NISN equipment.

3.8.2 Mission Unique Equipment

The Contractor shall operate and perform required preventive and corrective maintenance necessary for mission unique equipment located at Network sites. Mission unique systems include: Demand Access Technology (DAT)-1, DAT-2, Direct Downlink Technology (DDT) and Multiple Access Technology (MT)-1, Earth Observing System (EOS) Ground Station Interface Facility (GSIF), EOS Data Archive Facility (DAF), and EOS Real-time Processing System (ERPS).

3.8.3 Facilities Operations and Maintenance

The Contractor shall provide facility plant operations and maintenance at designated Network sites including: positive integrity control and access control monitors; power generation and distribution; environmental control systems including HVAC and hazardous waste; facility

configuration control and maintenance of “as-built” building drawings; water supply and distribution; maintenance of fire detection and suppression systems; and custodial services. The Contractor shall comply with the requirements of the most current edition of NPR 8831.2, Facilities Maintenance Management and NASA STD 8719.7, Facility System Safety Guidebook.

3.8.4 Alternate Wide Area Network Services

The Contractor shall provide Wide Area Network services between designated NASA facilities and commercial/foreign ground stations.

3.8.5 IT Security

The Contractor shall implement a compliant Information Technology Security (ITS) program for the Networks and systems, which meets at least the minimum requirements of the NASA ITS program as specified in the most current edition of NPD 2810.1, Security of Information Technology, and NPR 2810.1, Security of Information Technology, NFS 1852.204-76. Specific deliverables for Networks and systems, due dates, and other requirements will be identified in IDIQ Task Orders.

The Contractor shall provide security engineering, maintenance, and operations for systems protecting information stored, transmitted or processed. The Contractor shall implement Information Technology (IT) security requirements (compliance reviews, contingency plans, incident reporting and handling, risk assessment, security plan, physical security, vulnerability scanning, audit trails, network and systems access controls, and annual self assessments

Appendix A: Space Network (SN) Metrics

Metrics will form only a portion of the overall SN evaluation. NASA will separately evaluate performance elements not covered by metrics. The SN metrics are SN Service Proficiency and SN Availability. The SN Service Proficiency metric is the primary SN metric and carries a weight five times that of the SN Availability metric.

SN Service Proficiency:

Excellence: at least 99.97%.

Minimum Expectation: at least 99.90%.

Period of Measurement: Calendar month

Proficiency is defined as the percentage of time services were provided out of the total of forward and return service time scheduled in a period.

$$\text{Proficiency} = (\text{Tsch} - \text{Tloss}) / \text{Tsch},$$

where Tsch is defined as the total of all forward and return service time scheduled in the period, and Tloss is defined as the total of service times lost in the period.

Service outages caused by TDRS spacecraft failures (except if caused by inappropriate spacecraft operations), weather, NISN, customer Mission Operation Centers (MOCs), customer spacecraft, FDF, or other elements external to the SN are not considered in the proficiency calculation. Service outages caused by SN operations and ground systems (hardware, software, or firmware) failures are considered losses in the proficiency calculation. BRTS events are not considered in the proficiency calculation. If there is a forward service loss that causes a return service loss for a coherent event, both the forward and return losses are counted as losses in the proficiency calculation.

SN Availability:

Excellence: at least 98.00%.

Minimum Expectation: at least 97.00%.

Period of measurement: previous twelve months, measured monthly

Availability is defined as the percentage of time services are available for customer support.

Availability = $(\text{Texp} - \text{Tdown}) / \text{Texp}$, where Texp is defined as the time the service is expected to be available (24x7), and Tdown is defined as the total amount of time the service is not available.

Metrics shall be recorded for each service, but only the SN average is required to be reported. Some examples of system down-times included in the availability calculation are software deliveries, engineering changes, system failures, system maintenance, periodic TDRS testing, and internal tests not requested by customer missions. The amount of time considered in the

Contract No. NNG09DA01C

availability calculation shall be the actual downtime or the time customers are prevented from scheduling the service, whichever is larger. The SN consists of a total of 123 services as described below.

Table of SN services

Element	# of Services	
SGLT-1	16	SSA1F, SSA2F, KSA1F, KSA2F, MAF, SSA1R, SSA2R, KSA1R, KSA2R, MAR (5), DAS (EMC), TTC
SGLT-2	16	Same as SGLT-1
SGLT-3	9	No MAF, MAR, or DAS
SGLT-4	16	Same as SGLT-1
SGLT-5	16	Same as SGLT-1
SGLT-6	13	Only 2 MAR
SGLT-7	15	SSA1F, SSA2F, KSA1F, KSA2F, MAF, SSA1R, SSA2R, KSA1R, KSA2R, MAR (5), TTC
DAS	14	8 at WSC and 6 at GRGT
STTC	2	WSGT and STGT
WART	2	TTC and USS
ETGT	1	
NCCDS	3	SPSR, CCS, and SWSI
SN Total	123	