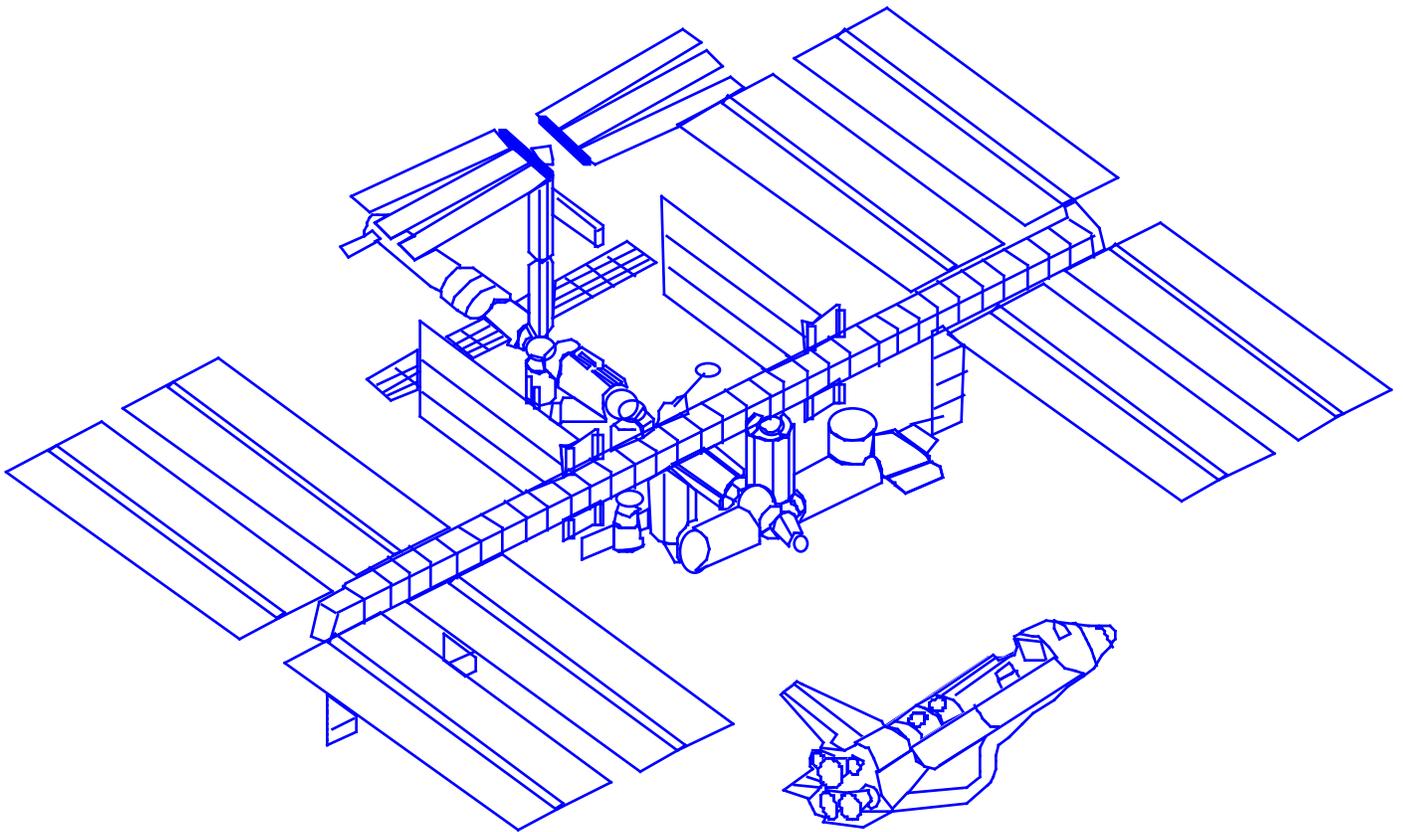


Revised : August 6, 1996

**HUMAN SPACEFLIGHT  
SERVICE LEVEL AGREEMENT  
SLA - 12**



**Technical Area Owner**

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## 1.0 SCOPE

The products, services and associated performance metrics under this Human Spaceflight (HS) Service Level Agreement (SLA) include the current Advance Mission Planning and Requirements tasks and Integrated Networks Planning and Operations tasks currently performed under the Network Mission and Operations Support (NMOS) Statement of Work (SOW) and the current SEAS tasks. The HS SLA consists of two main categories of services and Products:

Advance Mission Planning/Requirements and  
Networks Integration/Operations.

The existence of this HS SLA does not imply replacement or preclusion of current Statements of Work (SOW), Technical Directives (TD's), or other work presently contracted.

Human Spaceflight missions included in this SLA are:

<u>MISSION</u>	<u>FLIGHT FREQUENCY</u>
Space Shuttle	8 per year
International Space Station	Continuous
Reusable Launch Vehicle	TBD
Attached Payloads	Continuous

It should be noted that operations management services provided for contractor access to government facilities supporting Multiple missions and the Tracking and Data Relay Satellite System (TDRSS) are covered by SLA 2.0; Tracking, Data Acquisition, and Communications Service Level Agreement. Selected Services provided by contractors supporting multiple missions, including the TDRSS, will be acquired from SLA 2.0 - Tracking, Data Acquisition, and Communications Service Level Agreement, Flight Dynamics Facility (FDF), and SLA's/GSA's as required.

### Period Of Performance

The period of performance of this SLA is August 01, 1996 through September 30, 1997. Mission planning and analysis for International Space Station (ISS), Reusable Launch Vehicles (RLV) and future Space Shuttle missions are included. This SLA also encompasses the following Space Shuttle missions.

Mission	Launch Date	Landing Date
STS-79/S-MM-4	July 31, 1996	August 09, 1996
STS-80/ORFEUS/SPAS-2	October 31, 1996	November 15, 1996
STS-81/S-MM-5	December 05, 1996	December 13, 1996
STS-82/HST Service-2	February 13, 1997	February 23, 1997
STS-83/MSL-01	March 20, 1997	April 05, 1997
STS-84/S-MM-6	May 1, 1997	May 11, 1997
STS-85/Crista-Spas-02	July, 1997	
STS-86/S-MM-7	September, 1997	

Advanced Planning for missions beyond September 30, 1997 will be supported.

### Change Review Board

Changes to this SLA are required when a change to any portion of this SLA will result in a change in budget or schedule of work defined in the associated Human Spaceflight Project Management Plan (PMP) or Logistics Support Plan (LSP). All changes to this SLA are subject to the approval of the Change Review Board (CRB) established by the joint NASA/Contractor Program Management Team (PMT). All policies and procedures defined by the CRB will be followed to effect any change to this SLA.

## 2.0 FACILITIES

The National Aeronautics and Space Administration (NASA) will provide the following government owned facilities to accomplish Human Spaceflight tasks:

FACILITIES	SERVICES
Network Control Center (NCC)	Continuous (Provided by SLA 2.0)
White Sands Complex (WSC)	Continuous (Provided by SLA 2.0)
NASA Communications (NASCOM)	Continuous (Provided by SLA 2.0)
Flight Dynamics Facility (FDF)	Continuous
Shuttle POCC Interface Facility (SPIF)	40 hours/week
Electronic Systems Test Laboratory (ESTL)/JSC	40 hours/week
Attached Shuttle Payload Center (ASPC)	40 hours/week
Merrit Island Tracking Station (MIL)	80 hours/week (Provided by SLA 2.0)
Ponce De Leon Tracking Station (PDL)	40 hours/week (Provided by SLA 2.0)
Bermuda Tracking Station (BDA)	40 hours/week (Provided by SLA 2.0)
Wallops Orbital Tracking Station (WOTS)	Continuous (Provided by SLA 2.0)
Data Evaluation Lab (DEL)	40 hours/week (Provided by SLA 2.0)
Network Test and Training Facility (NTTF)	40 hours/week (Provided by SLA 2.0)
Compatibility Test Van (CTV)	40 hours/week (Provided by SLA MMCC)
Radio Frequency Simulations Operations Center (RF SOC)	40 hours/week (Provided by SLA MMCC)
Simulations Operations Center (SOC)	40 hours/week (Provided by SLA 2.0)

Continuous services are defined as 24 hours/day, 7 days/week

### Government Furnished Equipment (GFE)

Government furnished equipment (GFE) will be made available to the contractor no later than August 01, 1996. For all NASA facilities listed in section 2 the government will provide and maintain facility space, office space, power, heating, air-conditioning, humidity controls, and furniture. For all NASA and contractor facilities the government will also provide data lines, networks, video and voice communications equipment, test and operations hardware and software.

### Government Furnished Information (GFI)

Government furnished information (GFI) will be made available to the contractor as needed. This information includes, but is not limited to:

- All documentation, memoranda, meeting minutes and other written information that may affect the performance of this SLA received from or generated during discussions with external organizations.
- Various products from external organizations
- Software written by civil servants in support of Human Spaceflight missions

## 3.0 HUMAN SPACEFLIGHT SERVICE CATEGORIES

## SLA-12 SERVICE CATEGORIES

### Advanced Mission Planning

- Advanced Requirements Identification
- Advanced Mission Support Capability Analysis
- Future Operational Guidelines
- Cost Estimating of Standard/Non-Standard Services

### Mission Support Planning

- Mission Support Configuration Planning
- Test and Verification Planning
- Analysis and Dissemination of Schedules & System Impacts
- Support establishment of GSFC Element Support Commitments
- Network Integration Planning

### Mission Documentation Development

- Interagency Agreements Development
- Intercenter Agreements Development
- Implementation & Integration Reports
- SOMO/OSC Sponsored Support Plans
- Support Working Groups/Panels
- Operational Planning
- Interface Document Development

### Requirements Management

- Requirements Analysis
- Requirements Allocation
- Requirements Traceability
- Requirements Integration

### Engineering Services

- Network Integration
- Development and Use of Mission Support Configurations
- NW Configuration Management
- Engineering Support Analyses

### Near Term Integration Planning

- Mission Readiness Certification Activities
- Develop Operational Procedures
- Real-time Nominal & Contingency
- Support Configuration Planning
- System IT&V Planning
- Establish Future Ops Guidelines

### Documentation Maintenance

- Operations Plans
- Operations Directives

### Reporting

- Real-Time Support (Element Reports)
- Test Reporting
- Operational Mission Reporting

### Mission Engineering

- Operational & Technical Support (Real-time Failure Assessment)
- Post-anomaly Reconstruction

### Mission Integration Test & Verification

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• NW Compatibility Test Planning &amp; Conduct</li> <li>• NW Engineering Data Flow Planning &amp; Conduct</li> <li>• Interface Test Planning &amp; Conduct</li> </ul> | <ul style="list-style-type: none"> <li>• Verification &amp; Validation Test Planning &amp; Conduct</li> <li>• Simulations / Training</li> <li>• Launch Support (PAD) Tests &amp; On-Orbit Checkout</li> </ul> |
|--|---|

Planning ----- Implementation

Integration



Launch ----- Operations

**This section describes the services to be performed and the mission products to be generated under this SLA.**

## **4.0 ADVANCE MISSION PLANNING/REQUIREMENTS**

The contractor is responsible for providing Tracking, Data Acquisition and Communications support to the Human Spaceflight missions by coordinating support in the areas of Advanced mission planning, Mission Support planning, Requirements management and Mission documentation development.

### **4.1 Advance Mission Planning/Requirements (Services/Products)**

#### **4.1.A ADVANCED MISSION PLANNING**

SERVICES	PRODUCTS	CUSTOMER
Advanced Requirements Identification	PID/NPRD/PSP/Responses to Direction Statement of Capabilities/ and Program Documentation as Required	SS/ISS/RLV Programs, International Partners, SOMO
Advanced Mission Support Capability Analysis	Loading Studies/Link Budget Analysis/Coverage Analysis/ Design Analysis	SS/ISS/RLV Programs, International Partners, SOMO, Industry Reps
Future Operational Guidelines	Program Support Plans	POCC's, SS/ISS/RLV Programs
Cost Estimating of Standard/ Non-Standard Services	Manpower Matrices/Communications Services Cost Analysis Resource Reports	Human Space Programs and Payloads

#### **4.1.B MISSION SUPPORT PLANNING**

SERVICES	PRODUCTS	CUSTOMER
Mission Support Configuration Planning	Requirement Request Correspondence	SS/ISS/RLV Programs, International Partners SOMO
Test And Verification Planning	Test Methodology Guidelines/ Test Concepts	SS/ISS/RLV Programs, International Partners, SOMO
System Engineering & Analysis	Mission Management Plans, Systems Concepts, Risk Analysis Reports, System/ User Interface Analyses, System Assessments, Integrated Schedules, Operations Scenarios	SS/ISS/RLV Programs, International Partners, SOMO
Support establishment and Operations of GSFC Element Support Committees	Agenda/ Charters/ Presentations/ Action Items/ Issues Tracking & Resolution	SS/ISS/RLV Programs, International Partners, SOMO
Network Integration Planning	MOA's/ MOU's/ PIP's & Annex/ Program Documentation as Required	Human Space Programs and Payloads

**4.1.C REQUIREMENTS MANAGEMENT**

SERVICES	PRODUCTS	CUSTOMER
Requirements Analysis	Draft PRD Statements Capabilities Matrix/ CT&DA Requirements Statements	SS/ISS/RLV Programs, International Partners, SOMO
Requirements Allocation	PRD and CT&DA Responses	SS/ISS/RLV Programs, International Partners, SOMO
Requirements Traceability	ASRS Data Base (Reference GSA: XX)	SS/ISS/RLV Programs, International Partners SOMO
Requirements Integration	Translate to Ops Support Plans (PIP's/ MIP's etc.)	POCC's, SS/ISS/RLV Programs

**4.1.D MISSION DOCUMENTATION DEVELOPMENT**

SERVICES	PRODUCTS	CUSTOMER
Interagency Agreements Development	Draft/Prepare MOA/MOU/ICA's/ Protocols	SS/ISS/RLV Programs, International Partners, SOMO
Intercenter Agreements Development	Draft/Prepare MOA/MOU/ICA/LOA's	SS/ISS/RLV Programs, International Partners, SOMO
SOMO, NASA Sponsored Groups/Conferences Implementation & Integration Support GSFC	Plans/ Status Reports	SS/ISS/RLV Programs, International Partners, SOMO
SOMO/OSC Sponsored Support Plans Working Group/Panels (i.e. NSC/NCG)	Briefing Material as required/ Action Items/ Issues Tracking & Resolution	SOMO, NASA Sponsored Groups/Conferences
Operational Planning	Support Plans/Directives	POCC's, SS/ISS/RLV Programs
Interface Document Development	ICD's/ IDD's and other CT&DA Documents	Human Space Programs and Payloads

**4.1.E GSFC Resident Office (GSFCRO)**

The contractor shall maintain a GSFC human spaceflight resident office at the Johnson Space Center (JSC), the lead NASA center for human spaceflight and space operations mission services. This office shall coordinate and be the focal point at JSC for providing applicable SLA-12 listed GSFC products and services. The office shall provide JSC with local expertise for the preparation and signature concurrence of the GSFC MO&DSD mission support requirements. The office shall provide timely and comprehensive understanding of the requirements and related issues through direct interfaces with the JSC requirements developers and appropriate JSC line elements. Services and products are incorporated in section 4.0 Advanced Mission Planning/Requirements.

## 5.0 NETWORKS INTEGRATION/ OPERATIONS

The contractor is responsible for providing Integrated NASA/ DOD networks support to the Human Spaceflight missions by coordinating support in the Tracking, Data Acquisition and Communications area along with other NASA and DOD elements for Near Term Integration Planning, Engineering services, Mission Integration Test and Verification, Documentation Maintenance, Reporting, and Mission Engineering.

Portions of these Support services, performance parameters and metrics in the following tables are defined in SLA 2.0 (TDAC) section 2.0 Operations Management Services

### 5.1 NETWORKS INTEGRATION OPERATIONS (Services/Products)

#### 5.1.A NEAR TERM INTEGRATION PLANNING

SERVICES	PRODUCTS	CUSTOMER
Mission Readiness/ Certification Activities	Operational Readiness Reviews (ORR/LRR/FRR) Mission Readiness status reports	SS, ISS, RLV Programs
Develop Ops Procedures	Operations Plans/Directives	POCC's SS/ISS/RLV Programs
Real Time Nominal & Contingency Support Configuration Planning Scenarios	Operational & Technical Coordination / Technical Reports	POCC's SS/ISS/RLV Programs
System Integration Test and Verification, (IT&V) Planning	Test Procedures Test Results Reports	POCC's SS/ISS/RLV Programs
Establish Future Ops Guidelines	Operational Concept Assessment/ Lessons Learned Reports	POCC's SS/ISS/RLV Programs

#### 5.1.B ENGINEERING SERVICES

SERVICES	PRODUCTS	CUSTOMER
Network Integration	Loading Analysis/ Resources Reports	SS/ISS/RLV Programs, International Partners, SOMO
Development and Use of Mission Support Configurations	System Analysis Reports	POCC's SS/ISS/RLV Programs
NW Configuration Management	Hardware/Software Baselining / Reporting	Human Space Programs and Payloads
Engineering Support Analysis	Design Performance Coverage	SS/ISS/RLV Programs, International Partners, SOMO

### 5.1.C MISSION INTEGRATION, TEST AND VERIFICATION

SERVICES	PRODUCTS	CUSTOMER
Network Compatibility Tests Planning and Conduct	Test Plans and Procedures Test Results Reports and Analysis Requirements Matrix	POCC's SS/ISS/RLV Programs
NW Engineering Data Flows Planning and Conduct	Test Plans and Procedures Test Results Reports and Analysis Requirements Matrix	Human Space Programs and Payloads
Interface Tests Planning and Conduct	Test Plans and Procedures Test Results Reports and Analysis Requirements Matrix	Human Space Programs and Payloads
Verification And Validation Test Planning and Conduct	Test Plans and Procedures Test Results Reports and Analysis Requirements Matrix	Human Space Programs and Payloads
Simulations / Training	Briefing Messages Simulation/Training Input	Human Space Programs and Payloads
Launch Support (PAD) Tests On- Orbit Checkout	Test Plans and Procedures Test Results Reports and Analysis Requirements Matrix	Human Space Programs and Payloads

### 5.1.D DOCUMENTATION MAINTENANCE

SERVICES	PRODUCTS	CUSTOMER
Operations Plans/ Operations Directives	DCN's / ISI's / RIC's Revisions	POCC's SS/ISS/RLV Programs

### 5.1.E REPORTING

SERVICES	PRODUCTS	CUSTOMER
Real-Time Support	Element Reports	Human Space Programs and Payloads
Test Reporting	Tests Results Reports	Human Space Programs and Payloads
Operational Mission Reporting	Post Mission Performance Analysis / Assessment/ Summaries	Human Space Programs and Payloads

### 5.1.F MISSION ENGINEERING

SERVICES	PRODUCTS	CUSTOMER
Operational and Technical Support	Real-Time Failure Assessment/ Recommendations/Response	POCC's SS/ISS/RLV Programs
Post Anomaly Reconstruction	Configuration Audit Trails/ Anomaly Report Analysis	Human Space Programs and Payloads

## 6.0 Shuttle POCC Interface Facility (SPIF)

The contractor is responsible for providing Shuttle POCC Interface Facility (SPIF) support to the Human Spaceflight missions by coordinating support in the following areas: Serving as the focal point for the interface between GSFC payloads and the Space Shuttle Program (SSP). SPIF's technical services include familiarizing users with the SSP interfaces (hardware, software, and procedures), assisting with requirements definition and coordination, as well as development of mission specific documentation. SPIF operational services include providing pre-mission testing and simulation support, processing shuttle/payload mission data to generate displays and reports, transferring subsets of shuttle mission data to GSFC elements, monitoring voice and data interfaces to assist in problem resolution, and performing block dump analysis for fault isolation. In addition, SPIF maintains an Orbiter Data Reduction Complex (ODRC) interface to JSC to retrieve post-mission shuttle Calibrated Ancillary Systems (CAS) data for distribution to end users.

SERVICES	PRODUCTS	CUSTOMER
Documentation	Memos Operations Plans Requirement Response Test Results Reports Interface Control Documents SPIF/POCC ICA Document	SS and ISS Payloads Principle Investigators
Mission Readiness	Operational Readiness Review Presentation	Space Shuttle Program SS and
Mission Preparation/Testing	Shuttle Data Flows Simulations Verification/Validation Payload Data Flows	ISS Payloads Principle Investigators
Real - Time Mission Support	Subset of Shuttle Mission Data Subset of Shuttle/Payload Data Displays/Reports of Shuttle/Payload Data	SS and ISS Payloads Principle Investigators

## 7.0 Electronic Systems Test Laboratory (ESTL)

The contractor is responsible for providing Electronic Systems Test Laboratory (ESTL) support to the Human Spaceflight missions by maintaining, operating, and upgrading the GSTDN, ESTL-STGT, and ESTL unique hardware to support system and link certification tests. Support shall also be provided for system software/firmware and for data flow to related interfacing systems. Configuration management control processes shall be maintained to ensure that the test systems and all supporting elements remain technically compatible with their Network equivalents.

SERVICES	PRODUCTS	CUSTOMER
Test Preparation/ Test Support	Network Engineering Consulting	JSC/ Avionic System Division
Configuration Management of ESTL Equipment	EC Implementation/ Verification	JSC/ Avionic System Division
Evaluate Upgrades for Human Space Programs	Network Equipment Compatibility	JSC/ Avionic System Division
Authorizes Hardware Changes to SN/GN equipment	Configuration Change Document	JSC/ Avionic System Division
Mission Support as Required	Anomaly Assessment Participant	JSC/ Avionic System Division

## 8.0 Attached Shuttle Payload Center (ASPC)

The contractor is responsible for providing mission planning, mission control, spacecraft analysis, and payload analysis for Attached Shuttle Payload missions controlled from the Attached Shuttle Payload Center (ASPC). The ASPC is the central facility at GSFC for conducting attached payload operations on the Space Shuttle.

SERVICES	PRODUCTS	CUSTOMER
Mission Planning	Spacecraft, payload, network and ground system activity plans	Hitchhicker
Mission Control	Command management Telemetry management Ancillary services	Hitchhicker
Payload Analysis	Telemetry processing Payload status	Hitchhicker
Documentation	Operations plans requirements/ response documents ICA and ICD documents	Hitchhicker

This section describes the services to be performed and the mission products to be generated by purchasing these services and products from the Multi Mission SLA's and GSA's. Details of these activities shall be provided in the Human Spaceflight PMP.

## 9.0 Flight Dynamics Facility Services

The contractor is responsible for providing Flight Dynamics Facility support to the Human Spaceflight missions by providing required products and services. The products provided consist of: acquisition data, planning products, TDRS state vectors, displays, reports, presentations and briefing messages. The services provided include: premission trajectory analysis, continuous performance monitoring of the tracking network, and orbit determination during an EMCC support.

SERVICES	PRODUCTS	CUSTOMER
Premission Support	Communications configuration plan	NASCOM
	Analysis for launch trajectories	ND, NCC, and JSC
	Procedure development for GN and SN support related to acq data processing	GN DSN, DOD stations and NCC/WSC
	Vectors, displays, test reports and analysis for Proficiency Simulations, Vector Verifications, and Ascent/Abort Simulations	ND, NCC, WSC, and JSC
	Vectors for Verification/Validation	NCC and WSC
	Vectors and displays for Joint Integrated Simulations, Goddard Internal Simulations, and Integration & Test support	ASPC
	STS ascent vectors in various formats	Code 532/NORAD, JPL/NOCC, and Code 513
	NFOWG & Document Review Participation	NCC, Code 530, and 501 (JSC for PRD changes)
	ORR Preparation and Presentation	Code 500 and ND
	ISI generation	GN DSN, and DOD stations
	Prelaunch Nominal Acquisition Data	GN DSN, and DOD stations 5th SOPS
	Yaw Steering Vectors	
	Acquisition Data Plan	ND, NCC
	Full Mission Planning and Scheduling Products Predicts & Matrices Full Mission TOPSAS Full Mission RFI Full Mission PSAT D-Tape (copy)	NCC NCC, Code 531.1 Code 513, NCC NOM Code 531.1
	TDRS Vectors (East, West & Spare) Two deliveries	JSC
	SN Launch support vectors	NCC/WSC
	Tracking Network Performance Evaluation Reports (verbal and written)	SN, GN, DSN, DOD, and ND

SERVICES	PRODUCTS	CUSTOMER
Real-Time Support	Ascent, on-orbit, maneuver, and landing acquisition data	GN, DSN, and DOD
	Ascent, on-orbit, maneuver, and landing acquisition data	NCC/WSC (SN)
	Acquisition data for deployable spacecraft when required	GN, DSN, and DOD (Possibly SN too)
	Post-OMS-2 vector in various formats	JPL/NOCC, JPL/Code 400, Code 513, NASCOM TV, ASPC
	Full Mission Planning and Scheduling Products (based on actual OMS-2 vector) TOPSAS Predicts & Matrices RFI	NCC NCC NCC and Code 513
	TDRS vectors Daily Pre- and post-maneuver vectors	JSC JSC
	STS vector (daily)	University of Arizona
	Post-maneuver vectors in various formats	Code 513, NASCOM TV, ASPC
	Real-time Displays via CCTV Launch grid TDRS Beam Angles (launch & landing) 3-D Monitor  3-D Monitor Alpha Numeric	NCC  NCC NCC & ASPC (HST for repair missions)  ASPC
	Predicts & Matrices TOPSAS (updated every 8 hours w/48-hour planning set)	NCC NCC
	Full Mission Planning and Scheduling Products Updated when STS along-track error exceeds 700 km Predicts & Matrices TOPSAS RFI	NCC NCC NCC & Code 513
		Tracking Network Performance Evaluation Reports (verbal and written)
	STS Morning Reports	ND

SERVICES	PRODUCTS	CUSTOMER
Contingency support	Permission acquisition data for RTLS, TAL, and AOA support	GN, DSN, and DOD stations
	Permission predicts and matrices for RTLS, TAL, and AOA support	NCC
	Permission SN backup contingency support vectors	NCC and WSC
	Real-time acquisition data for RTLS, TAL, AOA, BAL/ECAL, ditch, and contingency landing support	GN, DSN, and DOD stations and NCC/WSC
	48-hour planning vector set received every 8 hours (for contingency evacuation support)	NCC or SOC
	Post mission contingency support analysis and reporting	ND, NCC, WSC, JSC, and NASA Management
Emergency Mission Control Center Support Upon Notification	Orbit Determination State vector generation Standard on-orbit scheduling and acquisition data products Best effort entry acquisition data generation for SN support	JSC, KSC, NCC/WSC GN, DSN, and DOD stations and NCC/WSC  NCC/WSC

SERVICES	PRODUCTS	CUSTOMER
Post-Mission Support	Post-Mission Meeting Attendance	ND, NASCOM, and NCC JSC, DOD, WSC, DSN, GN
	GSFC Reviews NOIG & Splinter Groups	
	Post-landing Reports and Analysis	NCC, ND, WSC, JSC
	Landing tape(s)	Code 531.1

## 10.0 TDRSS Spacecraft Operations

TDRSS Spacecraft Operations support services, parameters and metrics for Human Spaceflight missions are defined in SLA 2.0 (TDAC) section 2.2 TDRSS Spacecraft Operations.

## 11.0 Communications Service Levels

Communications Support services, parameters and metrics for Human Spaceflight missions are defined in SLA 2.0 (TDAC) section 3.0 Communications Service Levels.

## 12.0 Tracking Service Levels

Tracking Support Services, Parameters and metrics for Human Spaceflight missions are defined in SLA 2.0 (TDAC) section 4.0 Tracking Service Levels.

## 13.0 RF and Data Services

RF and Data Support services, parameters, and metrics for Human Spaceflight Missions are defined in SLA 2.0 (TDAC) section 5.0 RF and Data Services

## **14.0 PERFORMANCE PARAMETERS AND ASSOCIATED METRICS**

Within the Human Spaceflight SLA similar services and products are grouped into Service Categories as described in Sections 4.0 through 8.0. The Contractor's performance in each of the SLA Service Categories will be evaluated by the Human Spaceflight Technical Area Owners (TAOs). The performance of the Contractor in each Service Category under this SLA will be evaluated at the end of each month.

### **14.1 Human Spaceflight SLA Services and Products**

The majority of the services and products generated by the Human Space Flight SLA consists of technical, engineering, administrative, and management services and specific products resultant from those services. The succeeding paragraphs contain performance parameters and evaluation metrics that will be used to evaluate the following Service Categories:

- Advanced Mission Planning
- Mission Support Planning
- Requirements Management
- Mission Documentation Development
- Near Term Integration Planning
- Engineering Services
- Mission Integration, Test and Analysis
- Documentation Maintenance
- Reporting
- Mission Engineering
- Shuttle POCC Interface Facility (SPIF)
- Electronics Systems Test Laboratory (ESTL)
- Attached Shuttle Payloads Facility (ASPF)

#### **14.1.1 Human Spaceflight SLA Performance Parameters**

To determine the Contractor's performance, each Service Category will be evaluated based on schedule, cost, quantity, and quality criteria:

Schedule - the number of deliveries that are delivered in accordance with the agreed upon delivery schedule.

Quantity - the number of products delivered in accordance with the agreed upon delivery requirement. A single delivery may consist of one or more individual products.

Quality - the number of acceptable deliveries. A delivery is considered acceptable if all of the products in the delivery are correctly formatted, contain correct information, and are accurate for the intended use.

Cost - the success or failure of the contractor to generate and deliver products and perform services according to the agreed cost.

At the Service Category level, the evaluation of each of these criteria is characterized as green, yellow, or red. The TAO consolidates the evaluation of each individual Service Category to derive the overall evaluation of the SLA. Consideration may be given for extenuating circumstances which may have impeded contractor performance.

#### **14.1.2 Human Spaceflight SLA Evaluation Metrics**

##### **Schedule Metric**

The schedule metric determines the contractor's performance under this SLA in terms of success or failure of the contractor to generate and deliver products to the end-users in a timely manner during the evaluation period.

Evaluation of schedule metrics will be based on the product delivery requirements agreements reached between the TAO and TAM and documented in the Human Spaceflight Project Management Plan (PMP)

**GREEN:** Completion as scheduled

**YELLOW:** Event performed unacceptably late with no impact on subsequent milestones or events.

**RED:** Event performed unacceptably late, impacting subsequent milestones or events.

### Quantity Metric

The quantity metric determines the contractor's performance under this SLA in terms of the success or failure of the contractor to generate and deliver products to end users during the evaluation period. Evaluation of quantity products will be based on product delivery requirements reached between the TAO and TAM and documented in the PMP.

**GREEN:** All critical and normal products required to be generated and delivered

**YELLOW:** All critical products and 95% or more of the normal products required to be generated and delivered.

**RED:** Less than 100% of the critical products or less than and 95% of the normal products required to be generated and delivered.

The percent of normal products generated and delivered is calculated as:

$$\frac{\text{Normal Products}}{\text{Total Normal Products}} \times 100 = \%$$

where:

NP = the number of required normal products generated and delivered

TNP = the total number of normal products required to be generated and delivered

### Quality Metrics

The quality metric determines the contractor's performance under this SLA in terms of the acceptability of the products generated and delivered during the evaluation period. Acceptability criteria will be based on the product quality agreement's reached between the TAO and TAM as documented in the Human Spaceflight PMP.

**GREEN:** All generated critical and normal products were deemed acceptable.

**YELLOW:** All generated critical products and 95 % or more of the normal products were deemed acceptable.

**RED:** Any of the generated critical products deemed unacceptable or less than 95% of the normal products were deemed acceptable

The percent of normal products deemed acceptable is calculated as:

$$\frac{\text{Normal Products}}{\text{Total Normal Products}} \times 100 = \%$$

where:

NP = the number of normal products deemed acceptable

TNP = the total number of normal products required to be generated and delivered

### COST METRICS:

The cost metric determines the contractor's performance under this SLA in terms of the success or failure of the contractor to generate and deliver products and perform services according to the agreed cost. Evaluation of cost

metrics will be based on the planned and actual cumulative cost documented in the Human Spaceflight work plan. If any GFE or GFI is not provided by the government as agreed in section 4.0 through 8.0 of this SLA, then the TAO and TAM will, as necessary, negotiate a new “currently planned” cost. In that case, the evaluation of the cost metric will be made against the “currently planned” cost, rather than the original planned cost documented in the work plan.

**GREEN:** Currently no more than 5% above the cumulative-to-date BCWS (Budgeted Cost of Work Scheduled).  
and  
the current EAC (Estimate At Completion) is no more than 5% over the negotiated BB (Baseline Budget).

**YELLOW:** Currently more than 5% above the cumulative-to-date BCWS, but a feasible cost recovery plan is in place to bring the cost at completion to within 5% of the EAC

or

the current EAC is more than 5% above the negotiated BB but a feasible plan is in place that will bring the cost at completion to within 5% of the BB.

**RED:** Currently more than 5% above the cumulative-to-date BCWS, and no feasible cost recovery plan is in place to bring the cost at completion to within 5% of the EAC

or

the current EAC is more than 5% above the negotiated BB and no feasible plan is in place that will bring the cost at completion to within 5% of the BB.

## **14.2 Flight Dynamics Facility (FDF) Services and Products**

The Flight Dynamics products provided to the Human Spaceflight SLA consist of acquisition data, planning products, displays, and reports, presentations, memoranda, and briefing messages. The services provided by Flight Dynamics also include the performance monitoring of the tracking network managed by the Tracking, Data Acquisition, and Communications Service Level Agreement (TDAC SLA) or SLA 2. This section discusses the metrics associated with the performance parameters for Flight Dynamics as well as the metrics needed for assessing the performance of the tracking network.

### **Flight Dynamics Tracking Services**

The Tracking Services listed under the Tracking, Data Acquisition, and Communications Service Level Agreement (TDAC SLA) or SLA 2 will be made available to the Human Space flight SLA (SLA 12). Under these services, the contractor shall provide metric tracking data for Human Space flight missions for which the Network has support requirements, including range, doppler, and angle data in accordance with the formats and capabilities specified in the Spaceflight Tracking and Data Network (STDN) No. 724 document. This service will also include providing tracking data evaluation support to ensure nominal performance at the tracking sites and to ensure adequate nominal tracking data for orbit determination. The tracking data evaluation support will be provided for all elements of the tracking network required to support the Human Spaceflight Mission SLA, including the elements of the TDAC SLA and those outside the scope of the TDAC SLA. In addition, for purposes of this mission SLA, the contractor will also evaluate Doppler data received via the TDRS spacecraft fleet required to support the specific human spaceflight mission. The TDRS spacecraft are therefore listed as “tracking sites”, and evaluation of the tracking data from the TDRS spacecraft will include performance evaluation of the space and the ground segment of the White Sands Complex (WSC) as they relate to the User TDRSS services. It should be noted that the information on the tracking network, performance requirements, and service level metrics for this SLA is consistent with the information listed in the TDAC SLA.

#### **14.2.1 Flight Dynamics Tracking Services Performance Parameters**

The performance of Flight Dynamics Tracking services and products will be evaluated based on schedule, quantity, and quality criteria:

Schedule - the number of deliveries that are delivered in accordance with the agreed upon delivery schedule.

Quantity - the number of deliveries of Flight Dynamics products. A single delivery may consist of one or more individual products.

Quality - the number of acceptable deliveries. A delivery is considered acceptable if all of the products in the delivery are correctly formatted, contain correct information, and are sufficiently accurate for the intended use.

**14.2.2 Flight Dynamics Facility Tracking Services Evaluation Metrics**

1) For premission, on-orbit, and postmission support:

95 Percent of data delivered with acceptable timeliness and quality.

2) For critical mission support

99.7 Percent of data delivered with acceptable timeliness and quality.

The timeliness metric is determined by:

$$\frac{\text{Number of on-time deliveries}}{\text{Total number of deliveries}} \times 100 = \%$$

The quality metric is determined by:

$$\frac{\text{Number of acceptable deliveries}}{\text{Total number of deliveries}} \times 100 = \%$$

Critical support for Human Spaceflight is defined as Shuttle launch and landing, and payload rendezvous and deployment and EVA's.

**14.2.3 Tracking Network Performance Parameters**

The contractor will provide metrics on the performance of the tracking network as defined in the TDAC SLA. The following is a list of the tracking network elements that are currently required to support the Human Spaceflight SLA:

<b>TRACKING SITE</b>	<b>TDAC ELEMENT (YES/NO)</b>	<b>ANTENNA</b>
Bermuda S-band	Yes	9-meter S-band Systems 1 and 2
Bermuda C-band	Yes	FPQ-6
Merritt Island S-band	Yes	9-meter S-band Systems 1 and 2
Wallops S-band	Yes	9-meter S-band System
Wallops Island C-band	Yes	FPS-16
Wallops Island C-band	<b>No</b>	FPQ-6, FPS-16
WSC/TDRS	Yes	All available and required TDRS Spacecraft
DoD C-band	<b>No</b>	C-band radar's required for skin tracking operations
DSN	<b>No</b>	Goldstone (9- and 26-meter), Canberra (26-meter), Madrid (26-meter)

The contractor will provide tracking system performance monitoring and verify the accuracy of the tracking data against the following tracking accuracy requirements:

ANTENNA TYPE	RANGE (METERS)		DOPPLER	ANGLE (DEGREES)	
	PLANNED	RANDOM		PLANNED	RANDOM
9- and 26- meter S-band	15	3	2 mm/sec (1/10 second data rate)	0.05	0.01
WSC (TDRSS )	15	1.5 (High) 3.0 (Med.) 3.0 (Low)	45 MHz 68 MHz 90 MHz (1/sec data rate)	NA	NA
FPQ-6 Skin Track	15	20	NA	0.014	0.01
FPS-16 Skin Track	15	20	NA	0.03	0.02

Individual Ground Network (GN) passes and TDRSS events will be rated as successes or non-successes against the performance parameters listed above. In addition, at the termination of the mission support, a cumulative set of statistics will be derived to verify if the tracking site met the overall performance requirements listed above.

#### 14.2.4 Tracking Network Services Evaluation Metrics

As mentioned above, the Service Evaluation Metrics listed in this SLA for the tracking services are consistent with the metrics listed in the TDAC SLA.

For routine on-orbit mission support

95 Percent of data delivered with specified accuracy .

For critical mission support

99.7 Percent of data delivered with specified accuracy.

Critical support for Human Spaceflight is defined as Shuttle launch and landing, and payload rendezvous and deployment, and EVAs.

The metric is calculated as:

$$\frac{\# \text{ of Events Evaluated} - \# \text{ of Events with Anomalies}}{\text{Total number of events evaluated}} \times 100 = \%$$

## Appendix A

### Glossary of Terms

ASPC	Attached Shuttle Payload Facility
ASRS	Automated Support Requirements System
BDA	Bermuda Island Tracking Station
CAS	Calibrated Ancillary System
CRB	Change Review Board
CT&DA	Communications Tracking & Data Acquisition
CTV	Compatibility Test Van
CNMOS	Consolidated Network Mission Operations Support
DSN	Deep Space Network
DoD	Department of Defense
ESTL	Electronic Systems Test Laboratory
FDF	Flight Dynamics Facility
FRR	Flight Readiness Review
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GN	Ground Network
GSTDN	Ground Station Tracking Data Network
GSFC	Goddard Space Flight Center
HS	Human Spaceflight
ISS	International Space Station
JSC	Johnson Space Center
LSP	Logistics Support Plan
LRR	Launch Readiness Review
MIL	Merritt Island Tracking Station

MIP	Mission Integration Plan
MOA	Memoranda OF Agreement
MOU	Memoranda Of Understanding
NCC	Network Control Center, GSFC
ND	Network Director
NOCC	Network Operations Control Center
NOM	Network Operations Manager
NTTF	Network Test and Training Facility
ORR	Operational Readiness Review
PDL	Ponce De Leon Tracking Station
PIP	Payload Integration Plan
PMP	Project Management Plan
PMT	Program Management Team
POCC	Project Operations Control Center
PRD	Program Requirements
RF SOC	Radio Frequency Simulations Operations Center
RLV	Reusable Launch Vehicle
SIT	SLA Implementation Team
SIT	System Integration Team
SLA	Service Level Agreement
SOMO	Space Operations Management Office
SPIF	Shuttle POCC Interface Facility
SOW	Statement Of Work
SS	Space Shuttle
SSP	Space Shuttle Program
STGT	Second TDRS Ground Terminal

STS	Space Transportation System
TAM	Technical Area Manager
TAO	Technical Area Owner
TD	Technical Directive
TDAC	Tracking, Data Acquisition and Communications
WOTS	Wallops Orbital Tracking Station
WSC	White Sands Complex
WSGT	White Sands Ground Terminal