
NETWORK AND MISSION SERVICES PROGRAMS

**Interface Control Document (ICD)
between
Demand Access System (DAS)
and
Space Network (SN) Web Services Interface
(SWSI)**

Original

1 October 2001



National Aeronautics and
Space Administration

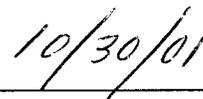
————— Goddard Space Flight Center —————
Greenbelt, Maryland

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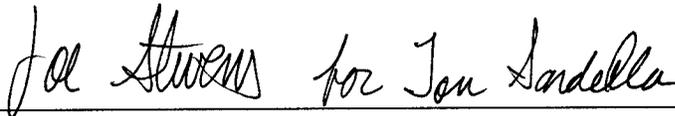
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Preface

The purpose of this document is to provide the interface requirements between Demand Access System (DAS) and Space Network (SN) Web Services Interface (SWSI) system.

This document is under the configuration management of the Network and Mission Services Programs Configuration Control Board (CCB).

This document may be updated by Documentation Control Notices (DCN) or revision.

Direct all comments, questions, or suggestions regarding this document to:

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Section 1. Introduction

1.1 Scope

This Interface Control Document (ICD) defines the interface specifications between Demand Access System (DAS) and Space Network (SN) Web Services Interface (SWSI) System. This document describes the details of the messages exchanged between DAS and SWSI.

SWSI was originally developed to meet the requirements defined in the Interface Control Document between the Network Control Center (NCC) and the Mission Operations Centers (MOC), 530-ICD-NCCDS/MOC. The ICD between the NCC and the MOC covers communications protocols and message formats adhered to by SWSI in support of SN Customers scheduling through the NCC.

This DAS-to-SWSI ICD contains the details of the communications protocols, security protocols, and detailed message formats to meet the interface requirements between the DAS and SWSI systems. To leverage previous work on the SWSI design, DAS utilizes the same communications and security protocols from SWSI since that infrastructure is already under development. This document contains the message organization structure and, at a high-level, the description of information that is contained within the messages exchanged between DAS and SWSI. This information specifies the types of data needed to support the requirements found in the DAS System Requirements Document (SRD), 453-SRD-DAS, and the DAS Operations Concept Document, 453-OCD-DAS.

1.2 Overview

The contents of this document are as follows:

- Section 1 contains the document introduction, which includes the scope, overview, and applicable documents,
- Section 2 contains brief depictions of the DAS Customer interface within the context of the DAS reference architecture and the high level SWSI architecture,
- Section 3 contains the interface descriptions,
- Section 4 contains the message organizational structure, and
- Section 5 contains the message field descriptions.

1.2.1 Documents

Section 1.3.1 lists the documents that are part of this ICD to the extent cited therein. Section 1.3.2 lists documents that serve as references for supplemental descriptive information. The most recent version of these documents takes precedence. If there are conflicts between the listed documents and the requirements of this ICD, the requirements of this ICD take precedence. If no section number is shown, the whole document applies.

1.2.2 Applicable Documents

<u>Document Number</u>	<u>Document Title</u>
453-OCD-DAS	Demand Access System (DAS) Operations Concept Document
453-SRD-DAS	Demand Access System (DAS) Systems Requirements Document
453-SRD-SWSI	Space Network (SN) Web Services Interface (SWSI) System Requirements
453-ICD-DAS/Customers	Interface Control Document between the Demand Access System (DAS) and DAS Customers
IETF RFC 791	Internet Protocol: DARPA Internet Program Protocol Specification
IETF RFC 793	Transmission Control Protocol DARPA Internet Program Protocol Specification
IETF RFC 826	Ethernet Address Resolution Protocol: for Converting Network Protocol Addresses to 48-bit Ethernet Address for Transmission on Ethernet Hardware
http://www.w3.org/XML	Extensible Markup Language (XML) 1.0 (Second Edition), February '98 W3C Recommendation
http://www.w3.org/XML	Namespaces in XML, Jan '99 W3C Recommendation
NPG 2810.1	NASA Procedures and Guidelines (NPG) 2810.1, Security of Information Technology
290-003	IP Operational Network (IONet) Security Plan
290-004	IONet Access Protection Policy and Requirements Document
451-PN CODE SNIP	Space Network Interoperable PN Code Libraries
IEEE Std 802.3	Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

1.2.3 Reference Documents

530-ICD-NCCDS/MOC	Interface Control Document between the Network Control Center Data System and the Mission Operations Centers
452-SDS-SWSI	Space Network (SN) Web Services Interface (SWSI) System Design Specification
453-ICD-DAS/WSC	Interface Control Document between the Demand Access System (DAS) and the White Sands Complex (WSC)
DSN 830-013 TLM-3-29	Telemetry Standard Formatted Data Unit (SFDU) Interface
DSN 830-013 TLM-3-26	DSN Telemetry Interface with MSFC for the Advanced X-ray Astrophysics Facility-Imaging (AXAF-I) Project
DSN 830-013 TLM-3-27	DSN Telemetry Interface with the Advanced Composition Explorer (ACE)
430-14-01-001-0	Interface Control Document between LANDSAT-7 and LANDSAT-7 Ground Network (LGN); Appendix C only
None	Epoch2000™ LEO-T Operations and Maintenance Manual
CCSDS 102.0-B-3	Packet Telemetry. Recommendation for Space Data Systems Standards. Blue Book, Issue 3, Washington, DC: CCSDS, November 1992
CCSDS 101.0-B-3	Telemetry Channel Coding. Recommendation for Space Data Systems Standards. Blue Book. Issue 3, Washington, DC: CCSDS, May 1992

Section 2. DAS Reference Architecture

2.1 DAS Operations Summary

The DAS operations are as described in the DAS Operations Concept Document, 453-OCD-DAS.

2.2 DAS Reference Architecture

The DAS reference architecture is shown in Figure 2-1. The high level SWSI architecture, including the DAS Controller (DASCON) interface, is shown in Figure 2-2.

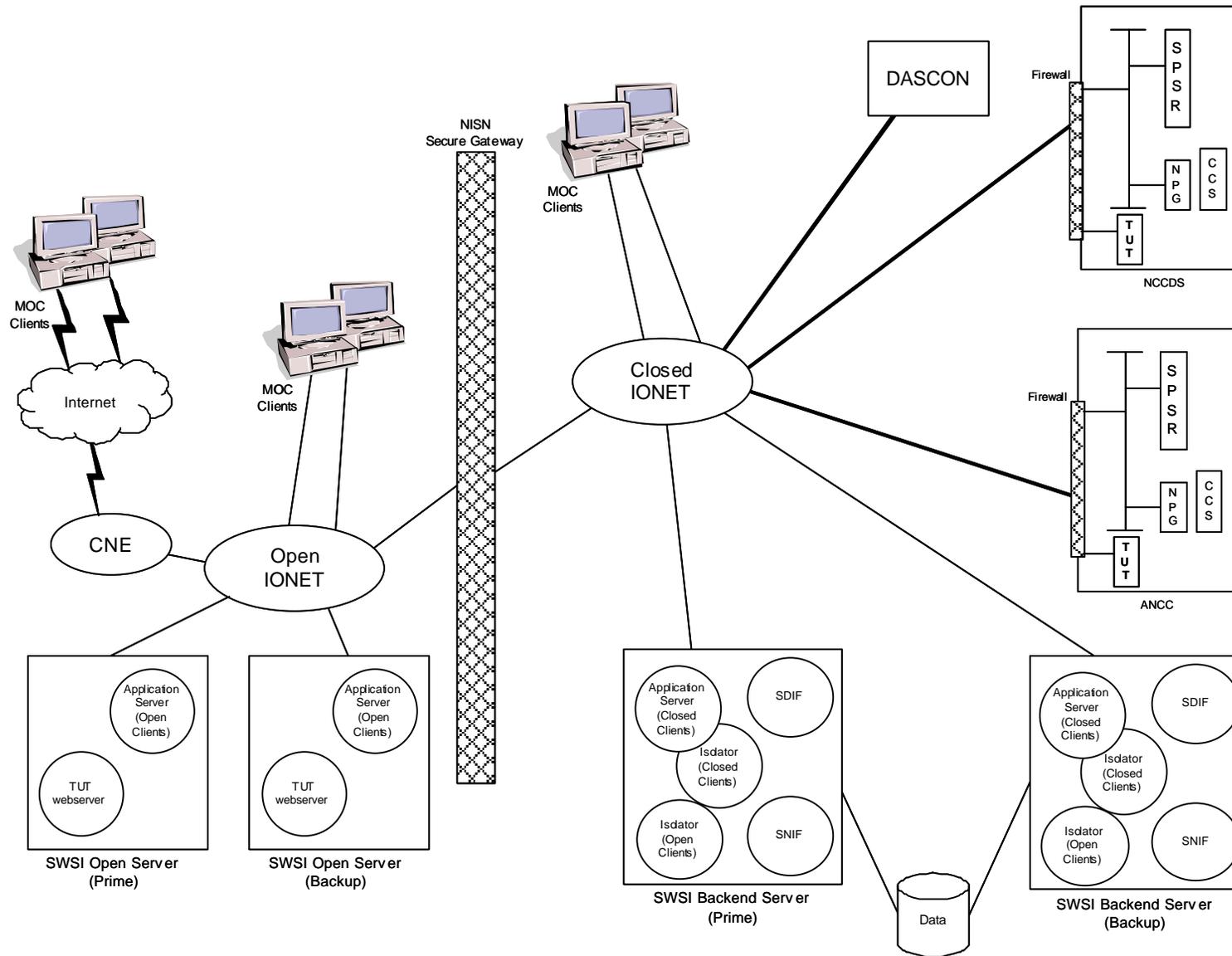


Figure 2-2: High Level SWSI Architecture

Section 3. DAS-to-SWSI Interface Description

3.1 General

This section describes the communications and physical interface between DAS and SWSI.

3.2 Communication Protocols

3.2.1 Communication Requirements

3.2.1.a DAS and SWSI shall communicate over the NASA Integrated Services Network (NISN) Closed Internet Protocol (IP) Operational Network (IONet).

3.2.2 Protocol Requirements

3.2.2.a DAS and SWSI shall use the communication protocols specified in Table 3-1 for message transfer and networking connectivity.

Table 3-1: DAS-to-SWSI Communication Protocols

Protocol Layer	Protocol	Reference
Application	XML	XML 1.0, W3C Recommendation Feb '98, and Namespaces, Jan '99
Transport	TCP	IETF RFC 793
Network	IP v 4.0	IETF RFC 791
Data Link	Ethernet	IETF RFC 826
Physical	10/100 BaseT	IETF RFC 791, IEEE Std 802.3, Part 3

3.2.3 Functional Description

The basic function of the Transmission Control Protocol (TCP)/IP protocol is to provide a reliable, full duplex connection between a process in DAS and another process in SWSI.

In establishing a TCP connection, SWSI performs the client role, and DAS performs the server role. To provide a TCP-based service, a DAS server calls on its Commercial Off-The-Shelf (COTS) TCP module to perform a PASSIVE OPEN with unspecified remote transport address, thereby "listening" for an incoming connection request from any client.

In order to establish a TCP connection to a DAS service, a SWSI application process calls on its COTS TCP module to perform an ACTIVE OPEN, specifying the destination transport address as that of the desired DAS service. A transport address consists of an IP address and port number.

3.3 Security Protocols

3.3.a DAS and SWSI shall implement appropriate security protocols to ensure compliance with the NASA Procedures and Guidelines Security of Information Technology, NPG 2810.1.

- 3.3.b The DAS-to-SWSI interface shall comply with the provisions of the IONet Access Protection Policy and Requirements Document, 290-004, and the IONet Security Plan, 290-003.
- 3.3.c DAS and SWSI shall use the source IP address to validate all connection requests.

Section 4. Message Descriptions

4.1 General

This section contains the structured groupings, the identification, and the sources and destinations of the messages exchanged between DAS and SWSI. Tables 4-1 through 4-7 are organized at the highest level by message category. The message categories reflect the functional aspects of DAS interactions as viewed by SWSI.

4.1.1 Alert Operations

The alert messages advise the DAS Customer of time critical events. Types of alert messages include: service status (granted or pending), service start times, service end times, data storage limits, signal loss, notification of Customer State Vectors (SVs) requiring updates and others. Alert messages also support a free-text format to allow flexibility in advising DAS Customers of time-dependent or critical events. Table 4-1 provides a description of these messages.

Table 4-1: Alert Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Alerts	Alert Messages	001	DAS	SWSI	DAS alert messages sent to the Customer in free text format

4.1.2 Service Planning Operations

Service planning operations include the types of messages used to assist the DAS Customer in identifying periods of DAS resource availability, such as time window for Tracking and Data Relay Satellite (TDRS) visibility from the Customer emitter platform. Table 4-2 describes the service planning request initiated at SWSI and the response message generated by DAS.

Table 4-2: Resource Availability Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Service Planning Operations	Resource Availability Request	100	SWSI	DAS	Customer request for a report on available resource allocations for this Customer
	Resource Availability Response	101	DAS	SWSI	DAS response listing of the time windows when resources are available for allocation for this Customer

4.1.3 Service Allocation Operations

Service allocation operations message types as shown in Table 4-3 allow the DAS Customer to request, modify or delete DAS resources for Multiple Access Return (MAR) services on demand. These message types also provide the DAS Customer with displays of the active DAS service schedules.

Table 4-3: Resource Allocation Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Service Allocation Operations	Resource Allocation Request	200	SWSI	DAS	Customer request for SN resource allocation for an event
	Resource Allocation Response	201	DAS	SWSI	DAS response to the Customer's request for SN resource allocation event (accepted, rejected or pending)
	Resource Allocation Deletion Request	202	SWSI	DAS	Customer request to delete a pending or an ongoing SN resource allocation
	Resource Allocation Deletion Response	203	DAS	SWSI	DAS response to the request for SN resource allocation deletion
	Resource Allocation Modification Request	204	SWSI	DAS	Customer request to modify a pending SN resource allocation
	Resource Allocation Modification Response	205	DAS	SWSI	DAS response to the request for SN resource allocation modification
	Planned Events Request	206	SWSI	DAS	Request for all planned events for a requesting Customer
	Planned Events Response	207	DAS	SWSI	DAS response to planned events request for a requesting Customer
	Event Details Request	208	SWSI	DAS	Request for details of a planned event by a Customer
	Event Details Response	209	DAS	SWSI	DAS response with details for a planned event by Customer

4.1.4 Real-Time Operations

Real-time operations message types allow the DAS Customer to reconfigure on-going active services or to reacquire a lost TDRS signal. Table 4-4 describes these time-critical messages.

Table 4-4: Service Reconfiguration Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Real-Time Operations	Service Reconfiguration Request	300	SWSI	DAS	Customer supplied SN resource specification parameters that can be changed during an ongoing service
	Service Reconfiguration Response	301	DAS	SWSI	DAS response to Customer request for service reconfiguration
	Signal Reacquisition Request	302	SWSI	DAS	Customer request to reacquire the return signal
	Signal Reacquisition Response	303	DAS	SWSI	DAS response acknowledging receipt of the reacquisition request

4.1.5 Service Performance Monitoring Operations

Service performance monitoring message types provide the DAS Customer with updates of service performance. The Customer has the option of enabling or disabling the User Performance Data (UPD) message. UPD messages are sent to the Customer, if requested, through SWSI once every minute after initiation of the service. Table 4-5 contains service performance monitoring message descriptions.

Table 4-5: UPD Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Service Performance Monitoring	User Performance Data Request	400	SWSI	DAS	Customer solicited request for performance data or service status
	User Performance Data Response	401	DAS	SWSI	DAS response for Customer performance data request
	User Performance Data Status	402	DAS	SWSI	DAS supplied Customer performance data as per request

4.1.6 Data Retrieval Operations

Data retrieval message types allow the DAS Customer to retrieve archived data, as necessary. Table 4-6 contains archived data retrieval message descriptions. A Customer may also delete or modify a previous playback request that may or may not yet be on the active schedule.

Table 4-6: Playback Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Data Retrieval	Playback Search Request	500	SWSI	DAS	Customer request for data archive contents
	Playback Search Response	501	DAS	SWSI	DAS report on data archive contents
	Playback Request	502	SWSI	DAS	Customer request for data playback
	Playback Response	503	DAS	SWSI	DAS response to Customer request for playback data
	Playback Deletion Request	504	SWSI	DAS	Customer request to delete a previous playback request
	Playback Deletion Response	505	DAS	SWSI	DAS response to Customer request to delete a playback request
	Playback Modification Request	506	SWSI	DAS	Customer request to modify a previous playback request
	Playback Modification Response	507	DAS	SWSI	DAS response to Customer request to modify a previous playback request
	Playback Event Details Request	508	SWSI	DAS	Customer request to view the details of a playback event
	Playback Event Details Response	509	DAS	SWSI	DAS response with details for a playback event

4.1.7 Customer State Vector (SV) Update Operations

Customer SV update messages provide the means to receive Customer SV updates for the current location of a Customer emitter platform as shown in Table 4-7.

Table 4-7: SV Messages

Message Category	Message Name	Message Type	Source	Destination	Message Description
Customer State Vector Updates	State Vector Update	600	SWSI	DAS	Customer supplied state vector
	State Vector Update Response	601	DAS	SWSI	DAS acknowledgement to a Customer supplied state vector update

Section 5. Message Formats

5.1 General

This section contains the description and contents for each of the messages identified in Section 4. The messages are grouped in sections by the same categories as presented in Section 4. The descriptions identify the detailed information to be exchanged between DAS and SWSI for each message.

Time is referenced to the Greenwich Mean Time (GMT). The time input/output format is represented as year, day of year, hour(s), minute(s), and second(s) (yyyyddd hhhmss) of GMT. The days are represented as the number of days from the beginning of the year, where January 1st is day 01 and December 31st is day 365 or 366 (for leap year). The ranges for hours, minutes, and seconds are from 0 to 23 hours, 0 to 59 minutes, and 0 to 59 seconds, respectively.

5.1.1 Alert Messages

Alert messages advise the DAS Customer of time-based, critical events. There are two categories of alerts that are sent from DAS to SWSI. These categories are: general free flow informational alert messages, such as message 001, and response request status alert messages, which occur as part of messages 101, 201, 203, 205, 301, 303, 401, 501, 503, 505, 507, and 601.

The general free flow informational alert messages are sent from DAS to SWSI. These alert messages can be informational, such as disk storage has reached a limit at 90%, or a vector is due in 2 hours from the Customer. The alerts can convey potential warnings to the Customer such as state vector overdue or re-initialization of a schedule service because of outage. Finally, the alert messages can be critical in conveying potential data loss such as purging files because of reaching 95% of the disk storage capacity or disruption of scheduled service due to signal loss.

The response request status alert sent from DAS to SWSI is provided within the response messages. The response request status alert provides status to the Customer for a specific request message (e.g., messages 101, 201, 203, 205, 301, 303, 401, 501, 503, 505, 507, and 601). The response request status alert may be acceptance of the specific request or rejection with an explanation. The response request status alert is sent as part of the DAS message, then SWSI displays it as an alert to the Customer. The specific acceptance or rejection status text is documented as part of the DAS response messages that are defined in subsequent sections of the ICD.

DAS passes a message code (also referred to as a request status code in the response message) to SWSI as part of the alert or response message. SWSI maintains a list of the alert and request status text, and displays the text to the Customers. DAS maintains an identical list of alert texts as contained in Table 5-2 so that same message text is displayed on the DASCON Local Control and Monitor (LCM). All alerts are displayed with the associated Spacecraft Identification Code (SIC) and the reference request identifier unless it is a general alert message (i.e., sent to all authorized Customers).

5.1.1.1 Alert Messages, Message 001

Types of alert messages include: service (granted or pending), data storage limit, start times, signal loss, and others. An alert message with a SIC code of '0000' implies a general alert message that is to be sent to all authorized Customers.

Table 5-1 describes the contents of the general free flow informational alert message. Item 8 is sent as an optional DAS alert message text that is to be used when item 7, message code, has a value of 099.

Table 5-1: Alert Message, Message 001, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Alert message type generated by DAS and sent to SWSI. Field will contain the number 001.
2	Spacecraft Identification Code (SIC)	Customer identifier SIC of '0000' means a broadcast alert
3	DAS Message Identifier	Message Identifier (ID) generated by DAS
4	Reference Request Identifier	Request ID of message (based on the request ID from message 100, 200, 202, 204, 206, 208, 300, 302, 400, 500, 502, 504, 506, 508, or 600) responsible for the generation of this alert message. If alert is not associated with a specific message then this field will be blank.
5	Time Tag	Time at which this alert message was generated by DAS, yyyyddd hhmss
6	Priority	Green – 'G' – Informational message Yellow – 'Y' – Warning message Red – 'R' – Critical message
7	Message Code	Alert message code sent to SWSI from DAS (refer to Table 5-2 for message codes sent from DAS to SWSI)
8	Message Text	Optional DAS alert text (only used when item 7 is 099, otherwise it is blank)

The alert text for the general free flow alert messages is described in Table 5-2. SWSI generates an alert to the Customer based on the message code received from DAS.

Table 5-2: Message 001 Alert Message Codes Text

Message Code	Text	Message Color
001	Data storage has reached 90% of the allocated total capacity. Old files will be purged when capacity reaches 95%.	Y
002	Data storage has reached 95% of the allocated capacity. Files have been purged.	R
003	Signal Detected.	Y
004	Receiver Lock.	G
005	Signal lost. Reacquisition initiated.	R
006	State vector due from Customer in 2 hours. Send current state vector.	G
007	State vector from Customer older than 24 hours. Send current state vector.	Y
008	Service for reference request ID will be initialized in 2 minutes.	G
009	Ongoing service for reference request ID has been pre-empted due to equipment outage.	R
010	Ongoing service for reference request ID has been pre-empted due to equipment unavailability.	R
011	Ongoing scheduled service for reference request ID reinitialized.	Y
012	Change to schedule due to modification of TDRS transition times	Y
013	Change to schedule due to pre-emption from higher priority service	R
014	Change to scheduled service from granted to pending status	R
015	Change to scheduled service from pending to granted status	G
016	PTP transmission rate is less than the telemetry data rate.	Y
017	PTP transmission rate has changed.	Y
018	Request rejected. Invalid SIC.	R
099	See Note 1	R / Y / G
Note 1: There is no pre-defined alert text for message code 099; the alert text is provided separately in item 8 of message 001.		

5.1.2 Service Planning Operations Messages

Service planning operations include the types of messages used to assist the DAS Customer in identifying periods of DAS resource availability, such as time windows for TDRS visibility from a Customer emitter platform. Service planning operations is based on a 96-hour schedule window. Beyond 96 hours all service requests are considered “pending” until they enter the 96-hour window.

5.1.2.1 Resource Availability Request, Message 100

Resource availability request messages provide the means for a DAS Customer to effectively plan for DAS services based on time visibility window calculations. DAS only supports visibility calculations 96 hours in the future. Only Customer and TDRS platform SVs are used to determine line-of-sight visibility based on physical location and velocity of the Customer and TDRS platforms. Link power budget calculations are not considered in computing visibility time windows. The contents of the resource availability request message are shown in Table 5-3.

Table 5-3: Resource Availability Request, Message 100, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 100 for a report on available resources from DAS
2	SIC	Spacecraft identification code
3	Customer Identifier	Customer ID sent from SWSI to DAS requesting report on available resources
4	Request Identifier	A unique ID for a resource availability request
5	Acceptable Time Window	Start and end times within which the TDRS service is desired. This may or may not be the same as the service length specified in item 6. Times are in the yyyyddd hhhmss format.
6	Service Length	Duration of the service requested must be equal to or less than the duration of the specified acceptable time window in item 5). Time is in the hhhmss format.
7	TDRS Satellite Identifier	TDRS specification
8	Maximum Number of Visibility Windows	Maximum number of visibility windows to be displayed to the Customer for the requested service.

5.1.2.2 Resource Availability Response, Message 101

This message provides the DAS response to a Customer request for TDRS visibility windows. Table 5-4 defines the message response information.

Table 5-4: Resource Availability Response, Message 101, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 101 from DAS listing the time windows when resources are available for allocation to the requesting Customer
2	SIC	Spacecraft identification code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 100 (item 4, Request ID) requesting identification of resource availability
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhhmss
6	Available Times with TDRS ID(s)	List of the available time windows that meet the time constraints specified in message 100. Windows listed by the start and end times and duration of the available windows and the TDRS satellite ID's.
7	Request Status Code	Accepted or rejected (refer to Table 5-5 for message codes sent from DAS to SWSI). If accepted, available times with associated TDRS IDs are provided in item 6.

For the message 101, item 7, request status code, DAS provides a request status code to SWSI as defined in Table 5-5. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-5: Message 101 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
100	Invalid resource availability request. Time window start/stop times inconsistent with service duration.	R
101	Invalid resource availability request. There are no available service time windows for the selected TDRS.	R
102	No state vector on file. Send current state vectors.	R

5.1.3 Service Allocation Operations Messages

Service allocation operations message types allow the DAS Customer to request, modify or delete DAS resources on demand. These message types also provide the DAS Customer with SWSI displays of the resource schedule request summaries and the active DAS service schedules.

5.1.3.1 Resource Allocation Request, Message 200

Table 5-6 defines the message format for requesting DAS resources. A significant portion of a resource allocation request message is comprised of the Service Specification Code (SSC) parameters. The SSC parameters are delineated in Table 5-7. The SSC parameters are retained by SWSI, modified as required by the Customer, and passed from SWSI to DAS on a per service request basis.

Table 5-6: Resource Allocation Request, Message 200, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 200 requesting allocation of resources from DAS
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the allocation of resources from DAS
4	Request Identifier	A unique ID for a resource allocation request
5	Service Specification Code (SSC) Identifier	Numeric service specification code identifier assigned to a profile
6	SSC Parameters	SSC profile parameters for this service request (See Table 5-7 for the detailed list. Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue")
7	Service Period	Start and end times when the service will be implemented. Times for the service are in the yyyyddd hhhmss format.
8	TDRS Satellite Identifier	TDRS specification

The default values indicated in Table 5-7 are the initial values SWSI sets for the SSC parameters. Customers may change the pre-selected SSC parameters, indicated as "default" in Table 5-7, to create unique SSC profiles that can be saved for use in the future. The SWSI system administrator sets the maximum number ranging from 001 to 999, of SSC profiles that each Customer is permitted to store. Typically, each Customer will be permitted to store ten (10) SSC profiles.

The Customer must specify all parameters in an SSC profile that are applicable to the service configuration being requested. The parameters that are not applicable to the service configuration should not be modified (i.e. left with the default values). SWSI sends all SSC parameters to DAS, however DAS only uses SSC parameters that are applicable to the requested service configuration.

For example, the Q-channel parameters are disregarded by DAS unless the modulation/data channel parameter specifies SQPN dual channel. This also applies to the data format parameters.

Table 5-7: Service Specification Code (SSC) Parameters

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
1	Modulation/Data Channel	BPSK; SQPN-single channel, SQPN-dual channel See Note 1 regarding SQPN - Single Channel	Modulation_Data_Ch	BPSK SQPN single channel SQPN dual channel
2	Independent Beamforming Unit (IBU) Mode	Adaptive mode Pointing mode	IBU_Mode	Adaptive mode Pointing mode
3	Acquisition Mode	Mode A (700 Hz); Mode B (3000 Hz)	Acq_Mode	Mode A Mode B
4	Carrier Frequency Reference	Acquisition center frequency (Hz)	Carrier_Freq_Ref	2287308500 to 2287691500
5	Storage Duration	Data storage duration in days	Storage_Duration	3 to 30
6	IP Address	IP address	IP_Add_I	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
7	Port Number	TCP port number 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	Port_Num_I	6000-6399; 7000-7399
8	PN Code	Pseudo-random noise code Shift register A octal value (4 digits)	PN_Code_I	nnnn, where n is a value between 0 and 7
9	Data Rate	bits per second (bps)	Data_Rate_I	1000 to 150000
10	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_I	Upright Inverted
11	Symbol Format	NRZ; Biphase	Symb_Fmt_I	NRZ Biphase
12	Data Format	L; M; S	Data_Fmt_I	L M S
Q – Channel Parameters				
13	IP Address	IP address	IP_Add_Q	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
14	Port Number	TCP port number 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	Port_Num_Q	6000 to 6399; 7000 to 7399
15	PN Code See Note 1	Pseudo-random noise code Shift register C octal value (4 digits)	PN_Code_Q	nnnn, where n is a value between 0 and 7
16	Data Rate	bps	Data_Rate_Q	1000 to 150000
17	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_Q	Upright Inverted

Table 5-7: Service Specification Code (SSC) Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
Q – Channel Parameters (cont'd)				
18	Symbol Format	NRZ; Biphase	Symb_Fmt_Q	NRZ Biphase
19	Data Format	L; M; S	Data_Fmt_Q	L M S
Data Format Parameters (see Note 2)				
20	Protocols	ACE, AXAF-I, IPDU, LEO-T, SFDU, Async Default is "Async"	Protocols_Data	ACE AXAF-I IPDU LEO-T SFDU Async
21	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000 to 255
22	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable CCSDS frame CCSDS packet TDM frame Stripped TDM frame
I-Channel Data Format Parameters (see Note 2)				
23	Frame Synchronization	Frame Synchronization is "On" by default It is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_I	On Off
24	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_I	8 to 60000
25	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_I	00000000 to FFFFFFFF
26	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_I	0 to 32
27	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_I	0 to 32
28	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_I	00000000 to FFFFFFFF
29	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_I	On Off
30	Virtual Channel Processing – CRC Location	If VCP is "On", then CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_I	8 to 60000

Table 5-7: Service Specification Code (SSC) Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
I-Channel Data Format Parameters (see Note 2) (cont'd)				
31	Virtual Channel Processing – CRC	If VCP is “On” then CRC can be On or Off Default is On	VCP_CRC_I	On Off
32	Virtual Channel Processing – Reed Solomon (RS) Decoding	If VCP is “On”, then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_I	On Off
33	Virtual Channel Processing - RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_I	0 to 8
34	Virtual Channel Processing - RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_I	8 to 60000
35	Virtual Channel Processing - RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_I	0 to 8
36	Virtual Channel Processing – VCP Segregation	If VCP is “On” then VCP Segregation can be On or Off Default is Off	VCP_Segregation_I	On Off
37	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is “On”, then IP Address for Engineering Data is required	VCP_Segregation_IP_Address_I	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
38	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is “On”, then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_I	6000 to 6399; 7000 to 7399
Q-Channel Data Format Parameters (See Note 2)				
39	Frame Synchronization	Frame Synchronization is “On” by default It is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_Q	On Off
40	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_Q	8 to 60000
41	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_Q	00000000 to FFFFFFFF

Table 5-7: Service Specification Code (SSC) Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
Q-Channel Data Format Parameters (See Note 2) (cont'd)				
42	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_Q	0 to 32
43	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_Q	0 to 32
44	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_Q	00000000 to FFFFFFFF
45	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_Q	On Off
46	Virtual Channel Processing – CRC Location	If VCP is “On”, then CRC Location (8 to Frame Length value) input is mandatory Default is 8	VCP_CRC_Location_Q	8 to 60000
47	Virtual Channel Processing – CRC	If VCP is “On” then CRC can be On or Off Default is On	VCP_CRC_Q	On Off
48	Virtual Channel Processing – Reed Solomon Decoding	If VCP is “On”, then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_Q	On Off
49	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_Q	0 to 8
50	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_Q	8 to 60000
51	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_Q	0 to 8
52	Virtual Channel Processing – VCP Segregation	If VCP is “On” then VCP Segregation can be On or Off Default is Off	VCP_Segregation_Q	On Off
53	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is “On”, then IP Address for Engineering Data is required	VCP_Segregation_IP_Address_Q	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255

Table 5-7: Service Specification Code (SSC) Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
Q-Channel Data Format Parameters (See Note 2) (cont'd)				
54	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is “On”, then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_Q	6000 to 6399; 7000 to 7399
Note 1: If data modulation/data channel is specified as SQPN–single channel, then the Q–Channel PN Code parameter must also be specified.				
Note 2: The data format parameters can <u>ONLY</u> be changed prior to the service start time using message 204. After the service is active the data format parameters <u>CANNOT</u> be reconfigured using message 300..				

The default, Async protocol, simply records the demodulated data to a Programmable Telemetry Processors (PTP) file and transmits it to the assigned address using TCP/IP. Unless otherwise requested by the Customer, DAS transmits and archives the Customer telemetry data without any Consultative Committee for Space Data Systems (CCSDS) processing or encapsulation in any structured header other than the normal TCP/IP transmission structures. The PTP is used to simply archive the data and to stream it as TCP/IP packets for delivery.

DAS supports telemetry processing using the PTPs in order to properly frame the data, encapsulate it for ground transport by NISN or pick up by the Customer at the local interface demarcation points. DAS PTPs are compatible with specific CCSDS data formats and ground transport headers used for space link communications. The Ground Transport Headers supported are the Standard Formatted Data Unit (SFDU), Advanced X-ray Astrophysics Facility – Imagery (AXAF-I), Advanced Composition Explorer (ACE), Low Earth Orbit – Terminal (LEO-T), and the IP Data Unit (IPDU).

Appendix A of the ICD between the DAS and DAS Customers, 453-ICD-DAS/Customer, describes in detail the available CCSDS options within DAS to process and format Customer telemetry data for each of the ground transport header formats.

Tables 5-8 through 5-12 depict how the SSC data format parameters should be specified by the DAS Customer for each type of protocol (i.e., SFDU, ACE, AXAF-I, LEO-T, IPDU) that can be specified in a resource allocation request message. If the protocol data format parameter, Table 5-7 item 20, is specified as “Async,” the remaining data format parameters, Table 5-7 items 21 through 54, do not have to be specified (i.e., SWSI sends DAS the default parameters in the resource allocation request; however, DAS disregards these parameters since “Async” was the specified protocol.) The Customer must provide the data format parameters for the I and/or Q channel(s) as required to support the specified SSC parameter for the modulation/data channel item (e.g., a single channel or BPSK service requires the I-channel parameters to be specified and a dual channel service requires the I- and Q-channel parameters to be specified).

Table 5-8: Input Parameters for SFDU Data Format Protocol

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
Optional	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000 to 255
Not Required	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable
x-Channel (where x represents I or Q) Data Format Parameters				
Mandatory	Frame Synchronization	Frame Synchronization is "On" by default It is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_x	On
Mandatory	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_x	8 to 60000
Mandatory	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_x	00000000 to FFFFFFFF
Optional	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_x	0 to 32
Optional	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_x	0 to 32
Mandatory	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_x	00000000 to FFFFFFFF
Optional	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_x	On Off
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC Location	If VCP is "On", then the CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_x	8 to 60000
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC	If VCP is "On" then CRC can be On or Off Default is On	VCP_CRC_x	On Off
Optional	Virtual Channel Processing – Reed Solomon Decoding	If VCP is "On", then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_x	On Off
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_x	0 to 8

Table 5-8: Input Parameters for SFDU Data Format Protocol (cont'd)

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
x-Channel (where x represents I or Q) Data Format Parameters (cont'd)				
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_x	8 to 60000
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_x	0 to 8
Optional	Virtual Channel Processing – VCP Segregation	If VCP is "On" then VCP Segregation can be On or Off Default is Off	VCP_Segregation_x	On Off
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is "On", then IP Address for Engineering Data	VCP_Segregation_IP_Address_x	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is "On", then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_x	6000 to 6399; 7000 to 7399

Table 5-9: Input Parameters for ACE Data Format Protocol

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
Not Required	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000
Not Required	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable
x-Channel (where x represents I or Q) Data Format Parameters				
Mandatory	Frame Synchronization	Frame Synchronization is "On" by default It is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_x	On
Mandatory	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_x	8 to 60000
Mandatory	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_x	00000000 to FFFFFFFF
Optional	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_x	0 to 32
Optional	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_x	0 to 32
Mandatory	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_x	00000000 to FFFFFFFF
Optional	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_x	On Off
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC Location	If VCP is "On", then the CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_x	8 to 60000
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC	If VCP is "On" then CRC can be On or Off Default is On	VCP_CRC_x	On Off
Optional	Virtual Channel Processing – Reed Solomon Decoding	If VCP is "On", then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_x	On Off
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_x	0 to 8

Table 5-9: Input Parameters for ACE Data Format Protocol (cont'd)

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
x-Channel (where x represents I or Q) Data Format Parameters (cont'd)				
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_x	8 to 60000
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_x	0 to 8
Optional	Virtual Channel Processing – VCP Segregation	If VCP is "On" then VCP Segregation can be On or Off Default is Off	VCP_Segregation_x	On Off
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is "On", then IP Address for Engineering Data	VCP_Segregation_IP_Address_x	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is "On", then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_x	6000 to 6399; 7000 to 7399

Table 5-10: Input Parameters for AXAF-I Data Format Protocol

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
Not Required	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000
Not Required	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable
x-Channel (where x represents I or Q) Data Format Parameters				
Mandatory	Frame Synchronization	Frame Synchronization is "On" by default It is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_x	On
Mandatory	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_x	8 to 60000
Mandatory	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_x	00000000 to FFFFFFFF
Optional	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_x	0 to 32
Optional	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_x	0 to 32
Mandatory	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_x	00000000 to FFFFFFFF
Optional	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_x	On Off
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC Location	If VCP is "On", then the CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_x	8 to 60000
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC	If VCP is "On" then CRC can be On or Off Default is On	VCP_CRC_x	On Off
Optional	Virtual Channel Processing – Reed Solomon Decoding	If VCP is "On", then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_x	On Off
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_x	0 to 8

Table 5-10: Input Parameters for AXAF-I Data Format Protocol (cont'd)

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
x-Channel (where x represents I or Q) Data Format Parameters (cont'd)				
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_x	8 to 60000
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_x	0 to 8
Optional	Virtual Channel Processing – VCP Segregation	If VCP is "On" then VCP Segregation can be On or Off Default is Off	VCP_Segregation_x	On Off
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is "On", then IP Address for Engineering Data	VCP_Segregation_IP_Address_x	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is "On", then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_x	6000 to 6399; 7000 to 7399

Table 5-11: Input Parameters for LEO-T Data Format Protocol

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
Not Required	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000
Optional	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable CCSDS frame CCSDS packet TDM frame Stripped TDM frame
x-Channel (where x represents I or Q) Data Format Parameters				
Optional	Frame Synchronization	Frame Synchronization is "On" by default If frame synchronization is desired, it is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_x	On Off
Mandatory if Frame Sync is "ON",	Frame Synchronization – Frame Length	If Frame Sync is "On" then Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_x	8 to 60000
Mandatory if Frame Sync is "ON"	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_x	00000000 to FFFFFFFF
Optional	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_x	0 to 32
Optional	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_x	0 to 32
Mandatory if Frame Sync is "ON"	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_x	00000000 to FFFFFFFF
Optional, but requires Frame Sync to be "ON"	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_x	On Off
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC Location	If VCP in "On," then the CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_x	8 to 60000
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC	If VCP is "On", then CRC can be On or Off Default is On	VCP_CRC_x	On Off
Optional	Virtual Channel Processing – Reed Solomon Decoding	If VCP is "On", then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_x	On Off

Table 5-11: Input Parameters for LEO-T Data Format Protocol (cont'd)

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
x-Channel (where x represents I or Q) Data Format Parameters (cont'd)				
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_x	0 to 8
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_x	8 to 60000
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_x	0 to 8
Optional	Virtual Channel Processing – VCP Segregation	If VCP is "On", then VCP Segregation can be On or Off Default is Off	VCP_Segregation_x	On Off
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is "On" then IP Address for Engineering Data	VCP_Segregation_IP_Address_x	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is "On", then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_x	6000 to 6399; 7000 to 7399

Table 5-12: Input Parameters for IPDU Data Format Protocol

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
Not Required	Mission Identifier	Customer assigned 3 digit number Default is 000	Mission_ID	000
Not Required	Data Class ID Number	Data Class Identification Number Default is "Not Applicable"	Data_class_ID	Not Applicable
x-Channel (where x represents I or Q) Data Format Parameters				
Optional	Frame Synchronization	Frame Synchronization is "On" by default If frame synchronization is desired, it is mandatory that the Frame Length, Sync Pattern, and Sync Mask be specified	Frame_sync_x	On Off
Mandatory if Frame Sync is "ON"	Frame Synchronization – Frame Length	If Frame Sync is "On" then Frame Length has a value between 8 and 60K bytes Default is 8	Frame_length_x	8 to 60000
Mandatory if Frame Sync is "ON"	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value Default is 1ACFFC1D	Sync_pattern_x	00000000 to FFFFFFFF
Optional	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search Default is 0	Sync_pattern_search_x	0 to 32
Optional	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock Default is 0	Sync_pattern_lock_x	0 to 32
Mandatory if Frame Sync is "ON"	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value Default is FFFFFFFF	Sync_mask_x	00000000 to FFFFFFFF
Optional, but requires Frame Sync to be "ON"	Virtual Channel Processing (VCP)	Virtual Channel Processing Default is Off	VCP_x	On Off
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC Location	If VCP is "On," then the CRC Location (8 to Frame Length value) is mandatory Default is 8	VCP_CRC_Location_x	8 to 60000
Mandatory if VCP is "ON"	Virtual Channel Processing – CRC	If VCP is "On", then CRC can be On or Off Default is On	VCP_CRC_x	On Off
Optional	Virtual Channel Processing – Reed Solomon Decoding	If VCP is "On", then Reed Solomon Decoding method can be On or Off Default is Off	VCP_Reed_Solomon_x	On Off

Table 5-12: Input Parameters for IPDU Data Format Protocol (cont'd)

Mandatory - Optional	Information Identifier	Information Description	Mnemonic	Input Values
x-Channel (where x represents I or Q) Data Format Parameters (cont'd)				
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave Default is 0	VCP_RS_Interleave_x	0 to 8
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword Default is 8	VCP_RS_Location_x	8 to 60000
Mandatory if RS Decoding is "ON"	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes Default is 0	VCP_RS_Virtual_Fill_x	0 to 8
Optional	Virtual Channel Processing – VCP Segregation	If VCP is "On", then VCP Segregation can be On or Off Default is Off	VCP_Segregation_x	On Off
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	If VCP Segregation is "On" then IP Address for Engineering Data	VCP_Segregation_IP_Address_x	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
Mandatory if VCP_Segregation is "ON"	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	If VCP Segregation is "On", then TCP Port Number for Engineering Data is required 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_x	6000 to 6399; 7000 to 7399

5.1.3.2 Resource Allocation Response, Message 201

Table 5-13 defines the message format used by DAS to respond to a Customer resource allocation request. DAS responds to each Customer by indicating an approved or pending status for each service requested. Item 6 provides the start and end times for a service that has been approved or is pending. Pending conveys to the Customer that the resources will be approved subject to the availability of beamformers and demodulators within the 96-hour active window schedule. DAS, via SWSI, provides an alert (message 001, message code 008) to each Customer two (2) minutes prior to start of their service.

Table 5-13: Resource Allocation Response, Message 201, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 201 acknowledging request for allocation of resources from DAS
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 200 (item 4, Request ID) requesting this resource allocation
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
6	Service Period	Start and end times when the service will be implemented. Times for the service are in the yyyyddd hhmss format.
7	Request Status Code	Request accepted and resources allocated or request pending (refer to Table 5-14 for the message codes sent from DAS to SWSI)

For item 7, a request status code as described in Table 5-14 is sent by DAS for the two possible request condition responses to SWSI: approved or pending. Pending requests are kept on file until the start of service and then deleted if no resources are available. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-14: Message 201 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
200	Request cannot be supported at this time, and is in queue pending further availability of resources by the specified start time.	R
201	Service request rejected because of invalid port number.	R
202	Service request rejected because of invalid IP address	R
203	No state vector on file. Send current state vector.	R

5.1.3.3 Resource Allocation Deletion Request, Message 202

This message format allows a DAS Customer to delete a previous resource allocation request. The resource allocation deletion request stops an on-going service or cancels a resource request that has not been initiated. Table 5-15 depicts the message contents.

Table 5-15: Resource Allocation Deletion Request, Message 202, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 202 identifying the resource allocation deletion request for a requested service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the deletion of resource request from DAS
4	Request Identifier	A unique ID for a resource allocation deletion request
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) of the resource allocation request that is to be deleted

5.1.3.4 Resource Allocation Deletion Response, Message 203

This is the message format used to respond to a resource allocation deletion request. Table 5-16 defines the message contents. Item 6 will provide the start and end times for the original service that has been deleted.

Table 5-16: Resource Allocation Deletion Response, Message 203, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 203 deleting the resource allocations for a previously requested service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 202 (item 4, Request ID) requesting this resource allocation deletion.
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) of the resource allocation request that is to be deleted
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhhmss
7	Service Period	Start and end times of the service that is being deleted. Times for the service are in the yyyyddd hhhmss format.
8	Request Status Code	Accepted or rejected (refer to Table 5-17 for the message codes sent from DAS to SWSI). If accepted, Service is deleted pertaining to the reference request ID.

For item 7, a request status code as described in Table 5-17 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-17: Message 203 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
204	Service deletion request rejected because of invalid real-time event request ID.	R
205	Service deletion request rejected because real-time event request ID belongs to another SIC.	R

5.1.3.5 Resource Allocation Modification Request, Message 204

Table 5-18 defines the contents for messages that allow a DAS Customer to modify a previous resource allocation request. Message 204 is to be used to modify the SSC parameters prior to the start time of the requested service. Item 8 indicates the start time when DAS is to implement the modified resource allocation request. This modification request applies to all current, future approved, and pending segments of the original request as of the effective start time of item 8.

For item 7 the first SSC parameter item in Table 5-7, the modulation/data channel, may only be changed from a single channel modulation scheme to another single channel scheme, such as BPSK to SQPN single channel, or changed from a dual channel configuration to a single channel configuration, such as SQPN dual channel to BPSK. A single channel service may not be changed to a dual channel reconfiguration without effecting replanning. DAS is responsible for enforcing this reconfiguration constraint check.

Table 5-18: Resource Allocation Modification Request, Message 204, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 204 identifying the resource allocation modification request for a requested service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the modification of resources service from DAS
4	Request Identifier	A unique ID for a resource allocation modification request
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a previously submitted and accepted message 204 (item 4, Request ID) of the resource allocation request that is to be modified
6	SSC Identifier	Numeric service specification code identifier assigned to a profile
7	Modified SSC Parameters See Note 1	Modified SSC profile parameters for this service request (See Table 5-7: Items 1 through 54 may be modified for this request. Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue")
8	Effective Start Time	Start time when the modification request is to be implemented. Time is in the yyyyddd hhmss format.
Note 1: SSC parameter items 20-54 may <u>ONLY</u> be changed prior to the start of the service. After the service start time items 20-54 <u>CANNOT</u> be reconfigured.		

5.1.3.6 Resource Allocation Modification Response, Message 205

This is the message format used to respond to a resource allocation request. The message contents are defined in Table 5-19.

Table 5-19: Resource Allocation Modification Response, Message 205, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 205 modifying the resource allocations for a previously requested service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 204 (item 4, Request ID) requesting this resource allocation modification.
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
6	Service Period	Start and end times for the service that was modified. Times for service are in the yyyyddd hhmss format.
7	Request Status Code	Accepted or rejected (refer to Table 5-20 for the message codes sent from DAS to SWSI). If accepted, the service is modified pertaining to the original request from SWSI.

For item 7, a request status code as described in Table 5-20 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-20: Message 205 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
206	Service modification request rejected because of invalid real-time event request ID.	R
207	Service modification request rejected because real-time event request ID belongs to another SIC.	R
208	Service modification request rejected because the parameter may not be modified.	R

Table 5-20: Message 205 Request Status Codes Text (cont'd)

Message Code	Text	Message Color
209	Service request rejected because of invalid port number.	R
210	Service request rejected because of invalid IP address	R
211	Service modification request rejected. Single channel service configuration cannot be changed to dual channel configuration. If dual channel service reconfiguration is required, delete original resource allocation request and resubmit new request.	R
212	Service modification request rejected due to insufficient times to implement prior to service starting. If desired, attempt to reconfigure service after start.	R

5.1.3.7 Planned Events Request, Message 206

Table 5-21 contains the planned events request message contents, which provides the means for displaying schedules to DAS Customers. Item 5 allows the DAS Customer to specify a window for scheduled events for a single or multiple SICs.

Table 5-21: Planned Events Request, Message 206, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 206 requesting all the planned events for a specific Customer
2	SICs	Spacecraft Identification Code(s)
3	Customer Identifier	Customer ID requesting a report on all the planned events for this Customer
4	Request Identifier	A unique ID for a planned events request
5	Time Window	Start and end times of a window for a requested listing of all the scheduled events for this Customer from DAS; input in yyyyddd hhmms format. Response will be provided for no more than the current 96-hour planning window.

5.1.3.8 Planned Events Response, Message 207

Table 5-22 defines the message format used to respond with a list of the planned events for a single or multiple SICs. For Item 5, if an event is initiated from the DAS LCM then the request ID is assigned by DAS otherwise the request IDs are assigned by SWSI. The ID numbers reserved for allocation by DAS range from 8,900,000 through 8,999,999. This constitutes 1% or 100,000 IDs that are reserved for allocation of requests that are initiated by DAS.

Table 5-22: Planned Events Response, Message 207, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 207 responding with all the planned events for a specific Customer
2	DAS Message Identifier	Message ID generated by DAS
3	Reference Request Identifier	Request ID of message 206 (item 4, Request ID) requesting identification of planned events
4	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmms
5	Scheduled Events	List of all events for this Customer provided with the following information: SIC, Real-time Event or Playback Request ID, Start Time, Stop Time, TDRS ID, and Service Type (MAR or playback). Note: Stop Time does not apply for playback events

5.1.3.9 Event Details Request, Message 208

This message format allows a DAS Customer to request the details of an event based on the original request identifier. The scheduled event is a single MAR event assigned to a particular TDRS. Table 5-23 defines the message contents.

Table 5-23: Event Details Request, Message 208, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 208 requesting all the details of a planned event for a specific Customer
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting a detailed report on a planned event for this Customer
4	Request Identifier	Unique ID for an event details request
5	Real-time Event Request Identifier	Selected event from the list of events for this Customer based on the message 200 (item 4, Request ID) or submitted and accepted message 204 (item 4, Request ID)

5.1.3.10 Event Details Response, Message 209

This is the message format used to respond with the details of an event selected by the Customer from an events list. Table 5-24 defines the message contents. Table 5-26 provides the details of an event to display to the Customer.

Table 5-24: Event Details Response, Message 209, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 209 responding with event details for a selected event from the planned events for a specific user
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 208 (item 4, Request ID) requesting these event details
5	Time Tag	Time when message was generated by DAS, yyyyddd hhhmss
6	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or submitted and accepted message 204 (item 4, Request ID) of the selected event whose details are being requested
7	Scheduled MAR Event Details	Detailed list of the selected event for this Customer by request ID (see Table 5-26 for event details. Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue")
8	TDRS Schedule	Listing of specific TDRS events for the original request ID (see Table 5-25 for details)

Table 5-25: TDRS Transitions, Message 209, Contents

Item No.	Information Identifier	Information Description
1	TDRS Satellite Identifier	TDRS specification
2	Start Time of TDRS Support	Start time of the TDRS support for the TDRS satellite identified in item 1.
3	End Time of TDRS Support	End time of the TDRS support for the TDRS satellite identified in item 1.
4	Status of TDRS Support	Granted or pending

All event detail parameters are displayed to the Customer as appropriate for the type of service requested. While the Customer inputs all SSC parameters, including default values for parameters not required for the service, DAS returns only the SSC parameters germane to the service in the

event details. For example, for a BPSK service request all default Q-channel SSC parameters are passed from SWSI to DAS; DAS sends back in the event detail parameters only the I-channel parameters appropriate for a BPSK service.

Table 5-26: Event Detailed Parameters

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
1	Modulation/Data Channel	BPSK; SQPN-single channel, SQPN-dual channel	Modulation_Data_Ch	BPSK SQPN single channel SQPN dual channel
2	Independent Beamforming Unit (IBU) Mode	Adaptive mode Pointing mode	IBU_Mode	Adaptive mode Pointing mode
3	Acquisition Mode	Mode A (700 Hz); Mode B (3000 Hz)	Acq_Mode	Mode A Mode B
4	Carrier Frequency Reference	Acquisition center frequency (Hz)	Carrier_Freq_Ref	2287308500 to 2287691500
5	Storage Duration	Data storage duration in days	Storage_Duration	3 to 30
I – Channel Parameters				
6	IP Address	IP address	IP_Add_I	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
7	Port Number	TCP port number 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	Port_Num_I	6000 to 6399; 7000 to 7399
8	PN Code	Pseudo-random noise code – Shift register A octal value (4 digits)	PN_Code_I	nnnn, where n is a value between 0 and 7
9	Data Rate	bps	Data_Rate_I	1000 to 150000
10	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_I	Upright Inverted
11	Symbol Format	NRZ; Biphase	Symb_Fmt_I	NRZ Biphase
12	Data Format	L; M; S	Data_Fmt_I	L M S
Q – Channel Parameters				
13	IP Address	IP address	IP_Add_Q	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
14	Port Number	TCP port number	Port_Num_Q	6000 to 6300; 7000 to 7399
15	PN Code	Pseudo-random noise code – Shift register C octal value (4 digits)	PN_Code_Q	nnnn, where n is a value between 0 and 7
16	Data Rate	bps	Data_Rate_Q	1000 to 150000
17	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_Q	Upright Inverted
18	Symbol Format	NRZ; Biphase	Symb_Fmt_Q	NRZ Biphase
19	Data Format	L; M; S	Data_Fmt_Q	L M S

Table 5-26: Event Detailed Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
Data Format Parameters				
20	Protocols (Data format)	ACE, AXAF-I, IPDU, LEO-T, SFDU, Async	Protocols_Data	ACE AXAF-I IPDU LEO-T SFDU Async
21	Mission Identifier	Customer assigned 3 digit number	Mission_ID	000 to 255
22	Data Class ID Number	Data Class Identification Number	Data_class_ID	Not Applicable CCSDS frame CCSDS packet TDM frame Stripped TDM frame
I-Channel Data Format Parameters				
23	Frame Synchronization	Frame Synchronization	Frame_sync_I	On Off
24	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes	Frame_length_I	8 to 60000
25	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value	Sync_pattern_I	00000000 to FFFFFFFF
26	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search	Sync_pattern_search_I	0 to 32
27	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock	Sync_pattern_lock_I	0 to 32
28	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value	Sync_mask_I	00000000 to FFFFFFFF
29	Virtual Channel Processing (VCP)	Virtual Channel Processing	VCP_I	On Off
30	Virtual Channel Processing – CRC Location	CRC Location (8 to Frame Length value)	VCP_CRC_Location_I	8 to 60000
31	Virtual Channel Processing – CRC	CRC On or Off	VCP_CRC_I	On Off
32	Virtual Channel Processing – Reed Solomon (RS) Decoding	Reed Solomon Decoding method On or Off	VCP_Reed_Solomon_I	On Off

Table 5-26: Event Detailed Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
I-Channel Data Format Parameters				
33	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave	VCP_RS_Interleave_I	0 to 8
34	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword	VCP_RS_Location_I	8 to 60000
35	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes	VCP_RS_Virtual_Fill_I	0 to 8
36	Virtual Channel Processing – VCP Segregation	VCP Segregation On or Off	VCP_Segregation_I	On Off
37	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	IP Address for Engineering Data	VCP_Segregation_IP_Address_I	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
38	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	TCP Port Number for Engineering Data 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_I	6000 to 6399; 7000 to 7399
Q-Channel Data Format Parameters				
39	Frame Synchronization	Frame Synchronization	Frame_sync_Q	On Off
40	Frame Synchronization – Frame Length	Frame Length has a value between 8 and 60K bytes	Frame_length_Q	8 to 60000
41	Frame Synchronization – Sync Pattern	Sync Pattern is an 8 digit Hex value	Sync_pattern_Q	00000000 to FFFFFFFF
42	Frame Synchronization – Sync Pattern Errors during Search	Allowable Sync Pattern Errors during Search	Sync_pattern_search_Q	0 to 32
43	Frame Synchronization – Sync Pattern Errors during Lock	Allowable Sync Pattern Errors during Lock	Sync_pattern_lock_Q	0 to 32
44	Frame Synchronization – Sync Mask	Sync Mask is an 8 digit Hex value	Sync_mask_Q	00000000 to FFFFFFFF
45	Virtual Channel Processing (VCP)	Virtual Channel Processing	VCP_Q	On Off
46	Virtual Channel Processing – CRC Location	CRC Location (8 to Frame Length value)	VCP_CRC_Location_Q	8 to 60000
47	Virtual Channel Processing – CRC	CRC On or Off	VCP_CRC_Q	On Off

Table 5-26: Event Detailed Parameters (cont'd)

Item No.	Information Identifier	Information Description	Mnemonic	Range of Values
Q-Channel Data Format Parameters (cont'd)				
48	Virtual Channel Processing – Reed Solomon Decoding	Reed Solomon Decoding method On or Off	VCP_Reed_Solomon_Q	On Off
49	Virtual Channel Processing – RS Interleave Depth	Depth of the RS interleave	VCP_RS_Interleave_Q	0 to 8
50	Virtual Channel Processing – RS Codeword location	Location in frame of the first byte of the RS Codeword	VCP_RS_Location_Q	8 to 60000
51	Virtual Channel Processing – RS Virtual Fill	Customer calculated as 255 minus the actual codeword length in bytes	VCP_RS_Virtual_Fill_Q	0 to 8
52	Virtual Channel Processing – VCP Segregation	VCP Segregation On or Off	VCP_Segregation_Q	On Off
53	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data	IP Address for Engineering Data	VCP_Segregation_IP_Address_Q	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
54	Virtual Channel Processing – VCP Segregation TCP Port Number for Engineering Data	TCP Port Number for Engineering Data 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks	VCP_Segregation_Port_Num_Q	6000 to 6399; 7000 to 7399

5.1.4 Real-Time Operations Messages

Real-time operations message types allow the DAS Customer to reconfigure an on-going active service or to reacquire a lost signal.

5.1.4.1 Service Reconfiguration Request, Message 300

Table 5-27 defines the message contents for a service reconfiguration request, which allows a DAS Customer to reconfigure parameters for an active service. This request applies to all future segments of the original service request as well as to the currently active portion of the service.

For item 7 of Table 5-27, the first SSC parameter item in Table 5-7, the modulation/data channel, may only be changed from a single channel modulation scheme to another single channel scheme, such as BPSK to SQPN single channel, or changed from a dual channel configuration to a single channel configuration, such as SQPN dual channel to BPSK. A single channel service may not be changed to a dual channel reconfiguration without effecting replanning. DAS is responsible for enforcing this reconfiguration constraint check.

Table 5-27: Service Reconfiguration Request, Message 300, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 300 identifying the service reconfiguration request during real-time for an on-going service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the service reconfiguration request during real-time for an on-going service from DAS
4	Request Identifier	A unique ID for a service reconfiguration request
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or submitted and accepted message 204 (item 4, Request ID) that is to be modified in real-time
6	SSC Identifier	Numeric service specification code identifier assigned to a profile
7	SSC Reconfigurable Parameter(s) See Note 1	Modified input configuration profile parameters for this real-time service request (See Table 5-7: <u>ONLY</u> items 1 through 19 may be modified for this request. Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue")

Note 1: SSC parameters items 20-54 may ONLY be changed prior to the start of the service using message 204.

5.1.4.2 Service Reconfiguration Response, Message 301

This is the message format used to respond to a service reconfiguration request during real-time for an on-going service from DAS. Item 6 provides the time window of the service that has been reconfigured. Table 5-28 defines the message contents.

Table 5-28: Service Reconfiguration Response, Message 301, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 301 identifying the service reconfiguration response during real-time for an on-going service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 300 (item 4, Request ID) requesting a real-time service reconfiguration for an on-going service
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or submitted and accepted message 204 (item 4, Request ID) that is to be modified in real-time
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
7	Service Period	Start and end times of the affected service that was modified. Times for the service are in the yyyyddd hhmss format.
8	Request Status Code	Accepted or rejected (refer to Table 5-29 for message codes sent from DAS to SWSI). If accepted, the service reconfiguration is implemented during real-time for the on-going service.

For item 7, a request status code as described in Table 5-29 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-29: Message 301 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
300	Service reconfiguration request rejected because of invalid real-time event request ID.	R
301	Service reconfiguration request rejected because real-time event request ID belongs to another SIC.	R
302	Service reconfiguration request rejected because the parameter may not be reconfigured.	R
303	Service reconfiguration request rejected because the requested reconfiguration parameter is invalid.	R
304	Service reconfiguration request rejected. Single channel service configuration cannot be changed to dual channel configuration. If dual channel service reconfiguration is required, delete original resource allocation request and resubmit new request.	R

5.1.4.3 Signal Reacquisition Request, Message 302

This message format allows a DAS Customer to request reacquisition for a disrupted signal in real-time. Table 5-30 defines the message contents.

Table 5-30: Signal Reacquisition Request, Message 302, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 302 identifying the signal reacquisition request during real-time for an on-going service that was disrupted
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the signal reacquisition during real-time for an on-going service that was disrupted
4	Request Identifier	A unique ID for a signal reacquisition request
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) for which the signal reacquisition is being requested.

5.1.4.4 Signal Reacquisition Response, Message 303

This is the message format used to respond to a signal reacquisition request from the Customer when the service was disrupted due to signal degradation of the on-going service. Table 5-31 defines the message contents. A failure to reacquire the signal should result in an alert message to the Customer. A rejected request status implies that the message was not accepted; it does not imply that the signal failed to be reacquired.

Table 5-31: Signal Reacquisition Response, Message 303, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 303 identifying the signal reacquisition response during real-time for an on-going service that was disrupted
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 302 (item 4, Request ID) requesting the signal reacquisition
5	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) for which the signal reacquisition is being requested.
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmmss
7	Service Period	Time window of the service that was in effect when the signal was lost. Start and end times for service in yyyyddd hhmmss format
8	Request Status Code	Accepted or rejected (refer to Table 5-32 for the message codes sent from DAS to SWSI). If accepted, the signal is reacquired or failed to reacquire.

For item 7, a request status code as described in Table 5-32 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-32: Message 303 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
305	Service reacquisition request rejected for because of invalid real-time event request ID.	R
306	Service reacquisition request rejected because real-time event request ID belongs to another SIC.	R
307	Service reacquisition request rejected because the service has terminated.	R

5.1.5 Service Performance Monitoring Messages

Service performance monitoring message types provide the DAS Customer with updates of the service performance. The UPD messages are sent to the Customer, only after being requested, through SWSI once every minute. SWSI always enables UPD transmission to the Customer.

5.1.5.1 User Performance Data Request, Message 400

This message format allows SWSI to enable the user performance data message. Table 5-33 defines the message contents.

Table 5-33: User Performance Data Request, Message 400, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 400 identifying the UPD request for an on-going active service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the UPD request for an on-going active service from DAS
4	Request Identifier	A unique ID for a user performance data request
5	UPD Message	Enable UPD message for this SIC

5.1.5.2 User Performance Data Response, Message 401

This is the message format used to respond to a UPD message request. Table 5-34 defines the message contents.

Table 5-34: User Performance Data Response, Message 401, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 401 acknowledging receipt of the UPD request message for an active service from DAS
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 400 (item 4, Request ID) requesting the UPD
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
6	Request Status Code	UPD message enabled or disabled (refer to Table 5-35 for the message codes sent from DAS to SWSI).

For item 6, a request status code as described in Table 5-35 is sent by DAS to SWSI for enabling or disabling the UPD message. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-35: Message 401 Request Status Codes Text

Message Code	Text	Message Color
400	UPD message enabled.	G
401	UPD message disabled.	Y

5.1.5.3 User Performance Data Status, Message 402

This message provides the performance status for an on-going active service. Table 5-36 defines the message contents. A single UPD message is sent that provides status for the I and/or Q channels. All UPD parameters are displayed to the Customer as appropriate for the type of service supported. DAS returns only the SSC parameters germane to the service in the UPD. Table 5-37 identifies the UPD parameters that may be reported.

Table 5-36: User Performance Data Status, Message 402, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 402 identifying the UPD response for an on-going active service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) to which the UPD is applicable
5	TDRS ID	TDRS specification. The format for TDRS identifiers will be presented identically at the SWSI and the LCM displays.
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
7	UPD Parameters	UPD parameters defined in Table 5-37 are sent to the Customer once every minute after activation of service, when requested. (Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue".)
8	Service Period	Time window of the service that is in effect. Start and end times for service in yyyyddd hhmss format
9	Configuration	I or I and Q channels

Table 5-37: UPD Reporting Parameters

Item No.	Parameters	Status	Mnemonic	Range of Values
Service Performance Parameters				
1	Recovered Carrier Frequency	Frequency with RF Doppler removed (Hz)	Rec_Carrier_Freq	2287308500 to 2287691500
2	Eb/No Estimate – I Channel Note 1	Decibel (dB)	Eb_No_Est_I	00.0 to 99.9
3	Eb/No Estimate – Q Channel Note 1	Decibel (dB)	Eb_No_Est_Q	00.0 to 99.9
4	RF Signal Detected – I Channel	Yes No	Sig_Acq_I	Yes No
5	RF Signal Detected – Q Channel	Yes No	Sig_Acq_Q	Yes No
6	Lock Status – I Channel Note 2	Yes No	Lock_Status_I	Yes No
7	Lock Status – Q Channel Note 2	Yes No	Lock_Status_Q	Yes No
Scheduled Parameters				
8	Modulation/Data Channel	BPSK; SQPN-single channel, SQPN-dual channel	Modulation_Data_Ch	BPSK SQPN single channel SQPN dual channel
9	Independent Beamforming Unit (IBU) Mode	Adaptive mode Pointing mode Fixed weight mode Fixed weight mode with calibration Fixed weight mode with adaptation	IBU_Mode	Adaptive mode Pointing mode Fixed weight mode Fixed weight mode with calibration Fixed weight mode with adaptation
10	Acquisition Mode	Mode A (700 Hz); Mode B (3000 Hz)	Acq_Mode	Mode A Mode B
11	Carrier Frequency Reference	Acquisition center frequency (Hz)	Carrier_Freq_Ref	2287308500 to 2287691500
12	Storage Duration	Data storage duration in days	Storage_Duration	3 to 30
I – Channel Parameters				
13	IP Address	IP address	IP_Add_I	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
14	Port Number	TCP port number	Port_Num_I	6000 to 6399; 7000 to 7399
15	PN Code	Pseudo-random noise code Shift register A octal value (4 digits)	PN_Code_I	nnnn, where n is a value between 0 and 7
16	Data Rate	bps	Data_Rate_I	1000 to 150000
17	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_I	Upright Inverted
18	Symbol Format	NRZ; Biphase	Symb_Fmt_I	NRZ Biphase

Table 5-37: UPD Reporting Parameters (cont'd)

Item No.	Parameters	Status	Mnemonic	Range of Values
I – Channel Parameters				
19	Data Format	L; M; S	Data_Fmt_I	L M S
Q - Channel Parameters				
20	IP Address	IP address	IP_Add_Q	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
21	Port Number	TCP port number	Port_Num_Q	6000 to 6399; 7000 to 7399
22	PN Code	Pseudo-random noise code Shift register C octal value (4 digits)	PN_Code_Q	nnnn, where n is a value between 0 and 7
23	Data Rate	Bps	Data_Rate_Q	1000 to 150000
24	G2 Symbol Inversion	Upright or Inverted	G2_Symb_Inv_Q	Upright Inverted
25	Symbol Format	NRZ; Biphase	Symb_Fmt_Q	NRZ Biphase
26	Data Format	L; M; S	Data_Fmt_Q	L M S
Data Format Parameters				
27	Protocol	ACE, AXAF-I, IPDU, LEO-T, SFDU, Async	Protocols_Data	ACE AXAF-I IPDU LEO-T SFDU Async
I – Channel Data Format Parameters				
28	Output Socket Connectivity	Status of output socket connectivity (independent of protocol selection)	Output_Connectivity_I	Active Inactive
29	Frame Synchronization	Status of Frame Synchronization if Frame Synchronization is specified as "On"	Frame_Sync_Status_I	Sync No Sync
30	Virtual Channel Processing – CRC	Status of CRC if CRC is specified as "On"	VCP_CRC_Check_I	Pass Fail
31	Virtual Channel Processing - RS Uncorrectable Errors	RS statistics if RS is specified as "On"	VCP_RS_Uncorrectable_I	Any integer
32	Virtual Channel Processing - RS Correctable Errors	RS statistics if RS is specified as "On"	VCP_RS_Correctable_I	Any Integer
33	Output Socket Connectivity for VCP Embedded Channel	Status of output socket connectivity See Note 3	Output_Connectivity_I_ Embed_Ch1	Active Inactive
34	Frame Synchronization for VCP Embedded Channel	Status of Frame Synchronization if Frame Synchronization is specified as "On" See Note 3	Frame_Sync_Status_I_ Embed_Ch1	Sync No Sync

Table 5-37: UPD Reporting Parameters (cont'd)

Item No.	Parameters	Status	Mnemonic	Range of Values
I - Channel Data Format Parameters (cont'd)				
35	Virtual Channel Processing – CRC for VCP Embedded Channel	Status of CRC if CRC is specified as “On” See Note 3	VCP_CRC_Check_I_Embed_Ch1	Pass Fail
36	Virtual Channel Processing - RS Uncorrectable Errors for VCP Embedded Channel	RS statistics if RS is specified as “On” See Note 3	VCP_RS_Uncorrectable_I_Embed_Ch1	Any integer
37	Virtual Channel Processing - RS Correctable Errors for VCP Embedded Channel	RS statistics if RS is specified as “On” See Note 3	VCP_RS_Correctable_I_Embed_Ch1	Any Integer
38	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data for VCP Embedded Channel	IP Address for Engineering Data See Note 3	VCP_Segregation_IP_Address_I_Embed_Ch1	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
39	Virtual Channel Processing – VCP Segregation TCP Port Number for VCP Embedded Channel	TCP Port Number for Engineering Data 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks See Note 3	VCP_Segregation_Port_Num_I_Embed_Ch1	6000 to 6399; 7000 to 7399
Q - Channel Data Format Parameters				
40	Output Socket Connectivity	Status of output socket connectivity (independent of protocol selection)	Output_Connectivity_Q	Active Inactive
41	Frame Synchronization	Status of Frame Synchronization if Frame Synchronization is specified as “On”	Frame_Sync_Status_Q	Sync No Sync
42	Virtual Channel Processing – CRC	Status of CRC if CRC is specified as “On”	VCP_CRC_Check_Q	Pass Fail
43	Virtual Channel Processing - RS Uncorrectable Errors	RS statistics if RS is specified as “On”	VCP_RS_Uncorrectable_Q	Any integer
44	Virtual Channel Processing - RS Correctable Errors	RS statistics if RS is specified as “On”	VCP_RS_Correctable_Q	Any Integer
45	Output Socket Connectivity for VCP Embedded Channel	Status of output socket connectivity See Note 3	Output_Connectivity_Q_Embed_Ch1	Active Inactive

Table 5-37: UPD Reporting Parameters (cont'd)

Item No.	Parameters	Status	Mnemonic	Range of Values
Q - Channel Data Format Parameters (cont'd)				
46	Frame Synchronization for VCP Embedded Channel	Status of Frame Synchronization if Frame Synchronization is specified as "On" See Note 3	Frame_Sync_Status_Q_Embed_Ch1	Sync No Sync
47	Virtual Channel Processing – CRC for VCP Embedded Channel	Status of CRC if CRC is specified as "On" See Note 3	VCP_CRC_Check_Q_Embed_Ch1	Pass Fail
48	Virtual Channel Processing - RS Uncorrectable Errors for VCP Embedded Channel	RS statistics if RS is specified as "On" See Note 3	VCP_RS_Uncorrectable_Q_Embed_Ch1	Any integer
49	Virtual Channel Processing - RS Correctable Errors for VCP Embedded Channel	RS statistics if RS is specified as "On" See Note 3	VCP_RS_Correctable_Q_Embed_Ch1	Any Integer
50	Virtual Channel Processing – VCP Segregation IP Address for Engineering Data for VCP Embedded Channel	IP Address for Engineering Data See Note 3	VCP_Segregation_IP_Address_Q_Embed_Ch1	nnn.nnn.nnn.nnn, where nnn is a value between 000 and 255
51	Virtual Channel Processing – VCP Segregation TCP Port Number for VCP Embedded Channel	TCP Port Number for Engineering Data 6000-6399 is to be used for real-time telemetry 7000-7399 is to be used for playbacks See Note 3	VCP_Segregation_Port_Num_Q_Embed_Ch1	6000 to 6399; 7000 to 7399
<p>Note 1: BER and C/No can be derived from Eb/No estimate given certain assumptions.</p> <p>Note 2: The lock status in the UPD message is a combined indication of successful or unsuccessful carrier lock, bit sync and decoder lock by the receiver. It is an integrated tracking loop (PN, carrier, symbol) and after the tracking loop closes, the node sync algorithm always selects a G1 and G2 decoder lock and provides a lock status.</p> <p>Note 3: These UPD Parameters are only applicable when VCP Segregation is "On."</p>				

5.1.6 Data Retrieval Messages

Data retrieval message types allow the DAS Customer to retrieve and playback MAR archived telemetry data, when requested. Customer telemetry data is archived after any Customer requested CCSDS processing or encapsulation, excluding all TCP/IP wrappers. Playback data cannot be reprocessed and is always transmitted in the data format protocol in which it was originally processed.

5.1.6.1 Playback Search Request, Message 500

This message format allows a DAS Customer to request a search for archived data within a specified time window. Table 5-38 defines the message contents.

Table 5-38: Playback Search Request, Message 500, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 500 for a report on playback search request from DAS
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID sent from SWSI to DAS requesting report on archived or logged data
4	Request Identifier	A unique ID for a playback search request
5	Time Window for the Archive request	Time window within which the archived data is to be searched. Start and end times in yyyyddd hhmss format

5.1.6.2 Playback Search Response, Message 501

This is the message format used to respond to a search request for an archived data within a specified time window. Table 5-39 defines the message contents. The search results are listed in Item 6.

Table 5-39: Playback Search Response, Message 501, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 501 from DAS listing the time windows when archived data are available for this user
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 500 (item 4, Request ID) requesting a playback search
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
6	Service Time Segment Information	List of telemetry time segments per event based on start and stop times. If accepted, playback services will be represented as: Request ID, Start Time, Stop Time corresponding to the requested time windows.
7	Request Status Code	Accepted or rejected (refer to Table 5-40 for the message codes sent from DAS to SWSI). If accepted, service time segment information is provided.

For item 7, a request status code as described in Table 5-40 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-40: Message 501 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
500	Playback search request invalid because of invalid SIC.	R
501	Playback search request invalid because the request time is older than the archived data.	R
502	Playback search request invalid because no files exist for the reference request ID.	R

5.1.6.3 Playback Request, Message 502

This message format allows a DAS Customer to request playback of specific archived data. In Item 5, the Customer specifies when the archived data is to be played back. Item 6 specifies the Customer's selection of the specific request ID that is to be played back. Item 7 requests a specific

start time for an event since there may be multiple time segment periods per event. Table 5-41 defines the message contents.

Table 5-41: Playback Request, Message 502, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 502 requesting playback of specific archived data from DAS
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the playback of archived data from DAS
4	Request Identifier	A unique ID for a playback request
5	Playback Start Time	Start time for the playback of archived data that is requested by the Customer
6	Real-time Event Request ID	Selected event to be played back chosen from the list of events based on the real-time event request ID from message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID)
7	Start Time of Data Segment	Specific start time for an event since there may be multiple time segment periods per event
8	IP Address	IP address that is to receive the archived data
9	Port Number	TCP port number receiving the archived data

5.1.6.4 Playback Request Response, Message 503

This is the message format used to respond to an archive data playback request by a Customer. Table 5-42 defines the message contents.

Table 5-42: Playback Response, Message 503, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type acknowledging the playback request for the archived data and servicing the requested time window
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 502 (item 4, Request ID) requesting a playback
5	Real-time Event Request Identifier	Selected event to be played back chosen from the list of events based on the real-time event request ID from message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID)
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmmss
7	Playback Start Time	Start time for playback service archived data in yyyyddd hhmmss format
8	Request Status Code	Accepted or rejected (refer to Table 5-43 for the message codes sent from DAS to SWSI). If accepted, the request is serviced (data sent to the specified IP address and port number).
9	IP Address	IP address that is to receive the archived data
10	Port Number	TCP port number receiving the archived data

For item 7, a request status code as described in Table 5-43 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-43: Message 503 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
503	Archive data playback request rejected because of invalid real-time event request ID.	R
504	Archive data playback request rejected because real-time event request ID belongs to another SIC.	R
505	Archive data playback request rejected because of an invalid IP address.	R

Table 5-43: Message 503 Request Status Codes Text (cont'd)

Message Code	Text	Message Color
506	Archive data playback request rejected because of an invalid port number.	R
507	Archive data playback request rejected because no data exists for the requested time period.	R
508	Archive data playback request rejected. Request received within 1 minute of requested playback start time.	R

5.1.6.5 Playback Deletion Request, Message 504

This message format allows a DAS Customer to delete a previous playback request. The playback deletion request will stop an on-going playback request or cancel a playback request that has not been initiated. Table 5-44 defines the message contents.

Table 5-44: Playback Deletion Request, Message 504, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 504 identifying the playback deletion request for a requested service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the deletion of resource request from DAS
4	Request Identifier	A unique ID for a playback deletion request
5	Playback Event Request Identifier	Request ID of message 502 (item 4, Request ID) or of a submitted and accepted message 506 (item 4, Request ID) of the playback request that is to be deleted

5.1.6.6 Playback Deletion Response, Message 505

This is the message format used to respond to a delete playback request. Table 5-45 defines the message contents. Item 6 will provide the start and end times for the playback service that has been deleted.

Table 5-45: Playback Deletion Response, Message 505, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 505 deleting the playback for a previously requested service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 504 (item 4, Request ID) requesting the deletion of the playback.
5	Playback Event Request Identifier	Request ID of message 502 (item 4, Request ID) or of a submitted and accepted message 506 (item 4, Request ID) of the playback request that is to be deleted
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmmss
7	Playback Start Time	Start time for playback service in yyyyddd hhmmss format
8	Request Status Code	Accepted or rejected (refer to Table 5-46 for the message codes sent from DAS to SWSI). If accepted, a playback is deleted pertaining to the selected reference request ID.

For item 7, a request status code as described in Table 5-46 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-46: Message 505 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
509	Playback deletion request rejected because of invalid playback event request ID.	R
510	Playback deletion request rejected because playback event request ID belongs to another SIC.	R
511	Playback deletion request rejected because no data exists for the requested time period.	R

5.1.6.7 Playback Modification Request, Message 506

Table 5-47 defines the message contents that allow a DAS Customer to modify a previous playback request. Item 6 indicates the requested time period for the modified playback request. The current time period is contained in the original request.

Table 5-47: Playback Modification Request, Message 506, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 506 identifying the playback modification request for a requested service
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting the playback modification from DAS
4	Request Identifier	A unique ID for a playback modification request
5	Playback Event Request Identifier	Request ID of message 502 (item 4, Request ID) or of a previously submitted and accepted message 506 (item 4, Request ID) of the playback request that is to be modified
6	Playback Start Time	Start time for playback service in yyyyddd hhmss format
7	IP Address	IP address that is to receive the archived data
8	Port Number	TCP port number receiving the archived data

5.1.6.8 Playback Modification Response, Message 507

This is the message format used to respond to a modify playback request. The message contents are defined in Table 5-48. Item 6 contains the new start time for the playback service.

Table 5-48: Playback Modification Response, Message 507, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 507 modifying the playback time for a previously requested playback service
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 506 (item 4, Request ID) requesting a playback modification
5	Playback Event Request Identifier	Request ID of message 502 (item 4, Request ID) or of a submitted and accepted message 506 (item 4, Request ID) of the playback request that is to be modified
6	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmss
7	Playback Start Time	New time of the playback that was modified. Start time for playback service in yyyyddd hhmss format
8	Request Status Code	Accepted or rejected (refer to Table 5-49 for the message codes sent from DAS to SWSI). If accepted, a playback is modified pertaining to the selected reference request ID from SWSI.
9	IP Address	IP address that is to receive the archived data
10	Port Number	TCP port number receiving the archived data

For item 7, a request status code as described in Table 5-49 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-49: Message 507 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
512	Playback modification request rejected because of an invalid playback event request ID.	R
513	Playback modification request rejected because playback event request ID belongs to another SIC.	R
514	Playback modification request rejected because of an invalid IP address.	R
515	Playback modification request rejected because of an invalid port number.	R
516	Playback modification request rejected because no data exists for the requested time period.	R
517	Playback modification request rejected because playback service is ongoing.	R

5.1.6.9 Playback Event Details Request, Message 508

This message format allows a DAS Customer to request the details of a previous event segment based on the original request identifier. The scheduled event is a playback event. Table 5-50 defines the message contents.

Table 5-50: Playback Event Details Request, Message 508, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 508 requesting all the details of a playback event for a specific user
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID requesting a detailed report on a playback event for this Customer
4	Request Identifier	A unique ID for a playback event details request
5	Playback Event Request Identifier	Selected playback event segment from the list of events for this Customer based on the message 502 (item 4, Request ID) or submitted and accepted message 506 (item 4, Request ID)

5.1.6.10 Playback Event Details Response, Message 509

This is the message format used to respond with the details of a playback event segment selected by the Customer from a playback events list. Table 5-51 defines the message contents.

Table 5-51: Playback Event Details Response, Message 509, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 509 responding with playback event segment details for a selected playback event segment from the list of events for a specific user
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 508 (item 4, Request ID) requesting identification of planned event
5	Time Tag	Time when message was generated by DAS, yyyyddd hhmss
6	Playback Event Request Identifier	Request ID of message 502 (item 4, Request ID) or submitted and accepted message 506 (item 4, Request ID) the selected playback event whose details are being requested

Table 5-51: Playback Event Details Response, Message 509, Contents (cont'd)

Item No.	Information Identifier	Information Description
7	Playback Start Time	Start time for playback service in yyyyddd hhmss format
8	IP Address	IP address to which the playback service is being sent
9	Port Number	TCP port number to which the playback service is being sent
10	Real-time Event Request Identifier	Request ID of message 200 (item 4, Request ID) or of a submitted and accepted message 204 (item 4, Request ID) from the real-time event that was archived
11	Start Time of Real-time Data Segment	Start time of the real-time event segment that is being played back in yyyyddd hhmss format.

5.1.7 Customer State Vector (SV) Updates Messages

Customer SV updates messages provide the means to receive Customer state vector updates on the current location of the Customer emitter platform.

5.1.7.1 State Vector Update, Message 600

This message format allows a DAS Customer to send an update of a state vector for a specified SIC to the DAS system. The vector will be in Earth Centered Earth Fixed (ECEF) True-of-Date coordinate system referenced to WGS-84 reference ellipsoid. Table 5-52 defines the message contents.

Table 5-52: State Vector Update, Message 600, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 600 accompanied with a state vector and reference coordinate system from SWSI
2	SIC	Spacecraft Identification Code
3	Customer Identifier	Customer ID sent from SWSI to DAS
4	Request Identifier	A unique ID for a state vector update
5	SIC Vector and Reference Parameters	Ephemeris vector for the specified SIC and reference coordinate system. (See Table 5-53 for a detailed list. Each parameter is exchanged between DAS and SWSI using the mnemonic name as "keyname" and range value as "keyvalue")

Table 5-53 defines the format for Customer SV parameters. DAS also requires satellite parameters for each Customer's satellite. The details of these satellite parameters are provided in the ICD between DAS and DAS Customer, ICD-453-DAS/Customer.

Table 5-53: Ephemeris Vector Message for a Specified SIC

Item No.	Information Identifier	Information Description
1	Emitter Type	Orbiting or fixed emitter selection
2	Epoch Time	Time associated with the emitter position and velocity vector in yyyyddd hhmss format referenced to GMT
3	Emitter Position	X position coordinates of the emitter at epoch in meters
4	Emitter Position	Y position coordinates of the emitter at epoch in meters
5	Emitter Position	Z position coordinates of the emitter at epoch in meters
6	Emitter Velocity	X velocity coordinate of the emitter at epoch in millimeters/second
7	Emitter Velocity	Y velocity coordinate of the emitter at epoch in millimeters/second
8	Emitter Velocity	Z velocity coordinate of the emitter at epoch in millimeters/second

5.1.7.2 State Vector Update Response, Message 601

This is the message format used to respond as an acknowledgment of receipt of an updated state vector via message 600. Table 5-54 defines the message contents. An alert is generated if an

invalid SV is received. DAS rejects a SV with an epoch time in the future as referenced to the DAS Inter-Range Instrumentation Group (IRIG)-B timing standard, which is converted from the WSC Common Timing and Frequency System (CTFS) IRIG-G timing source. DAS only stores the latest state vector received from a Customer, as long as the epoch time of the state vector is in the past. DAS provides an advisory (yellow) request status code if the epoch time of the latest state vector received is older than the current vector held by DAS. In this case the latest state vector received, regardless of the older epoch time, will be used for determining orbit location.

Table 5-54: State Vector Update Response, Message 601, Contents

Item No.	Information Identifier	Information Description
1	Message Type	Message type 601 identifying DAS acknowledgment of receipt of the user specified emitter state vector
2	SIC	Spacecraft Identification Code
3	DAS Message Identifier	Message ID generated by DAS
4	Reference Request Identifier	Request ID of message 600 (item 4, Request ID) providing a state vector update
5	Time Tag	Time at which this message was generated by DAS, yyyyddd hhmmss
6	Request Status Code	Accepted or rejected (refer to Table 5-55 for the message codes sent from DAS to SWSI). If accepted, receipt of the emitter state vector is acknowledged, or if rejected, a message is generated indicating a problem.

For item 6, a request status code as described in Table 5-55 is sent by DAS for the acceptance or rejection response to SWSI. SWSI generates an alert to the Customer based on the request status code provided by DAS.

Table 5-55: Message 601 Request Status Codes Text

Message Code	Text	Message Color
000	Request accepted.	G
600	State vector rejected. Invalid future epoch time.	R
601	Epoch time of new state vector is older than the epoch time of the current state vector on file.	Y
602	State vector rejected. Invalid position vector.	R
603	State vector rejected. InvalidSIC.	R
604	Maximum allowable distance between current state vector and updated state vector has exceeded 920 km. Schedule has been re-planned. Check for new TDRS transition times.	Y

Abbreviations and Acronyms

ACE	Advanced Composition Explorer
Async	Asynchronous
AXAF-I	Advanced X-ray Astrophysics Facility – Imaging
BER	Bit Error Rate
Biphase	Binary Phase
bps	Bits per second
BPSK	Binary Phase Shift Keying
C/No	Carrier to Noise ratio
CCB	Configuration Control Board
CCR	Configuration Change Request
CCS	Communication and Control Segment
CCSDS	Consultative Committee for Space Data Systems
CNE	Center Network Environment
COTS	Commercial Off-The-Shelf
CRC	Cyclic Redundancy Check
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
CTFS	Common Timing and Frequency System
DAS	Demand Access System
DASCON	DAS Controller
dB	Decibel
DCN	Document Control Notice
ddd	Time format day of the year
DSN	Deep Space Network
Eb/No	Bit energy to noise power spectral density ratio
ECEF	Earth Centered Earth Fixed
EMC	Element Multiplexer Correlators
G	Green
GDIS	GRGT Data Interface System
GMT	Greenwich Mean Time
GRGT	Guam Remote Ground Terminal
hex	hexadecimal
hh	Time format hours of the day
Hz	Hertz
IBU	Independent Beamformer Unit
ICD	Interface Control Document
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IONet	IP Operational Network
IP	Internet Protocol
IPDU	Internet Protocol Data Unit
IRIG	Inter-Range Instrumentation Group

L	Level
LCM	Local Control and Monitor
LEO-T	Low Earth Orbiting -Terminal
LGN	LANDSAT-7 Ground Network
M	Mark
MAR	Multiple Access Return
mm	Time format minutes of the day
MOC	Mission Operations Center
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NCC	Network Control Center
NCCDS	Network Control Center Data System
NISN	NASA Integrated Services Network
NPG	NASA Procedures and Guidelines
NPG	Network Protocol Gateway
NRZ	Non Return to Zero
OCD	Operations Concept Document
PN	Pseudo-Random Noise
PTP	Programmable Telemetry Processor
R	Red
RF	Radio Frequency
RFC	Requests for Comments
RS	Reed Solomon
S	Space
SDIF	SWSI – DAS Interface
SFDU	Standard Formatted Data Unit
SIC	Spacecraft Identification Code
SN	Space Network
SNIF	SWSI – NCCDS Interface
SNIP	Space Network Interoperable PN
SPSR	Service Planning Segment Replacement
SQPN	Staggered Quadrature Pseudorandom Noise
SRD	System Requirements Document
SSC	Service Specification Code
ss	Time format seconds of the day
Std	Standard
STGT	Second TDRSS Ground Terminal
SV	State Vector
SWSI	SN Web Services Interface
Sync	Synchronous
TCP	Transmission Control Protocol
TDM	Time Division Multiplex
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TLM	Telemetry
TUT	TDRS Unscheduled Time

UPD	User Performance Data
VCDU	Virtual Channel Data Unit
VCP	Virtual Channel Processing
WGS-84	World Geodetic System 1984
WSC	White Sands Complex
WSGT	White Sands Ground Terminal
XML	Extensible Markup Language
XSD	XML Schema Definition
Y	Yellow
yyyy	Time format year