Traffic Flow Management System-to-Flight Schedule Monitor (TFMS-to-FSM) Interface Control Document (ICD) for the Traffic Flow Management-Modernization (TFM-M) Program

Final, Release 5, Revision 1

Contract Number: DTFAWA-04-C-00045

CDRL: E05

March 1, 2011

Prepared for:

U.S. Federal Aviation Administration

Prepared by:

CSC

North American Public Sector – Civil Group

15245 Shady Grove Road

Rockville, MD 20850

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CSC/TFMM-10/1077
Release 5, Final, Revision 1
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INTERFACE CONTROL DOCUMENT
APPROVAL SIGNATURE PAGE
TFMS/FSM

APPROVAL SIGNATURES

PARTICIPANT	NAME	DATE

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1 Scope

This section identifies the scope, purpose, and organization of this Interface Control Document (ICD) and identifies the subsystem responsibility list.

1.1 Scope and Purpose

This ICD provides the design characteristics of the interface between the Traffic Flow Management System (TFMS) and the Flight Schedule Monitor (FSM) as it is implemented for TFMS Build 3. This ICD satisfies the interface design requirements contained in the Traffic Flow Management System Interface Requirements Specification (IRS) for Traffic Flow Management Modernization (TFM-M), Release 5 Revision 4.1, dated September 14, 2010. The IRS is a companion document to the System/Subsystem Specification (SSS) for the Traffic Flow Management– Modernization (TFM-M), Release 5 Revision 7.1 dated September 14, 2010. This ICD was prepared under guidance from FAA-STD-025e, dated August 9, 2002 and the TFMM-ENGR-05(E05), Traffic Flow Management Modernization (TFM-M), Data Item Description (DID) for ICDs.

The purpose of this ICD is to specify:

- Interface connectivity between TFMS and FSM
- Format of data transmitted between FSM and TFMS

1.2 Subsystem Responsibility List

The following list provides the TFMS external system interface and identifies the responsible Federal Aviation Administration (FAA) organizations:

- TFMS - FAA-ATO-R
- FSM - FAA-ATO-R

1.3 Document Organization

This ICD is organized in six sections and one appendix:

Section 1, **Scope**, describes the purpose and scope of this ICD.

Section 2, **Applicable Documents**, provides a listing of referenced government and non-government documents, and document sources researched and used by this ICD.

Section 3, **Interface Characteristics**, identifies and describes the general characteristics, functional design, and physical design characteristics for this ICD.

Section 4, **Verification Provisions**, contains verification provisions for this ICD.

Section 5, **Preparation for Delivery**, contains any specific preparations required by this ICD.

Section 6, **Notes**, provides a list of definitions, abbreviations, and acronyms used in this ICD.

Appendix A, **FSM – TFMS Tools**, provides a description of each of the FSM commands that result in FSM – TFMS data exchange.

Appendix B, **ADL & FSM Broadcast File Format Specifications**, provides a detailed description of the ADL and FSM Broadcast file formats and naming conventions.

Appendix C, **FSM ADL Parameters Specification**, provides a detailed description of the FSM delay program parameters associated with proposed and actual delay programs. FSM provides these parameters to TFMS and TFMS includes these parameters, as received, in subsequent ADL file distribution.

Appendix D, **CDM Message Protocol**, details the application, connectivity and the protocols used by TFMS to exchange messages via the CDM participant (AOCNet, FSM, and ARINC) client interface.

2 Applicable Documents

The following documents form part of this ICD to the extent specified herein.

2.1 Government Documents

FAA Standards:

FAA-STD-025e	Preparation of Interface Documentation, August 9, 2002
FAA-STD-039b	Open Systems Architecture and Protocols, May 1, 1996
FAA-STD-043b	Open System Interconnect Priority, 1996
FAA-STD-045	OSI Security Architecture, Protocol and Mechanisms, 1994

FAA Orders:

FAA Order 1370.82A	Information Systems Security Program, September 11, 2006
FAA Order 1830.2	Telecommunication Standards, Selection and Implementation Policy, August 1987

National Airspace System (NAS) Documents:

NAS-IR-24032410	Enhanced Traffic Management System (ETMS) Interface Requirements Document (IRD) for Traffic Flow Management Infrastructure (TFMI), Revision A, September 16, 2005
NAS-IR-241400001	Traffic Flow Management System (TFMS) Interface Requirements Document (IRD) for Traffic Flow Management Modernization (TFM-M) Version 1.0, August 14, 2006

Request For Comments (RFC) Documents:

RFC 791	Internet Protocol, Sep 1981
RFC 793	Transmission Control Protocol, Sep 1983
RFC 3076	Canonical XML Version 1.0, Mar 2001

Other Government Documents:

CSC/TFMM-04/0025	System/Subsystem Specification (SSS) for the Traffic Flow Management–Modernization (TFM-M) Program, Release 5, Revision 7.1, September 14, 2010
CSC/TFMM-11/1247	Final Information Systems Security Plan (ISSP) - Fiscal Year (FY) 2011 for Traffic Flow Management–Modernization (TFM-M), February 28, 2011
CSC/TFMM-05/0121	Interface Requirements Specification (IRS) for the Traffic Flow Management – Modernization (TFM-M) Program, Release 5, Revision 4.1, September 14, 2010
CSC/TFMM-10/1077	Traffic Flow Management System-to-Airline Operations Center Network (TFMS-to-AOCNet) Interface Control Document (ICD), Release 5, Final, Revision 1, March 1, 2011
FCM-H1-2005	Federal Meteorological Handbook No 1: Surface Weather Observations and Reports, September 1, 2005
ND319705	Weather Service Operations Manual (WSOM), Chapter D-31, Aviation Terminal Forecasts, June 6, 1997
TFMM-ENGR-05(E05)	Traffic Flow Management Modernization (TFM-M), Data Item Description (DID), undated
VNTSC-TFM-RM-007	ETMS Reference Manual Volume I, Version 8.5, November 2007
DCN 31F08007-015-R0	ETMS Reference Manual Volume II: FSM User's Guide, Version 8.5 Client
Metron Aviation ICD	FSM/Autosend Server Communications Interface, Version 1.2, June 28, 2005
CSC Memorandum	Web Coversheet Dictionary FSM 9.0v6, November 11, 2010

2.2 Non-Government Documents

International Organization for Standardization (ISO):

ISO/IEC 7498-1	Information Processing Systems – Open Systems

Interconnect – Basic Reference Model, 1993

Institute of Electrical and Electronics Engineers (IEEE):

IEEE 802.3	IEEE Standard for Information Technology — Telecommunications and Information Exchange Between Systems, 2000

American National Standards Institute (ANSI):

ANSI X3.4	American National Standard Code for Information Interchange (ASCII), Rev. 1992

2.3 Document Sources

This subsection provides sources for FAA and International Organization for Standardization (ISO) documents.

2.3.1 Source of FAA Documents

Copies of FAA specifications, standards, and publications may be obtained from the Contracting Officer, Federal Aviation Administration, 800 Independence Avenue S.W., Washington, DC, 20591. Requests should clearly identify the desired material by number and date and state the intended use of the material.

2.3.2 Request for Comment (RFC) Documents

RFC documents are available from the reference area electronically at the following Web address:

http://www.faqs.org/rfcs/

2.3.3 ISO, IEEE, and ANSI Documents

Copies of ISO, IEEE, and ANSI standards may be obtained from the American National Standards Institute, 11 West 42nd Street, New York, NY, 10036.

3 Interface Characteristics

This section provides the general, functional, and physical interface characteristics for the TFMS interface with FSM.

3.1 General Characteristics

The Flight Schedule Monitor (FSM) was developed for the FAA by Metron Aviation, providing the FAA, NavCanada, and Collaborative Decision Making (CDM) participating users with the capability to monitor airport capacity/demand balance, model traffic flow management initiatives, and evaluate alternative approaches. FSM provides common situational awareness to FSM users by presenting airport demand and capacity information with both graphics and text. FSM contains several rationing schemes that seek to maintain an efficient and equitable balance between capacity and demand. FSM is also used by the Air Traffic Control System Command Center (ATCSCC) to implement Ground Stop (GS) and Ground Delay Program (GDP) strategies. Airline Operations Centers use FSM to assess the proposed GS/GDP, develop strategies to cope with the restrictions, and monitor GS/GDP initiatives that are in effect. FSM is used by more than 30 FAA facilities, 40 airlines, and an increasing General Aviation community in the United States and Canada.

The TFMS-to-FSM interface described in this ICD is from the FSM Server to the TFMS TPC.

Figure 3-1, TFMS-to-FSM Interface Block Diagram, illustrates the TFMS-to-FSM interface and the demarcation point for the FSM to TPC. The demarcation point is illustrated as a black dot.

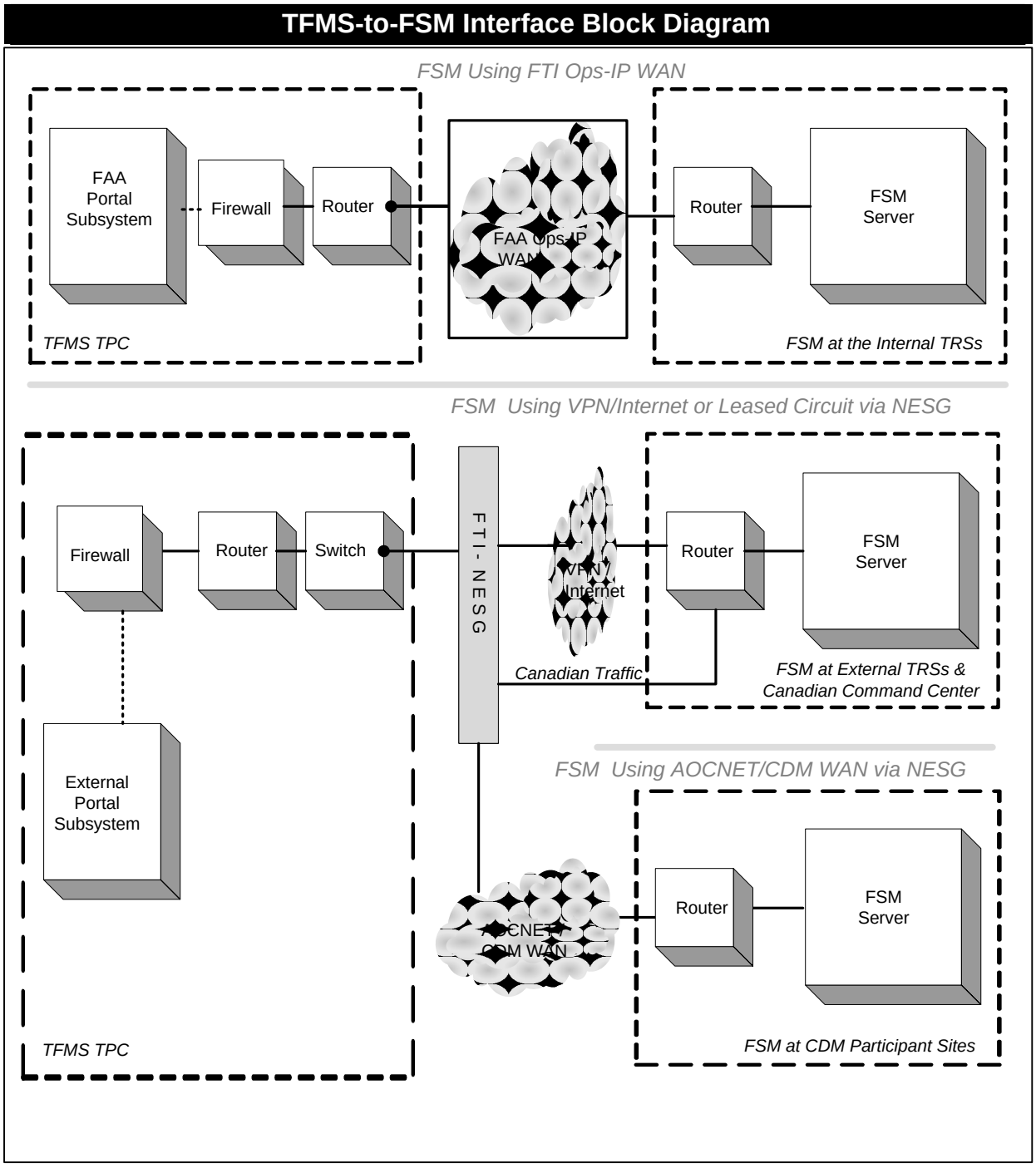

Figure 3-1. TFMS-to-FSM Interface Block Diagram

The TFMS-to-FSM interface transfers data via three communications paths (depending on the FSM Server entity interfacing), as detailed below:

- Via the FAA FTI Ops-IP Gateway – This pathway enables data transfers via a closed "trusted' high speed connection system (primarily at the ATCSCC). This

allows communications to and from FSM Servers, through the Ops-IP Gateway into a designated TFMS router and then through the FAA Portal Subsystem for further processing. The interface uses the standard TCP/IP protocols for communications. The demarcation point is at the TFMS router.

- Via the National Airspace System (NAS) Security Gateway (NESG) – This pathway enables data transfers via the NESG communication system. NESG is a closed "untrusted' high speed connection system, allowing a communications link to specified an External TRS (ETRS) and other designated systems. The External TRSs connect to the NESG via the VPN/Internet. The Canadian traffic flows into the NESG via a dedicated circuit. This allows communications to and from FSM Servers, through the NESG Gateway, into a designated TFMS router and switch, and then into the External Portal Subsystem for further processing. The interface uses the standard TCP/IP protocols for communications. The demarcation point is at the TFMS switch.
- Via the AOCNET/CDM Wide Area Network – This pathway enables data transfers to the FSM Servers via the AOCNET/CDM WAN. The AOCNet/CDM WAN is an open 'untrusted' system used by airlines and other entities for FSM communications. This allows communications from the FSM Servers to communicate through the AOCNET/CDM WAN (maintained by Aeronautical Radio INC) into the NESG over to the designated TFMS router and switch, and then to the External Portal Subsystem for further processing. The interface uses the standard TCP/IP protocols for communications. The demarcation point is at the TFMS switch.

Refer to Section 3.3 for a detailed physical detailing of the TFMS-to-FSM Interface.

3.2 Functional Design Characteristics

This subsection describes the functional design characteristics of the TFMS and FSM.

3.2.1 Application Processes (APs)

This subsection identifies each application process and the applicable services, including performance characteristics (information units, quality of service, error handling, and responses).

3.2.1.1 Identification of Application Processes

The TFMS uses the following APs to send and receive data from FSM:

- FTI Ops-IP WAN – This interface AP is the FAA Portal Message Interface Server located in the FAA Portal Subsystem
- VPN/Internet via NESG – This interface AP is the External Portal Message Interface Server located in the External Portal Subsystem
- AOCNET/CDM WAN – This interface AP is also the External Portal Message Interface Server located in the External Portal Subsystem

The corresponding FSM AP is the FSM Server AP.

3.2.1.2 Category of Services Required by the AP

Loss of the TFMS-to-FSM interface will impair full system operation, but will not degrade TFMS operations to the point of inoperability. This interface is designated "essential" IAW NAS-SR-1000.

3.2.1.2.1 Application Services Identification

The TFMS-to-FSM interface is used to transfer the following data from FSM:

- Aggregate Demand List Requests
- FSM Broadcast Request
- Substitution Messages
- EDCT Control Commands and Report Requests
- Delay Program Rates
- Delay Program Parameters
- Heartbeat Message

The TFMS-to-FSM interface is used to transfer the following data to FSM:

- Aggregate Demand List
- FSM Broadcast Response
- FSM Broadcast Message
- Substitution Message Responses
- EDCT Control Command Responses and Reports
- Heartbeat Acknowledgements

3.2.1.3 Information Units

This subsection describes the formats of the data transferred between FSM and TFMS.

3.2.1.3.1 Information Code

All TFMS-to-FSM interface messages are encoded in American Standard Code for Information Interchange (ASCII) alphanumeric data format in accordance with ANSI X3.4, American National Standard Code for Information Interchange (ASCII), Rev. 1992., as described in Section 3.2.1.3.2, and the appropriate subsections.

In addition, the FSM Broadcast Message and one element of the Aggregate Demand List (ADL) are encoded in XML, an ASCII-based encoding format (conforming to the documentation in the previous paragraph), in accordance with RFC 3076, Canonical XML Version 1.0, Mar 2001.

3.2.1.3.2 Information Structure

The following subsections provide the detailed record layout of the products sent by the FSM. Table 3-I, TFMS-to-FSM Interface Messages Table, presents the TFMS-

to-FSM Interface Messages, including the subsection reference and mnemonic.

Table 3-I. TFMS-to-FSM Interface Messages

Product Name	Product Mnemonic	ICD Subsection
Aggregate Demand List	ADL	3.2.1.3.2.1
FSM Broadcast Request	---	3.2.1.3.2.2
FSM Broadcast Reply	---	3.2.1.3.2.3
FSM Broadcast Message	FBCM	3.2.1.3.2.4
Slot Credit Substitution Message	SCS	3.2.1.3.2.5
Substitution Good Responses	N/A	3.2.1.3.2.6
Substitution Error Responses	N/A	3.2.1.3.2.7
EDCT and Other Commands	N/A	3.2.1.3.2.8
EDCT List	EDCT List	3.2.1.3.2.9
EDCT Sub Show	EDCT Sub Show	3.2.1.3.2.10
EDCT SList	EDCT SList	3.2.1.3.2.11
EDCT Unassigned Slots	EDCT Unassigned Slots	3.2.1.3.2.12
Delay Program Rate Messages	AAR or ADR	3.2.1.3.2.13
Delay Program Parameters Messages	GDP (or GS or AFP) PARAM, COMP PARAM, or BLANK PARAM	3.2.1.3.2.14
Heartbeat Message	HB	3.2.1.3.2.15

The following syntax rules are used for field specifiers in the ASCII Tables following the following subsections. Below these rules are the conventions for XML entries.

- L – represents one upper-case letter in ASCII
- d – represents one numeric digits in ASCII
- n – represents one integer in ASCII
- a – represents one alphanumeric (either number or upper-case letter) in ASCII
- [] – means the characters enclosed are optional. Any characters not within brackets are required. For example, Ldd [aa] would indicate an upper-case letter, followed by two digits, and then zero, one, or two optional alphanumeric characters.
- **BOLD** indicates a static entry.
- *ITALIC* entries are optional to the message

- All times, unless specified will be in DayDayhourhourminuteminute (DDhhmm) format

The following rules apply to the XML schema:

- The files contain only printable ASCII characters.
- The file format follows standard XML structural conventions.
- In XML terminology, the files are guaranteed to be:
  - Valid – The XML file content matches the proper schema and documentation.
  - "Well-Formed." - This means that every opening tag (i.e. - <TAG>) has a corresponding closing tag (i.e. - </TAG>), opening and closing tag pairs are correctly matched and nested, and consistent capitalization is used. Note - The first line of every file is the standard "**<?XML ...>**" entry, identifying the XML version number. This is the only tag which has no corresponding close tag.
  - Simple - Only a simple subset of XML is used. All data is between matching start and end tags:

    ```
    <TAG>data</TAG>
    ```

    The files do not contain data in any other XML form. For example, composite tags (e.g., <TAG="data"/>) and attributes are never used. Note - New-line characters between matching start and end tags are part of the element's data.

  - Structured – The XML file consists of *data element* (or simply an element), consisting of a pair of matching start and end tags, together with the data between them. Elements can contain other elements, and are referred to as a *container*. The container element is considered to be the '*parent*' to the elements contained within. Elements contained within the 'parent' container are considered '*child'* elements. Example:

    ```
    <CTR_ROUTE>
        <CTR_SEG>...</CTR_SEG>
    </CTR_ROUTE>
    ```

    Only a simple subset of XML is used. All data is between matching start and end tags:

    ```
    <TAG>data</TAG>
    ```

    Characters that are not between matching start and end tags are ignored. They are and may be used occasionally for comments or enhancements of clarity. Example:

    ```
    <TAG1>
        <TAG2>This is data </TAG2>
        This is a comment.
        <TAG2>This is data</TAG2>
    </TAG1>
    ```

Data elements can be in any order within their container element's tag pair (if element is a child of a parent element) or within the file (if an element not acting as a container).

3.2.1.3.2.1 Aggregate Demand List

The ADL is the primary product that drives FSM and is used by many AOCNET Participants. It is an ASCII file consisting of two distinct parts, the header and the data update sections. It is comprised of data extracted from the TFMS databases, which are maintained with a combination of:

- Official Airline Guide (OAG) data
- Airline-provided flight data messages (FC, FX, FM, EI, and OOOI data)
- NAS messages generated from the ATC system (FZ, DZ, RZ, AZ, AF, UZ, and TZ data messages)
- Issued ground delays (EDCTs – CTs for individual delays, FA for blanket delays)
- GDP-specific data entered by traffic management specialists using AOCNET.

Refer to Appendix B ADL & FSM Broadcast File Format Specifications for a detailed description of the ADL file format.

3.2.1.3.2.2 FSM Broadcast Request

A client application, (in this case, FSM) requests that an FSM Broadcast message be sent from the TFMS. The format of the request is completely contained within a CDM Protocol message and no explicit application message is sent by the client. Refer to the M_AUTO_MONITOR_REQ protocol message (located in Appendix D) for details.

3.2.1.3.2.3 FSM Broadcast Reply

The FSM Broadcast Reply Message is sent by the TFMS as a reply to a FSM Broadcast Request Message from a client application (typically FSM). The format of the message is identical to the format of the FSM Broadcast Message. Refer to the M_AUTO_MONITOR_REPLY protocol message (located in Appendix D) and Section 3.2.1.3.2.4 (FSM Broadcast Message) for details.

3.2.1.3.2.4 FSM Broadcast Message

TFMS sends an FSM Broadcast Message (separate from ADLs) to notify applications, primarily FSM, of two sets of dynamic data:

- The current traffic management initiatives that are proposed, in place, or have been purged on this day,
- The current FEAs and FCAs that are available for monitoring with FSM.

Refer to Appendix B, ADL & FSM Broadcast File Format Specifications, for a detailed description of the FSM Broadcast Message format.

3.2.1.3.2.5 Slot Credit Substitution Message (SCS)

A slot credit substitution request can be submitted to TFMS using the SCS message. The format of the SCS message differs from the other CDM messages in that the format is completely fixed. Special fields are used in the SCS that cannot be modified by the CDM Flight Modify (FM) message (see TFMS-to-AOCnet Interface Control Document). This was done because the additional fields in an SCS message are not flight attributes that are stored by TFMS. Rather, they are temporary values used only in the processing of the request.

An SCS message uses the fields specified in Table 3-II, in the indicated order.

Table 3-II. Slot Credit Substitution (SCS) Message

Field	Designation	Unit/Format	Description	Bytes
Field 01	Message type	**SCS**	Static Entry - **SCS**	3
Field 02	Flight Identification	La[a][a][a][a][a]	Flight call sign (Flight ID) as it appears in the OAG and/or subsequently will be filed on the NAS flight plan. Only the aircraft identification portion of the NAS syntax is accepted (i.e., the computer IDs are not used here). Flight IDs must match the NAS flight plan exactly. IDs consisting of a 3-letter code and a flight number should use leading zeros on the flight number only if they will be filed that way on the flight plan.	2-7
Field 26	Departure Airport (NAS Departure Point)	aaa[a]	ICAO identifier for the airport of origin for this flight leg. TFMS also accepts published FAA 3-letter designator for CONUS airports.	3 - 4
Field 27	Arrival Airport	aaa[a]	ICAO identifier for the destination airport for this flight leg. TFMS also accepts published FAA three-letter designator for CONUS airports. Called Destination in NAS. Example - JFK, KJFK, 32G	3 - 4
Field A1	UTC Departure Date/Time	dddddddd	Date/time on which the flight leg was originally scheduled to depart the gate. Format is *MMDDhhmm*, and must be 8 digits, zero padded. This field is used as part of the unique identification of a flight	8

Field	Designation	Unit/Format	Description	Bytes
			leg. Example - 06261225	
No tag	Yielded Slot	Laadddddda Or **FCA**aaadddddda	Slot designator. The format is a concatenation of: • Airport name: 3 or 4 characters or FCA name : FCA followed by up to 3 characters • Slot date and time: Format is *DDhhmm*, and must be 6digits, zero padded. • 1-letter suffix: The suffix letter is used to ensure that slot name is unique	10-14
No tag	Earliest Acceptable Time	dddddd	Earliest acceptable time the aircraft will take. Format is *DDhhmm*, and must be 6 digits, zero padded.	6
No tag	Latest Acceptable Time	dddddd	Latest acceptable time the aircraft will take. Format is *DDhhmm*, and must be 6 digits, zero padded.	6

Sample Slot Credit Substitution (SCS) Message for a GDP

```
SCS UNA1277 DFW SFO 03241701 SFO.242040A 242050 242120
```

Sample Slot Credit Substitution (SCS) Message for an AFP

```
SCS UNA1277 DFW SFO 03241701 FCAA02.242040A 242050 242120
```

The fields contained in the above examples have the following meaning:

- `SCS` – This is an SCS request message type. (Required)
- `UNA1277` – The ID of the flight to be subbed into the new slot. (Required)
- `DFW` – The origin of the flight. (Required)
- `SFO` – The destination of the flight. (Required)
- `03241701` – The original departure date/time for the flight. (Required)
- `SFO.242040A` – The yielded slot. (Required)
- `242050` – The earliest acceptable time for the new slot. (Required)
- `242120` – The latest acceptable time for the new slot. (Required)

In addition, there are other notes that provide guidance on ECR messages:

- The SCS message is allowed only in an SS packet. The SS packet M_SS_Data_Packet [112] is described in detail in Appendix D. The only message FSM sends in an SS packet is the SCS message.

3.2.1.3.2.6 Substitution Good Responses

The FAA will send a response to every SS message packet. The response is sent to the return address on the incoming message. The format of the response is the same regardless of what types of messages were sent in the SS packet.

If no errors are detected in the SS packet, the FAA database is updated to reflect the changes requested by the airlines. The response to the airline includes the packet identifier, a message indicating it was successfully processed, and an updated slot list for each flight affected by the message.

Sample Substitution Good Response
(Line Numbers for Reference Only)

```
(1) SS ABC0625121029.01 ACCEPTED.
(2) SLOT LIST for LGA
(3)
(4) ACID    ASLOT      DEP ARR CTD    CTA    TYPE EX CX SH ERTA   IGTD
(5) ABC1234 LGA260500A DCA LGA 260400 260500 ECR  -  Y  -  -      260145
(6) ABC5678 LGA260400A IAD LGA 260300 260400 SBRG -  -  -  260400 260245
```

Table 3-III below presents a breakout of the Substitution Good Response

Table 3-III. Substitution Good Response Message

Field	Designation	Unit/Format	Description	Bytes
Packet Type	Initial Packet Type Identifier	LL	Identifies the initial packet type being replied to	3
Sender	Sender ID code	aaa	3-character code of the data sender (An airline with an FAA-assigned 3-letter code will use that code in the packet header; e.g., AAL, FDX. A data provider that is sending data for N-number flights will use the 3-letter code assigned by FAA especially for this purpose.)	3
DTG	Date /Time Group	ddddddddd	10-digit transmission date and time in the format: *MMDDhhmmss*	10
Period	Separator period	.	One period, separating the DTG from the Unique ID.	1

Field	Designation	Unit/Format	Description	Bytes
Unique	Unique identifier	dd	2 digits for uniqueness (in case multiple messages are generated in the same second)	2
Space	Space	[ ]	One space separating the Unique code from the Processed entry	1
Accepted	Accepted	**ACCEPTED**	Shows the identifier of the packet that is being replied to. The word "ACCEPTED" indicates that the processing of the packet was successful.	8
Data ID	Data Identifier	**ATCSCC EDCT FLOW CONTROL DEPARTURE TIME**	Static Entry - ATCSCC EDCT FLOW CONTROL DEPARTURE TIME	39
Headers	Slot List Data Headers	**ACID ASLOT DEP ARR CTD CTA TYPE EX CX SH EENTRY (or) ERTA IGTD**	Header for the following data fields: • ACID – Aircraft identifier • ASLOT – Arrival Slot • DEP – Departure Airport • ARR – Arrival Airport • CTD – Controlled Time of Departure • CTA –Controlled Time of Arrival • TYPE – Type of Entry • EX – Exempt Flag (Yes or No) • CX – Control Flag (Yes or No) • SH – Slot Hold flag (Yes or No) • EENTRY – Earliest Entry Time (for AFP) *or* ERTA - Earliest Runway Time of Arrival *(*for Airport GDP) • IGTD - Initial Gate Time of Departure	**64**

Field	Designation	Unit/Format	Description	Bytes
SLOT LIST DATA FIELDS*				
ACID	Flight Identification	Laa[a][a][a][a]	Flight call sign as it appears in the OAG and/or subsequently will be filed on the NAS flight plan. Padded with spaces to equal 8 bytes.	8
ASLOT	Arrival Slot	LLL[Laa].ddddddL or **FCA**aaa.dddddL	The time slot reserved at the airport or FCA for this flight to arrive as follows: • Name – airport or FCA name. An airport name can be three or four characters and can include letters and numbers. An FCA name must be the entry FCA followed by three alphanumeric characters. The name is separated from the Date/Time by a period for readability • Date/Time – Slot date and time. The format is DDhhmm (padded as necessary) • Suffix Letter - The suffix letter is used to ensure that slot name is unique. Note - An FCA name must be six characters starting with the literal letters "FCA". The remaining characters can be either digits, upper-case letters, dash ("-"), or underscore ("_"). An FCA name cannot end with an underscore. Padded with spaces to equal 15 bytes.	15
DEP	Departure Airport	LLL[L]	Departure airport code in standard 3 or 4 letter identifier, padded with spaces to equal 5 bytes	5

Field	Designation	Unit/Format	Description	Bytes
ARR	Arrival Airport	LLL[L]	Arrival airport code in standard 3 or 4 letter identifier, padded with spaces to equal 5 bytes. Note - For a GDP, the arrival airport will be the same for every flight; for an AFP, they may differ. It is padded with spaces to equal 5 bytes	5
CTD	Controlled Time of Departure	dddddd	The time the flight should take off In the format *DDhhmm*, padded with spaces to equal 7 bytes	7
CTA	Controlled Time of Arrival	dddddd	The time the flight should arrive at the controlled airport or FCA (e.g., 260400). In the format *DDhhmm*, padded with spaces to equal 7 bytes	7
TYPE	Control Type	LLL[L]	The source of the current control times for this flight (e.g. GDP). The control types that can appear in a slot list are: • ABRG – Control times were assigned when the flight was utilized to create a bridge in order to adaptive compress a slot. • ADPT – Control time assigned when the flight was adaptively compressed by the TFMS adaptive compression process (AFP and GDP) • AFP – Control times were computed as part of an initial AFP, a revision to an AFP, or an extension to an AFP. • BLKT – Control times were computed by a blanket program. • COMP – Control times were computed by compression. • DAS – Control time which resulted from the assignment of the average delay to a pop-up flight	5

Field	Designation	Unit/Format	Description	Bytes
			which did not receive an unassigned slot in an AFP or GDP. For DAS based programs this is used for the initial delay assignments to all pop-up flights. For GAAP and UDP based program, this control type is used only if no unassigned slot is available for the pop-up. This control type is not used for re-controlled flights. (AFP and GDP) • ECR – Control times were assigned by an FAA ECR request. • GAAP – Control times are the result of a GAAP or UDP based AFP or GDP if a pop-up or a re-control flight is allocated to an unassigned slot. This occurs for all pop-up flights in a GAAP or UDP based program when an unassigned slot is available for the flight. However, only some classes of re-controlled flights in a GAAP or UDP are assigned to unassigned slots. (e.g., those that occur after dropping out of an AFP). (AFP and GDP) • GDP – Control times were computed as part of an initial GDP, a revision to a GDP, or an extension to a GDP. • GS – Control times were computed by a ground stop. • RCTL – Control time which resulted from the assignment of the average delay to a flight that was at some point controlled by a GDP or AFP, which was then purged or the flight dropped out and was re-	

Field	Designation	Unit/Format	Description	Bytes
			controlled in another AFP. For DAS programs this is used for the initial delay assignments to all re-controlled flights. For GAAP and UDP, this control type is used only if no unassigned slot is available for the re-controlled flight or the class of re-controlled flight is never assigned to unassigned slots. As opposed to other pop-ups, RCTL flights retain full substitution rights (AFP) • SBRG – Control times were assigned when creating a bridge for an SCS or ECR request. • SCS – Control times were assigned by a user slot credit substitution message. • SUB – Control times were assigned by a conventional user substitution message. • UBRG – Control times were assigned when creating a bridge for pop-up flight assignment during UDP. Performed automatically by the TFMS Core (AFP and GDP) • UPD – Control times are from an FAA "EDCT UPDATE" command. This entry is padded with spaces to equal 5 bytes.	

Field	Designation	Unit/Format	Description	Bytes
EX	Exempt Flag	**Y** *or* –	Flag indicating flight was exempt from delays when the GDP or AFP was computed. (one of two entries): • Y if true • - if False This entry is padded with spaces to equal 3 bytes	3
CX	Cancel Flag	**Y** *or* –	Flag indicating whether the flight is currently cancelled. (one of two entries): • Y if true • - if False This entry is padded with spaces to equal 3 bytes	3
SH	Slot Hold Flag	**Y** *or* –	Flag indicating whether the flight is currently on Slot Hold. (one of two entries): • Y if true • - if False This entry is padded with spaces to equal 3 bytes	3

Field	Designation	Unit/Format	Description	Bytes
ERTA for a GDP or EENTRY for an AFP	Earliest Runway Time of Arrival Earliest Entry Time	dddddd	The earliest time flight can arrive at the controlled element in the case that the delays are reduced (e.g., 260200). In the format *DDhhmm*, padded with spaces to equal 7 bytes EENTRY is used to ensure that a flight will not be assigned a slot for an AFP that it cannot use. Since the CDM Participants do not send earliest entry times for an FCA, TFMS computes this by: first determining the earliest ETA (EETA), then applying any delta to the ENTRY time. • If flight has ERTD, EENTRY = ENTRY + (ERTD-ETD) • Else if flight has LRTD, EENTRY = ENTRY + (LRTD-ETD) • Else if flight has LGTD, EENTRY = ENTRY + ((LGTD+10)-ETD) • Else if flight has IGTD, EENTRY = ENTRY + ((IGTD+10)-ETD) Else, EENTRY = ENTRY	6
IGTD	Initial Gate Time of Departure	dddddd	The original scheduled gate push back time for the flight in the format *DDhhmm*. Used to uniquely identify the flight.	6
*Note – There may be multiple rows of data under the header.				

3.2.1.3.2.7 Substitution Error Responses

If errors are detected in the SS packet, the entire packet is rejected and the FAA database is not updated. The response includes the packet identifier, a message indicating it was rejected, and the number of errors. For each error, the response shows the SS message that triggered the error and the reason for the error. (For a complete listing of Error messages, refer to Table 3-IV.)

Sample Error Response
(Line Numbers for Reference Only)

```
(1)    SS ABC0625121029.01 REJECTED. 1 ERROR.
(2)
(3)    SCS UNA1277 DFW SFO 03241701 FCAA02.242040A 242050 242140
(4)    ERR417: CTA NOT WITHIN 20-MINUTE WINDOW
```

The meaning of the sample response is as follows:

Line 1: Shows the identifier of the packet that is being replied to. The word "REJECTED" indicates that the processing of the packet was successful. The number of errors is shown.

Line 2: blank

Line 3: The SS message that triggered the error.

Line 4: The error code and message. In this case, it was Error 417, indicating the flight specified on an ECR message could not be updated in the TFMS database, due to the fact that the CTA was not within the 20-minute window for slot times.

Table 3-IV. Error Code Messages

Number	Error Description	Corrective Action
Packet Header Error Messages		
ERR401	PACKET NOT PROCESSED	The packet has not been processed due to internal TFMS error.
ERR402	PACKET ID IS MISSING. USE LLLDDDDDDDDDD.DD	The packet header line does not include a packet ID.
ERR403	INVALID PACKET ID. USE LLLDDDDDDDDDD.DD	The packet ID does not match the specified syntax.
ERR405	UNKNOWN PACKET CODE. USE FD OR SS	The packet contains a code other than FD in the header line.
ERR406	PACKET CODE LINE MISSING. USE FD LLLDDDDDDDDDD.DD	The packet has no header line.
ERR407	UNKNOWN HUB SITE ARINC ADDRESS. USE QU BOSCDYA	The packet was sent to the wrong address.
ERR408	PACKET NOT PROCESSED	An error occurred while attempting to update the TFMS Flight Database (FDB).
ERR409	MESSAGE NOT PROCESSED DUE TO TFMS INTERNAL ERROR	An error occurred while attempting to update the TFMS Flight Database (FDB).
ERR410	INVALID EN ROUTE TIME	En Route Time may not exceed 18 hours.
ERR411	MESSAGE NOT PROCESSED: FDB IN SLAVE MODE.	This message should only appear on internal TFMS logs.
Slot Credit Substitution Error Messages		
ERR412	ILLEGAL HOLD FLAG VALUE: USE R OR H	Valid values for Hold Flag are H to hold slot or R to release slot.

Number	Error Description	Corrective Action
ERR414	NOT AUTHORIZED TO SUB FOR THESE FLIGHTS	At least one flight in this packet belongs to a carrier for which the sender is not authorized to make substitutions at this airport. Sender must be authorized to submit substitutions for all flights referenced in an SS packet.
ERR415	CANNOT CANCEL A NON-CONTROLLED FLIGHT	An FX message submitted in an SS packet must pertain to a controlled flight. A non-controlled flight may only be cancelled in an FD packet. The most common cause for this error is an incorrect flight ID, origin, destination, or original gate departure date and time.
ERR417	CTA NOT WITHIN 20-MINUTE WINDOW	CTA must be no earlier than the slot time for the flight's assigned slot, and no more than 20 minutes later than the slot time.
ERR418	CANNOT SUB INTO SLOT NOT OWNED BY THIS CARRIER	The FM message references a slot that does not currently belong to the sending airline or one of its authorized affiliates.
ERR419	CANNOT SUB TWO FLIGHTS IN ONE SLOT	Packet contains FM messages that assign more than one flight to the same slot. Only one flight may be assigned to a slot.
ERR420	CANNOT SUB ONE FLIGHT IN TWO SLOTS	Packet contains FM messages that assign a flight to more than one slot. A flight may be assigned to only one slot.
ERR421	CANNOT SUB A NON-CONTROLLED FLIGHT	Cannot use an FM message to assign a flight to a slot if the flight does not already have a slot assignment. This message is generated if the flight referenced in an FM does not exist in the TFMS flight database, or if it exists but is not currently controlled. The most common cause is an incorrect flight ID, origin, destination, or original gate departure date and time.
ERR422	CANNOT CONTROL FLIGHT SCHEDULED TO ARRIVE DURING GDP	An SC message can be used to create a slot and assign it to a flight only if the flight is scheduled to arrive after the GDP end time is over.
ERR423	SLOT NOT OWNED BY FLIGHT IN THIS PACKET	In order to preserve the one-flight-one-slot rule, every slot that is assigned in an SS packet must be assigned to another flight in that packet prior to the packet being processed.
ERR424	CANNOT SUB INTO SLOT OCCUPIED BY FORMER POP-UP FLIGHT	Flight cannot be assigned to an earlier slot if the flight currently assigned to that slot was formerly a pop-up.
ERR425	AIRPORT NOT CONTROLLED	A HOLD ALL SLOTS or RELEASE ALL SLOTS message was received for an airport that does not currently have a GDP.
ERR426	CANNOT CHANGE HOLD FLAG FOR NON-CANCELLED FLIGHT	Cannot modify hold flag for flight that does not have an assigned slot in a GDP. The most common cause for this error is an incorrect flight ID, origin, destination, or original gate departure date and time.

Number	Error Description	Corrective Action
ERR427	CANNOT SUB POP-UP FLIGHT	Cannot assign a pop-up flight to a slot. Only a revision may assign a pop-up to a slot, after which the flight is referred to as a former pop-up.
ERR428	CONTROL INFO MISSING. SPECIFY: DEP.TIME, ARR.TIME, AND SLOT	CTD, CTA, and ASLOT fields are required in an FM message submitted in an SS packet.
ERR429	SLOT TIME CANNOT BE IN THE PAST	A flight cannot be assigned to a slot whose slot time is earlier than the current time.
ERR430	CANNOT SUB COMPLETED FLIGHT	Cannot modify slot assignment for a completed flight.
ERR431	CANNOT SUB MULTIPLE AIRPORTS	All messages in an SS packet must pertain to flights arriving at the same airport.
ERR432	CANNOT SEND FC MESSAGE IN SS PACKET	Flights cannot be created in an SS packet. An FC message may only be submitted in an FD packet.
ERR433	SC CAN BE SENT ONLY IN SS PACKET	Slots cannot be created in an FD packet. An SC message may only be submitted in an SS packet.
ERR434	CANNOT CREATE SLOT FOR CONTROLLED FLIGHT	Flight referenced in SC message is already controlled. Cannot use SC message to create a slot and assign a flight to the newly created slot if the flight already has an assigned slot or an FA Delay.
ERR435	SLOT ALREADY EXISTS	The slot value provided in SC message already exists. A newly created slot must have a unique slot identifier. An airline can generally create a unique identifier by changing the suffix letter in the slot name.
ERR436	INVALID MESSAGE TYPE FOR SS PACKET. USE FM/FX/SCS/HOLD ALL SLOTS/RELEASE ALL SLOTS	Only FM, FX, SCS, HOLD ALL SLOTS or RELEASE ALL SLOTS are valid within an SS packet.
ERR437	SLOT IN SC MSG CANNOT BE DURING CURRENT GDP	Slot time for newly created slot falls in the current GDP timeframe. For an airline to create a slot, the slot time portion of the “Assigned Arrival Slot” field in the SC message must specify a time that is after the GDP is over.
ERR438	CANNOT SUB REMOVED FLIGHT	The flight has been removed by the FAA and is not available for subbing.
ERR439	ETE CANNOT BE CHANGED BY MORE THAN 50%	The new ETE, derived by subtracting CTD from CTA, cannot change from the prior ETE by more than 45 minutes or 50% of the prior ETE, whichever is greater.
ERR440	SUB PROCESSING IS OFF	Command Center is currently not accepting substitution messages pertaining to this GDP. TFMS sends an TFMS SUBS ON message when it resumes accepting substitution messages
ERR441	SCS CAN ONLY BE INCLUDED IN SS PACKETS	A Slot Credit Sub message can only be included in an SS packet, not in an FD or EI packet.

Number	Error Description	Corrective Action
ERR442	SCS PROCESSING IS OFF	The FAA has turned Slot Credit Sub processing off for the airport. All SCS requests will be rejected.
ERR443	YIELDED SLOT MUST BE IN THE FUTURE	The slot that is being given up in the SCS message must be later than the current time.
ERR444	EARLIEST ACCEPTABLE TIME MUST BE LATER THAN TIME OF YIELDED SLOT	The time of the yielded slot must be earlier than the earliest acceptable time.
ERR445	EARLIEST ACCEPTABLE TIME MUST BE EARLIER THAN LATEST ACCEPTABLE TIME	The window of acceptable times must be specified as the earliest acceptable time first then the latest acceptable time.
ERR446	20-MINUTE WINDOW NOT ALLOWED WITH SCS	The substitution window size for an SCS packet must be set to 0. If any flights within the packet violate the window size, then the packet will be rejected.
ERR447	YIELDED SLOT OWNED BY FORMER POP-UP FLIGHT	The yielded slot must not be owned by a former pop-up.
ERR448	SCS TIME RANGES OVERLAP	The time ranges of different SCS messages within a packet must not overlap. The time range of an SCS is defined as the time from the yielded slot to the latest acceptable time.
ERR449	SLOT CREDIT SUBSTITUTION CANNOT BE FULFILLED	No bridge flights could be found that would allow the SCS flight to be moved into the requested window.
ERR450	SLOT TIME OF SCS FLIGHT IS ALREADY WITHIN WINDOW	The yielded slot of the SCS flight already falls within the requested window. No processing is required.
ERR451	SCS PROCESSING HAS BEEN DISABLED UNTIL FURTHER NOTICE	The FAA has suspended SCS processing temporarily.

3.2.1.3.2.8 EDCT and Other Commands

In general, EDCT commands are associated with the management of delay programs. There are two basic categories of commands, commands that request data (i.e, reports) and commands that change data. Most of the EDCT commands can be entered from both the TFMS TSD and the FSM client. Also, most of these commands are only available to FAA authorized users. This ICD documents those EDCT commands entered via FSM, which result in a data exchange between FSM and TFMS. The format of the command entered by a user is the same regardless of whether it is entered from a TSD or FSM. However, when an EDCT command is entered from FSM, the command is sent to the TFMS, where the data associated with the command can be changed (with the change acknowledged) or provided back to the requestor in the form of a report. The available EDCT commands related to FSM are as follows:

- EDCT AC OFF
- EDCT AC ON
- EDCT CHECK
- EDCT CNX
- EDCT CTALIST
- EDCT HOLD
- EDCT LIST (report request)
- EDCT LOG
- EDCT PURGE
- EDCT RELEASE
- EDCT REMOVE
- EDCT RESTORE
- EDCT SCS OFF
- EDCT SCS ON
- EDCT SHOW
- EDCT SLIST (report request)
- EDCT SLOTS
- EDCT SUB OFF
- EDCT SUB ON
- EDCT
- EDCT SUB SHOW (report request)
- EDCT UNASSIGNED SLOTS (report request)
- EDCT UPDATE

These commands are documented in the ETMS Reference Manual Volumes I and II (refer to Section 2.1) for full references. The commands are also briefly described in Appendix A of this ICD. The mechanisms used to send these commands and their corresponding replies between TFMS and FSM are the protocol messages, which are documented in Section 3.2.2.1, Application Services.

The following additional commands are available to the FSM user, which result in a data exchange on the TFMS – FSM interface:

- Weather Request – used to request current airport weather (METAR and TAF) for one or more airports (uses the three letter airport identifiers separated by commas or spaces)
- ADL Request – used to request a new ADL for a specific airport or FSM-eligible FEA/FSM.
- ADL AAR – used to reset an Arrival Rate to its default or to modify ADL Arrival Rates for an airport or FSM eligible FEA/FCAADL
- ADR - used to reset a Departure Rate to its default or to modify ADL Departure Rates for an airport
- Delete Program Parameters – used to delete delay program parameters for a specific airport or Flow Constrained Area (FCA).

These commands are documented in the ETMS Reference Manual Vol. II (refer to Section 2.1) for full reference. The commands are also briefly described in Appendix A of this ICD. The mechanisms used to send these commands and their corresponding replies between TFMS and FSM are the protocol messages, which are

documented in Appendix D, CDM Message Protocol.

NAS Users can make requests for data as well as requests that control aspects of substitution process. Four reports are available to the NAS Users. These reports apply to FCAs, AFPs as well as airports GDPs:

EDCT Report Requests

A sample report request has the following format:

Sample EDCT Report Request
(Line Numbers for Reference Only)

```
(1)  EDCT LIST
(2)  EDCT SUB SHOW
(3)  EDCT SLIST
(4)  EDCT UNASSIGNED SLOTS
```

Table 3-V below presents a breakout of the EDCT Report Request. Sections 3.2.1.3.2.9 through 3.2.1.3.2.12 describe the format of each of the report response messages.

Table 3-V. Report Request

Field/Line	Designation	Unit/Format	Description	Bytes
Line 1-*n*: Request(s). The packet can include one or more requests. Each requested report comes back as a separate message. Possible request types are listed below				
1	EDCT LIST	**EDCT LIST**	Returns a list of all airports that currently have GDPs. (See 3.2.1.3.2.15 below)	9
2	EDCT SUB SHOW	**EDCT SUB SHOW**	Returns the substitution status (on or off) at all airports that currently have GDPs (sub status is also part of the EDCT LIST report) (See 3.2.1.3.2.16 below)	13
3	EDCT SLIST	**EDCT SLIST** aaa [aaa]…[aaa]	Returns a slot list for the requested airport. Unlike the slot lists when the GDP is issued, the EDCT SLIST report returns a single list that includes all flights affiliated with the requesting airline. That is, the reply can include	15-68

Field/Line	Designation	Unit/Format	Description	Bytes
			different 3-letter airline codes in one report	
4	EDCT UNASSIGNED SLOTS	**EDCT UNASSIGNED SLOTS**	Returns a list of unassigned slots, similar to the ADL UNNASSIGNED_SLOTS block	21

3.2.1.3.2.9 EDCT LIST

This message returns a list of all airports that currently have GDPs. A sample EDCT LIST has the following format:

Sample EDCT LIST

(Line Numbers for Reference Only)

```
(1)   Number of airports currently controlled: 3
(2)
(3)   DEST    TIMES    CONTROL    FLIGHTS    SUBS   SCS    AC
(4)   ------------------------------------------------------------
(5)   EWR     /19/01/  EDCT+DAS    255       ON     ON     ON
(6)   JFK     /20/23/  GS           47       OFF    OFF    ON
(7)
(8)   Bridging status at EWR:
(9)     - Carriers which turned bridging OFF:
(10)      USA
(11)  Bridging status at JFK: ON.
(12)
(13)  Number of FCAs currently controlled: 1
(14)
(15)  FCA     TIMES    CONTROL    FLIGHTS    SUBS   SCS    AC
(16)  ------------------------------------------------------------
(17)  FCAA02  /18/23/  EDCT+DAS     24       ON     ON     OFF
(18)
(19)  Bridging status at FCAA02: ON.
(20)
```

```
(21)  Bridging turned OFF permanently for non-CDM general aviation
and military.
(22)
(23)  Printer:  $fsa.//wkstn32
```

Table 3-VI below presents a breakout of the EDCT List

Table 3-VI. EDCT List

Field/Line	Designation	Unit/Format	Description	Bytes
1	Number of Controlled Airports	**NUMBER OF AIRPORTS CURRENTLY CONTROLLED:** d[d]	The number of airports that currently have GDPs or GSs.	42-43
2	Blank Line Separator		Blank line separating data	1
3	Headers	**DEST TIMES CONTROL FLIGHTS SUBS SCS AC**	Column Headers: • DEST – Destination Airport • TIMES – GDP/GS Time range • CONTROL – Type of Control issued • FLIGHTS – Number affected • SUBS – Substitution Status • SCS - Slot Credit Substitutions Status • AC – Adaptive Compression Status	49
4	Dashed Line Separator	----------	Dashed line separator	49
5	Destination	Laa[a]	Destination airport in three or four character identifier. This entry is padded with spaces to equal 8 bytes.	8
5	Times	/dd/dd	Start and end times of the GDP or ground stop in the following format: */hh/hh* (hour start and hour end in sequence) This entry is padded with spaces to equal 9 bytes.	9
5	Control	LL[LL…LLL]	Control Type issue: May be more than one entry. If so, each entry will be joined by a plus	12

Field/Line	Designation	Unit/Format	Description	Bytes
			sign. This entry is padded with spaces to equal 12 bytes.	
5	Flights	d[d][d][d]	Number of flights that are affected by the Control. In as many digits are necessary to detail. This entry is padded with spaces to equal 10 bytes.	10
5	Sub Status	**ON** *or* **OFF**	Status of substitutions: One of two entries: • **ON** • **OFF** This entry is padded with spaces to equal 7 bytes.	7
5	SCS Status	**ON** *or* **OFF**	Status of Slot Credit Substitutions. One of two entries: • **ON** • **OFF**	2-3
5	AC	**ON** *or* **OFF**	Adaptive Compression Status. One of two entries: • **YES** • **NO**	2-3
6 – *#n*			Multiple entries are possible containing the items listed as Field/Line 5.	48-49 per line
7	Blank Line Separator		Blank line separating data	1
8	Bridging Status	**BRIDGING STATUS AT** Laa:	Status of bridging for individual GDPs.	23
9	Bridging Off	**- CARRIERS WHICH TURNED BRIDGING OFF:**	If bridging is off, the report lists each carrier that currently has bridging off for that GDP. This field is led by two blank spaces.	39
10	Carrier List	LLL [LLL]	Carriers which have turned Bridging off. This field is led by 4 blank spaces.	3-68
11	Bridging Status	**BRIDGING STATUS AT** Laa: **ON**	Status of bridging for individual GDPs, indicating Bridging is ON.	28
12	Blank Line Separator		Blank line separating data	1

Field/Line	Designation	Unit/Format	Description	Bytes
13	Number of Controlled FCAs	**NUMBER OF FCAS CURRENTLY CONTROLLED: d[d]**	Number of controlled FCAs. In one or two digits	38-39
14	Blank Line Separator		Blank line separating data	1
15	Headers	**FCA TIMES CONTROL FLIGHTS SUBS SCS AC**	Column Headers: • FCA – FCA Identifier • TIMES – GDP/GS Time range • CONTROL – Type of Control issued • FLIGHTS – Number affected • SUBS – Substitution Status • SCS - Slot Credit Substitutions Status • AC – Adaptive Compression Status	49
16	Dashed Line Separator	---------- ----------	Dashed line separator	49
17	FCA Identifier	**FCA**aaa	FCA in six character identifier. This entry is padded with spaces to equal 8 bytes.	8
17	Times	/dd/dd	Start and end times of the GDP or ground stop in the following format: */hh/hh* (hour start and hour end in sequence) This entry is padded with spaces to equal 9 bytes.	9
17	Control	LL[LL…LLL]	Control Type issue: May be more than one entry. If so, each entry will be joined by a plus sign. This entry is padded with spaces to equal 12 bytes.	12
17	Flights	d[d][d][d]	Number of flights that are affected by the Control. In as many digits are necessary to detail. This entry is padded with spaces to equal 10 bytes.	10
17	Sub Status	**ON** *or* **OFF**	Status of substitutions: One of two entries: • **ON** • **OFF**	7

Field/Line	Designation	Unit/Format	Description	Bytes
			This entry is padded with spaces to equal 7 bytes.	
17	SCS Status	**ON** *or* **OFF**	Status of Slot Credit Substitutions. One of two entries: • **ON** • **OFF**	2-3
17	AC Status	**ON** *or* **OFF**	Adaptive Compression Status. One of two entries: • **On** • **Off**	2-3
17– *#n*			Multiple entries are possible containing the items listed as Field/Line 17.	48-49 per line
18	Blank Line Separator		Blank line separating data	1
19	Bridging Status	**BRIDGING STATUS AT FCA**aaa**: ON**	Status of bridging for individual AFPs.. Same format as for GDPs	23
20	Blank Line Separator		Blank line separating data	1
21	System Bridging Status	**BRIDGING TURNED OFF PERMANENTLY FOR NON-CDM GENERAL AVIATION AND MILITARY.**	Status of bridging for the system. This applies to both GDPs and AFPs. (NOTE: This line continues out past the right margin.)	74
22	Blank Line Separator		Blank line separating data	1
23	Printer	**PRINTER:** aaaa./aaaaaaaa	Location of the printer at the command center. (NOTE: This is of no use for the NAS user.)	24

3.2.1.3.2.10 EDCT SUB SHOW

This message returns the substitution status (on or off) at all airports that currently have GDPs (sub status is also part of the EDCT LIST report) as well as the substitution status for all FCAs that have AFPs. A sample EDCT SUB SHOW report has the following format:

Sample EDCT SUB SHOW

(Line Numbers for Reference Only)

```
(1)       Current Time: 18:06:17 on 7/29/2005
(2)
(3)       Airport SUB Processing Activated SCS Processing Activated AC Active
(4)         ---------------------------------------------------------------
(5)         EWR        Yes                     Yes                   Yes
(6)         JFK        No                      No                    No
(7)
(8)         Bridging status at EWR:
(9)           - Carriers which turned bridging OFF:
(10)            USA
(11)        Bridging status at JFK: ON.
(12)
 (13)     FCA     SUB Processing Activated SCS Processing Activated AC Active
(14)        ---------------------------------------------------------------
(15)        FCAA02     Yes                      Yes                   No
(16)
(17)        Bridging status at FCAA02: ON.
(18)
(19)        Bridging turned OFF permanently for non-CDM general aviation …
(20)
(21)        Printer:  $fsa.//wkstn32
```

Table 3-VII below presents a breakout of the EDCT Sub Show

Table 3-VII. EDCT Sub Show

Field/Line	Designation	Unit/Format	Description	Bytes
1	Current Time and Date	**CURRENT TIME:** dd:dd:dd **ON** d[d]/d[d]/dddd	Current Time and Date of message in format *hh:mm:ss* on *M[M]/D[D]/YYYY* • hh – hour • mm – minute	40

Field/Line	Designation	Unit/Format	Description	Bytes
			• ss – second • M[M] – Month in one or two digits • D[D] – day in one or two digits • YYYY – Year	
2	Blank Line Separator		Blank line separating data	1
3	GDP Headers	**AIRPORT SUB PROCESSING ACTIVATED SCS PROCESSING ACTIVATED AC ACTIVATED**	Column Headers: • Airport – Destination Airport • Sub Processing Activated– Substitution Processing on or off • SCS Processing Activated – Slot Control Substitution Processing on or off • Adaptive Compression Activated on or off	59
4	Dashed Line Separator	---------- ----------	Dashed line separator	49
5	Airport	Laa[a]	Destination airport in three or four character identifier. This entry is padded with spaces to equal 11 bytes.	11
5	Sub Processing	**YES** *or* **NO**	Substitution Processing Status. One of two entries: • **YES** • **NO** This entry is padded with spaces to equal 26 bytes.	26

Field/Line	Designation	Unit/Format	Description	Bytes
5	SCS Processing	**YES** *or* **NO**	Substitution Processing Status. One of two entries: • **YES** • **NO**	2-3
5	AC Activated	**YES** *or* **NO**	Adaptive Compression Status. One of two entries: • **YES** • **NO**	2-3
6 – *#n*			Multiple entries are possible containing the items listed as Field/Line 5.	48-49 per line
7	Blank Line Separator		Blank line separating data	1
8	Bridging Status	**BRIDGING STATUS AT** Laa:	Status of bridging for individual GDPs.	23
9	Bridging Off	**- CARRIERS WHICH TURNED BRIDGING OFF:**	If bridging is off, the report lists each carrier that currently has bridging off for that GDP. This field is led by two blank spaces.	39
10	Carrier List	LLL [LLL]	Carriers which have turned Bridging off. This field is led by 4 blank spaces.	3-68
11	Bridging Status	**BRIDGING STATUS AT** Laa: **ON**	Status of bridging for individual GDPs, indicating Bridging is ON.	28
12	Blank Line Separator		Blank line separating data	1
13	FCA Header	**FCA SUB PROCESSING ACTIVATED SCS PROCESSING**	Column Headers: • FCA – FCA Number • Sub Processing Activated– Sub Processing on or off • SCS Processing Activated – Slot Control Substitution processing on or off	59

Field/Line	Designation	Unit/Format	Description	Bytes
		ACTIVATED **AC** **ACTIVATED**	• Adaptive Compression Activated on or off	
14	Dashed Line Separator	**----------** **----------** **----------**	Dashed line separator	49
15	FCA Identifier	**FCA**aaa	FCA in six character identifier. This entry is padded with spaces to equal 8 bytes.	8
15	Sub Processing	**YES** *or* **NO**	Substitution Processing Status. One of two entries: • **YES** • **NO** This entry is padded with spaces to equal 26 bytes.	26
15	SCS Processing	**YES** *or* **NO**	Substitution Processing Status. One of two entries: • **YES** • **NO**	2-3
15	AC Active	**Yes** *or* **No**	Adaptive Compression Status. One of two entries: • **YES** • **NO**	2-3
15– *#n*			Multiple entries are possible containing the items listed as Field/Line 17.	48-49 per line
16	Blank Line Separator		Blank line separating data	1
17	Bridging Status	**BRIDGING** **STATUS AT** **FCA**aaa**: ON**	Status of bridging for individual AFPs. Same format as for GDPs.	23
18	Blank Line Separator		Blank line separating data	1
19	System Bridging Status	**BRIDGING** **TURNED OFF** **PERMANENT**	Status of bridging for the system. This applies to both GDPs and AFPs. (NOTE: This line continues out past the right	74

Field/Line	Designation	Unit/Format	Description	Bytes
		LY FOR NON-CDM GENERAL AVIATION AND MILITARY.	margin.)	
20	Blank Line Separator		Blank line separating data	1
21	Printer	**PRINTER:** aaaa./aaaaaaaa	Location of the printer at the command center. (NOTE: This is of no use for the NAS user.)	24

3.2.1.3.2.11 EDCT SLIST

The EDCT SLIST request returns the same format used to issue a GDP/AFP, or to reply to an SS message. A sample EDCT SLIST report (for an AFP) has the following format:

Sample EDCT SLIST

(Line Numbers for Reference Only)

```
(1)  SLOT LIST FOR FCAA02
(2)
(3)  ACID    ASLOT          DEP  ARR  CTD    CTA    TYPE EX CX SH  EENTRY   IGTD
(4)  ABC1234 FCAA02.260400A DCA  LGA  260300 260400 AFP  -  -  -   260400   260245
     ABC5678 FCAA02.260500A IAD  BOS  260400 260500 AFP  -  -  -   260300   260145
     ABC360  FCAA02.260323A CYYZ LGA  260206 260323 AFP  Y  -  -   260319   260150
     ABC3522 FCAA02.260311A DCA  BOS  260215 260311 AFP  -  -  -   260311   260145
     ABC39   FCAA02.260353A ROC  LGA  260246 260353 AFP  -  Y  -   260355   260235
```

Table 3-VIII below presents a breakout of the EDCT SLIST.

Table 3-VIII. EDCT SLIST

Field/Line	Designation	Unit/Format	Description	Bytes
1	Slot List Identifier	**SLOT LIST FOR FCA**aaa *or* **SLOT LIST FOR** aaa	Identifies airport or FCA that the slot list is for.	17-20
2	Blank Line Separator		Blank line separating data	1
3	Slot List Data Headers	**ACID** **ASLOT** **DEP ARR** **CTD CTA** **TYPE EX CX SH** **EENTRY (or) ERTA** **IGTD**	Header for the following Slot List data fields: • ACID – Aircraft identifier • ASLOT – Arrival Slot • DEP – Departure Airport • ARR – Arrival Airport • CTD – Controlled Time of Departure • CTA –Controlled Time of Arrival • TYPE – Type of Entry • EX – Exempt Flag (Yes or No) • CX – Control Flag (Yes or No) • SH – Slot Hold flag (Yes or No) • EENTRY – Earliest Entry Time (for AFP) *or* ERTA - Earliest Runway Time of Arrival (for Airport GDP) • IGTD - Initial Gate Time of Departure	64
4 - *n*	Slot List Data Fields		Refer to Table 3-III for detailed breakout.	
*Note – There may be multiple rows of data under the header.				

3.2.1.3.2.12 EDCT UNASSIGNED SLOTS

The EDCT UNASSIGNED SLOTS will contain a list of unassigned slots that have not yet been allocated to flights. An example is provided below, followed by a detailed breakout in Table 3-IX.

Sample Unassigned Slots Blocks

```
(1) EDCT UNASSIGNED SLOTS
(2)
(3) EWR.191233A EWR.191234A EWR.191235A EWR.191236A EWR.191237A EWR.191238A
(4) EWR.191241A EWR.191242A EWR.191243A EWR.191442A EWR.191245A EWR.191246A
(5) EWR.191249A EWR.191250A EWR.191251A EWR.191252A EWR.191253A EWR.191254A


(1) EDCT UNASSIGNED SLOTS
(2)
(3) FCA027.191233A FCA027.191234A FCA027.191235A FCA027.191236A FCA027.191237A
(4) FCA027.191241A FCA027.191242A FCA027.191243A FCA027.191442A FCA027.191245A
(5) FCA027.191249A FCA027.191250A FCA027.191251A FCA027.191252A FCA027.191253A
```

Table 3-IX. EDCT UNASSIGNED SLOTS

Line	Function	Unit/Format	Description	Bytes
1	Unassigned Slots title	**EDCT UNASSIGNED SLOTS**	Static Entry: **EDCT UNASSIGNED SLOTS**	21
2	Blank Line		Blank Line Separator	1
3-n	Unassigned Slot entries	LLL.dddddda (GDP) or **FCA**aaa.dddddda (AFP) or **NONE** (Empty)	The block contains a list of unassigned slots that have not yet been allocated to flights. Two different entries are used: • GDP – The formatting for GDP is – Airport Name – three letters – Slot number – six digits, followed by one alphanumeric character.	15-75*

Line	Function	Unit/Format	Description	Bytes
			• AFP – The formatting for AFP is – FCA Identifier – three letters FCA followed by three alphanumeric characters – Slot number – six digits, followed by one alphanumeric character.	

3.2.1.3.2.13 Delay Program Rate Messages

FSM transmits Delay Program arrival and departure rates (AAR and ADR respectively) using the messages listed below that are described in Appendix D. Delay Program Rate Messages are received when an Actual Delay Program is initiated. Delay Program Rate Messages are not received for Proposed Delay Programs.

- M_ADD_ADL_AAR_GDP
- M_DEL_ADL_AAR_GDP

The format of the Delay Program Rate Messages is internal to FSM. TFMS treats the Delay Program Rate Message as a simple text string that is extracted, retained and inserted into the ADL for the associated control element. The exception to this is the Control Element name (i.e., airport or AFP name) as well as the time. These are the first two elements in the Delay Program Rate message. Table 3-X describes he format of the Delay Program Rate Message.

Table 3-X. Delay Program Rate Message

Field	Function	Unit/Format	Description	Bytes
1	Control Element Identifier	**aaa *or* FCAaaa *or* aaaaaa**	The name of the airport, FEA, or FCA to which the data rates in this message are associated. The alphanumeric string is followed by a blank. • For airports – three or four alpha-mumeric character airport identifier • For FEAs – up to six characters limited to upper case alpha-numeric, "-", and "_". Characters may be used in any position except that "-	5-7

Field	Function	Unit/Format	Description	Bytes
			", and "_" may not be used in the last position. NOTES - FEA names are not guaranteed to be unique and can duplicate airport names, in such a case they should not be considered to be the same element. FEA names can be reused within the same day, in such a case they should not be considered to be the same element. • For FCAs - six alpha-numeric characters beginning with "FCA".	
2	Time	dddddddd	Date and time expressed as DDHHMMSS. Often referred to as the "FADT Report Time". 8 digits of time are followed by a blank.	9
3	Aircraft Arrival (or Departure) Rate Time and Incremental Rates	**AAR_TIME** dddddd **IDX** d[d] **AAR**-d[d] [ddx20] *or* **ADR_TIME** dddddd **IDX** d[d] **ADR**-d[d] [ddx20]	The AAR_TIME (or ADR_TIME) value consists of three entries: • The date/time of the first 15 minute period to which the first AAR (or ADR) should be applied. Format is ddhhmm. • The code "IDX ddd" is for uses other than TFMS and is ignored. • The remaining AARs (or ADRs) are for the subsequent 15 minute periods after the start date/time, in one or two digits.	27-87*
• Note – The maximum stated here is for a single data line. There may be multiple lines of data as necessary.				

3.2.1.3.2.14 Delay Program Parameters Messages

FSM notifies TFMS of delay program parameters for GDPs, AFPs, and GSs using the following messages that are described in Appendix D. Delay Program Parameter Messages are received for both Proposed and Actual Delay Programs. There is a separate message for original program parameters as well as separate parameters for

compression and blanket revisions to an existing delay program.

- M_ADD_ADL_GDP_PARAM
- M_ADD_ADL_COMP_PAPAM
- M_ADD_ADL_BLANK_PARAM
- M_ADD_ADL_GS_PARAM
- M_ADD_ADL_AFP_PARAM
- M_DEL_ADL_GDP_PARAM
- M_DEL_ADL_COMP_PAPAM
- M_DEL_ADL_BLANK_PARAM
- M_DEL_ADL_GS_PARAM
- M_DEL_ADL_AFP_PARAM

See Appendix C FSM ADL Parameters Specification for a detailed description of the individual parameters.

3.2.1.3.2.15 Heartbeat Message

Heartbeat messages are simply a brief exchange of heartbeat requests and responses between FSM and the TFMS to indicate the system is still functional, if there has been no message traffic between the two for a specified amount of time. It consists of a request message (M_HB_REQ) from the FSM and a response message (M_HB_ACK) from TFMS. FSM sends the M_HB_REQ message to TFMS, requesting a heartbeat message to confirm that the connection is still active. TFMS sends back the M_HB_ACK message with an acknowledgement. Appendix D provides the record layout of these two messages.

3.2.1.3.3 Information Unit Segmentation

The TFMS-to-FSM APs are not required to perform message segmentation.

3.2.1.3.4 Direction of Information Flow

The information flow between FSM and TFMS is bi-directional. The flow of individual messages is detailed in Table 3-V.

3.2.1.3.5 Frequency of Transmission

All message traffic in the TFMS-to-FSM interface is dynamic, with data sent when it is required.

3.2.1.3.6 Responses

Refer to Section 3.2.2.1 for session messages and responses, detailing required responses.

3.2.1.4 Quality of Service

Not Applicable.

3.2.1.5 AP Error Handling

The FAA will send a response to every SS message packet, to the return address on the incoming message. If errors are detected in the SS packet, the entire packet is rejected. The response to the error includes the packet identifier, a message indicating it was rejected, and the number of errors. For each error, the response shows the SS message that triggered the error and the reason for the error. (For a complete listing of Error messages, refer to Table 3-IV.)

Loss of FSM

TFMS will consider any of the following events to be a "loss of FSM":

- Notification that a message is undeliverable
- An excessive backup in the sending queue (see below)
- Receipt of a disconnect message

Loss of TFMS

FSM will consider any of the following to be a "loss of TFMS":

- Notification that the connection to the server has been lost
- Notification that a message to the server is undeliverable
- Receipt of a shutdown message

In addition, TFMS will queue ADL files intended for FSM in the event that the socket is not being read as fast as it is being written. A maximum queue of 50 ADL files will be allowed. Once the maximum is exceeded, TFMS will consider FSM to be inaccessible and will terminate the session.

3.2.1.6 Summary Table

An interface summary table (see Table 3-XI below) shows the association between the messages that flow across the interface and the APs of the interfacing subsystems. The left side of the interface summary table column lists the TFMS APs. The center columns contain the names of the messages transferred and the direction of transfer flow. The right hand column lists the FSM APs.

Table 3-XI. TFMS-to-FSM Interface Summary

Subsystem A TFMS AP	Messages	Flow Direction	Subsystem B FSM AP
FAA Portal	Aggregate Demand List	A→B	FSM Server
External Portal	Aggregate Demand List	A→B	FSM Server
FAA Portal	FSM Broadcast Request	A←B	FSM Server
External Portal	FSM Broadcast Request	A←B	FSM Server
FAA Portal	FSM Broadcast Reply	A→B	FSM Server

Subsystem A TFMS AP	Messages	Flow Direction	Subsystem B FSM AP
External Portal	FSM Broadcast Reply	A→B	FSM Server
FAA Portal	FSM Broadcast Message	A←B	FSM Server
External Portal	FSM Broadcast Message	A←B	FSM Server
FAA Portal	EDCT Change Request Messages	A←→B	FSM Server
External Portal	Slot Credit Substitution Messages	A←→B	FSM Server
FAA Portal	Substitution Good Responses	A←→B	FSM Server
External Portal	Substitution Good Responses	A←→B	FSM Server
FAA Portal	Substitution Error Responses	A←→B	FSM Server
External Portal	Substitution Error Responses	A←→B	FSM Server
FAA Portal	EDCT Commands/Replies	A←→B	FSM Server
External Portal	EDCT Commands/Replies (EDCT Report Requests/Reports)	A←→B	FSM Server
FAA Portal	Delay Program Rate Messages	A←B	FSM Server
External Portal	Delay Program Rate Messages	A←B	FSM Server
FAA Protal	Delay Program Parameters Messages	A←B	FSM Server
External Portal	Delay Program Parameters Messages	A←B	FSM Server
FAA Portal	Heartbeat Message	A←B	FSM Server
External Portal	Heartbeat Message	A←B	FSM Server

3.2.2 Protocol Implementation

The TFMS to FSM interface communications functions are implemented according to OSI reference model as defined in FAA-STD-039b, Open Systems Architecture and Protocols, and FAA-STD-043b, Open System Interconnect Priority. Subsection 3.2.2 documents the OSI protocols implemented for each layer of the interface.

a. Application Layer (Layer 7) - This layer is not implemented within the TFMS-to-FSM interface.

b. Presentation Layer (Layer 6) – This layer is not implemented within the TFMS-to-FSM interface.

c. Session Layer (Layer 5) - This layer is not implemented within the TFMS-to-FSM interface.

d. Transport Layer (Layer 4) - The TFMS-to-FSM interface uses the TCP, in accordance with RFC793, Transmission Control Protocol, Sep 1983, as its Transport layer protocol.

e. Network (Packet) Layer (Layer 3) - The TFMS-to-FSM interface uses the standard IP RFC791, Internet Protocol, Sep 1981, as its Network layer protocol.

f. Data-Link (Frame) Layer (Layer 2) – The TFMS-to-FSM uses the 100-baseT Ethernet standard in accordance with IEEE 802.3, IEEE Standard for Information Technology — Telecommunications and Information Exchange Between Systems, 2000 as the Data Link Layer

g. Physical Layer (Layer 1) – The Physical layer of the TFMS-to-FSM interface uses a standard Category 5 (Cat-5) Ethernet cable as its Physical layer protocol.

Figure 3-2, OSI Layer Functional Interface Connectivity Diagram for TFMS-to-FSM, gives a visual representation of the OSI layers and their structure.

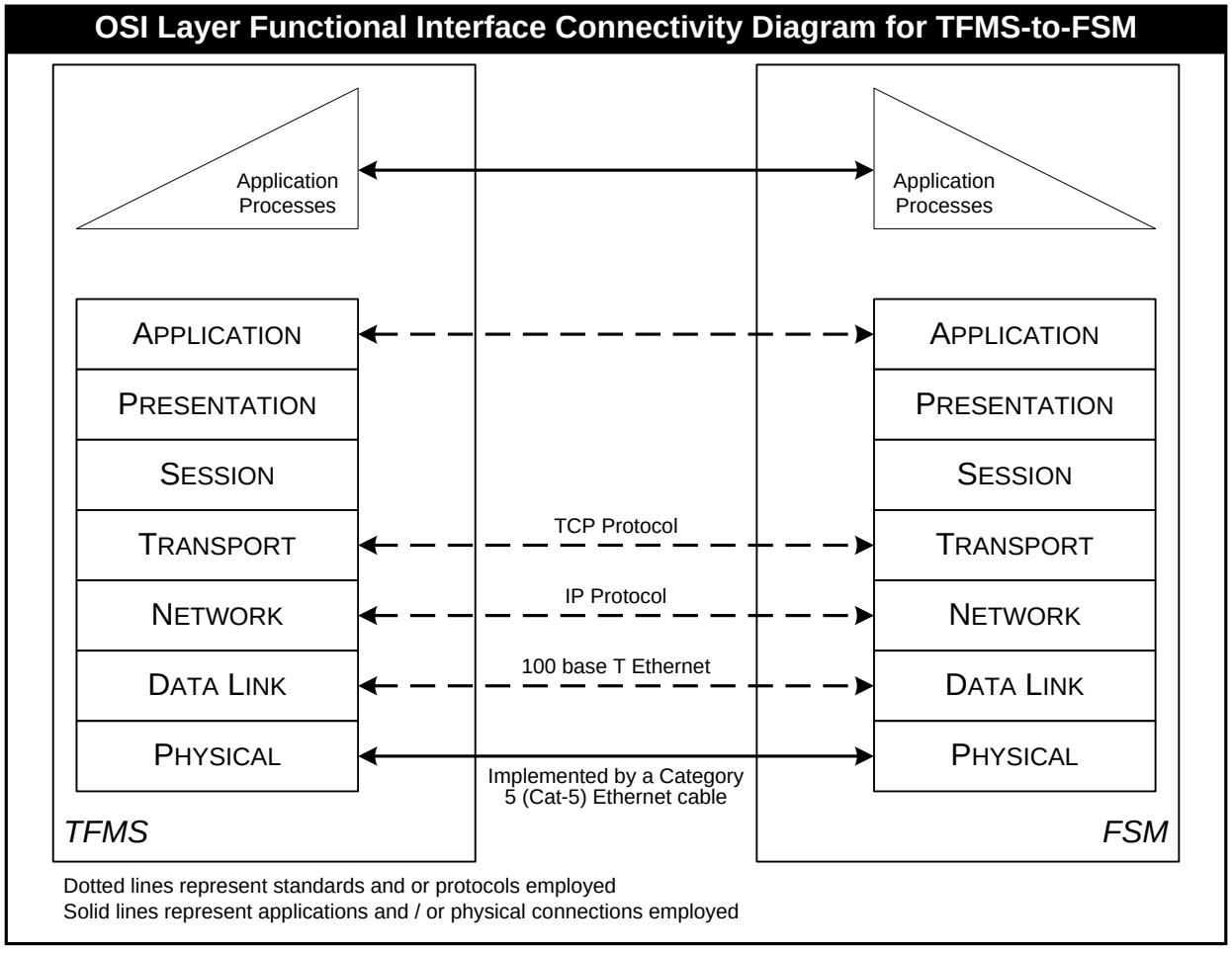

Figure 3-2. OSI Layer Functional Interface Connectivity Diagram for TFMS-to-FSM

3.2.2.1 Application Services

This section details the application and connectivity of the FSM interface. TFMS-to-FSM interface uses CDM Session protocols and a number of other sub-protocols to initiate and a session with the clients and exchange data. These protocols are defined in detail in Appendix D.

3.2.2.2 Network Services

The TFMS-to-FSM interface uses the established standards of Transmission Control Protocol (TCP) in accordance with RFC 793, Transmission Control Protocol, and Internet Protocol (IP) in accordance with RFC 791, Internet Protocol, Sep 1981.

3.2.2.3 Naming and Addressing

ADL and FSM Broadcast

Naming conventions are used for the exchange of ADL and FSM Broadcast files. These conventions are described in Appendix B ADL & Broadcast File Format Specifications.

Substitution Messages

The first line of the substitution message is the Packet header, consisting of the letters "SS", followed by a space, followed by a unique packet identifier. The packet identifier consists of:

- The three-letter user code
- A ten-digit transmission date/time in the format *MMDDhhmmss*
- A period (".")
- A two-digit suffix - The two-digit suffix may be used to create unique identifiers when multiple messages are generated in the same second. Otherwise the user can set the suffix to any desired two digits.

Report Requests and EDCT Lists

No header or addressing is required for this report. The direct IP address of the connection is sufficient, along with the format of the messages. (Refer to Sections 3.2.1.3.2.8 through 3.2.1.3.2.12 for formats of these messages.)

3.2.3 Security

TFMS implements FAA information security guidelines in accordance with Information Systems Security Plan (ISSP) for Traffic Flow Management–Modernization (TFM-M), the FAA Information Systems Security Program, FAA Order 1370.82A, and FAA-STD-045, OSI Security Architecture, Protocols and Mechanisms. It will enact security strategies and measures on all incoming information into TFMS.

3.2.4 Interface Design Characteristics Table

Subsection 3.2.4 summarizes the interface functional design characteristics in an Interface Design Characteristics Table (See Table 3-XII below) in addition to the text. The Interface Design Characteristics Table serves as a "quick-look" reference.

Table 3-XII. Interface Design Characteristics of the TFMS to FSM Interface

Message Name	Format	Size (Bytes)	Time Constraints	Frequency
Aggregate Demand List	ASCII	2,900/		As required

Message Name	Format	Size (Bytes)	Time Constraints	Frequency
		8,761		
FSM Broadcast Request	ASCII	24		As required
FSM Broadcast Reply	ASCII	24		As required
FSM Broadcast Message	XML	1307/ 1764*		Every 5 minutes**
Slot Credit Substitution Message	ASCII	40/46		As required
Substitution Good Responses	ASCII	56/60		In response to SS Packet
Substitution Error Responses	ASCII	141/213*		In response to SS Packet
EDCT and Other Commands	ASCII	35/103		As required
EDCT and Other Command Replies	ASCII	238/1468		As required
Delay Program Rate Messages	ASCII	192		As required
Delay Program Parameters Messages	ASCII			As required
Heartbeat Message	ASCII	102	Every Five minutes max	1 per minute***

*Note – Some entries in these messages may require more than one line of entry. The given maximum is valid if all entries do not exceed one line.

**** Note - The file will be broadcast at a regular 5 minute interval, except that the following events will trigger a new file irrespective of the set interval:

- When a TMI is processed by TFMS
- When a FEA/FCA is created, modified, or removed
- When requested by an application

***Note – Heartbeat message is transferred from FSM to TFMS if no data has passed through the interface within the time constraint period.

3.3 Physical Design Characteristics

As stated in Section 3.1, the TFMS-to-FSM Interface uses three forms of communication paths to transfer data. Figure 3-3 below, details each of these communications paths and their related physical configurations. The demarcation points are denoted as circled dots in the figure.

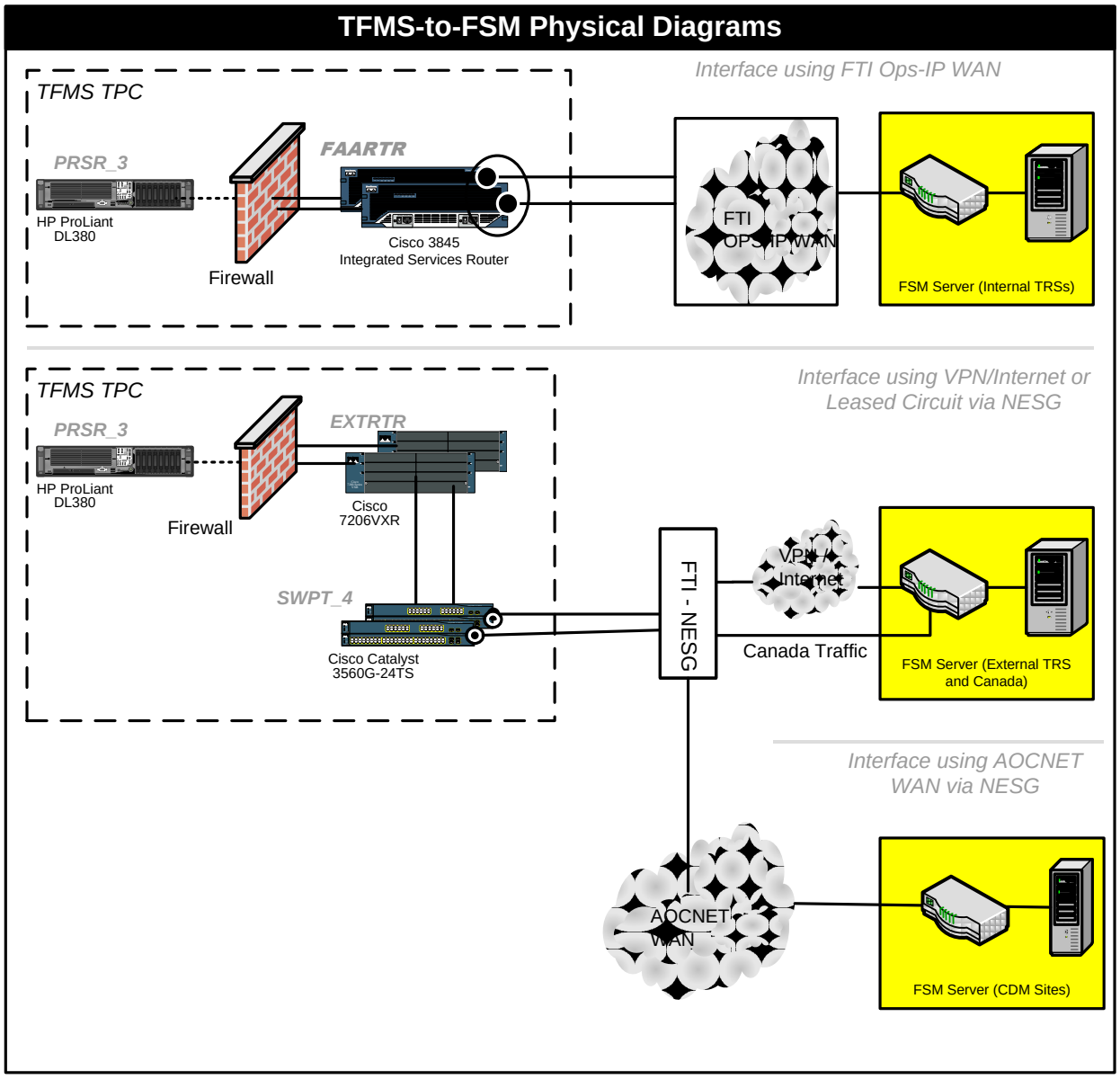

Figure 3-3. TFMS-to-FSM Physical Diagrams

The four pathways are:

- Via Ops-IP WAN -The FSM Server routes data to the Ops-IP WAN. Data is transferred by the standard TCP/IP protocols. TFMS uses the FAA Routers, a pair of Cisco 3845 Integrated Services Router (designated FAARTR), to access the Ops-IP WAN. The FAA Routers then pass the data to and from the Firewall. The firewall passes data to and from the FAA Portal Message Interface Server, an HP ProLiant DL380 (designated PRSR_3).
- Via the AOCNET WAN - The FSM Servers using the AOCNet WAN connect to the FTI-NESG. On the TPC side of the interface, the FTI- NESG connects to ports on the two Cisco Catalyst 3560G switches (designated SWPT_4). The

data flows through the Cisco 7206 Router/Switch (designated EXTRTR). The physical demarcation point is at the TPC's SWPT_4 switches.

- Via VPN/Internet via the NESG connection - The FSM servers using the VPN/INTERNET, connect to the FTI- NESG. On the TPC side of the interface, the connectivity follows the same path into the TFMS subsystems as described in the AOCNET WAN connectivity above.
- Via leased circuit into the FTI-NESG – The FSM servers from the Canadian Command Center connect to the FTI-NESG via a leased circuit. On the TPC side of the interface, the connectivity follows the same path into the TFMS subsystems as described in the AOCNET WAN connectivity above.

3.3.1 Electrical Power and Electronic Characteristics

There are no specific 3.3.1 characteristics applicable to the TFMS-to-FSM interface No subsystems supply electrical, mechanical, or environmental support to another subsystem, Systems supply their own discrete power and do not support each other in this manner.

3.3.1.1 Connectors

The TFMS-to-FSM interface uses a standard RJ-45 Ethernet connection as the interface connection. Standard RJ-45 pin assignments are used.

3.3.1.2 Wire/Cable

Standard Cat5 Ethernet cabling with RJ-45 connectors are used in the TFMS-to-FSM interface.

3.3.1.3 Electrical Power/Grounding

There are no specific 3.3.1.3 characteristics applicable to the TFMS-to-FSM interface

3.3.1.4 Fasteners

There are no specific 3.3.1.4 characteristics applicable to the TFMS-to-FSM interface

3.3.1.5 Electromagnetic Compatibility

There are no specific 3.3.1.5 characteristics applicable to the TFMS-to-FSM interface.

4 Verification Provisions

4.1 Responsibility for Verification

- Following are verification provisions for the TFMS-to-FSM interface:
- Pre-OT&E (Operational Testing and Evaluation)
- OT&E
- KSAT (Key Site Acceptance Test)

4.1.1 Pre-OT&E

Pre-Operational Test and Evaluation (OT&E) testing is performed to verify the operational viability of the TFMS-FSM interface and data stream prior to formal testing. FSM message exchange is available within this test phase but testing may be performed using simulated data. Pre-OT&E testing verifies that the end systems comply with and utilize the messages and formats as specified in this ICD. This test is conducted by both end systems as part of their informal system tests using their own test plans and test procedures. It is conducted at their respective test facilities. The William J Hughes Technical Center (WJHTC) TFMS Test Facility (TF) is designated as the test facility for the TFMS system. Pre-OT&E testing of TFMS is performed in accordance with FAA-approved test plans and procedures. TFMS test results are provided to the FAA. A TPC Auxiliary Platform (TAP) at the WJHTC is configured with the appropriate TFMS release software to support FSM testing (refer to Section 4.2 Test Environments).

4.1.2 OT&E

The OT&E tests are live tests conducted formally by the FAA with CSC support at the TPC. They include the Air Traffic Control System Command Center (ATCSCC) "early look" tests with the participation of FAA field personnel. Among other things, these tests verify end to end connectivity between TFMS and the FSM.

4.1.3 KSAT

The Key Site Acceptance Test (KSAT) focuses on TFMS functionality and connectivity tests. It is conducted under operational conditions, performed with live data between the TPC, the ATCSCC and an FAA-selected Air Route Traffic Control Center (ARTCC) site.

4.2 Test Environments

The TFMS-FSM test environment consists of a TPC Auxiliary Platform (TAP) that is configured with the FSM software for CDM user community pre-production testing. Each TAP is a separate test environment, loaded with either the current operational TFMS release or the next version to be released. Each TAP is isolated from the operational system and is configured to receive one way flow of live flight data from a message forwarding component of the TFMS operational system. Non-operational data on a TAP is not enabled to flow into the operational system.

Access to the test environments for CDM customers requires that a separate connection be created to access the TAPs. Current operational CDM network connections (Ops) are not permitted to access the test environments. A separate non-operational service delivery point or gateway (referred to as the FAA National Test Bed or FNTB) provides isolation from the operational system and access to the TFMS test environments.

4.3 Special Verification Requirements

No special verification requirements exist for this ICD.

4.4 Verification Requirements Traceability Matrix (VRTM)

No VRTM is required for this ICD.

5 Preparation for Delivery

There are no specific preparations for delivery applicable to the TFMS-to-FSM interface.

6 Notes

6.1 Definitions

None

6.2 Abbreviations and Acronyms

This section provides a definition of acronyms contained within this ICD.

AAR	Aircraft Arrival Rate
ABRG	Adaptive Compression Bridging
AC	Air Carrier
ACENTR	Arrival Center
ACID	Aircraft Identifier
ADC	Advise Customs Flag
ADCUS	ADCUS
ADL	Aggregate Demand List
ADPT	Adaptive Compression
ADR	Aircraft Departure Rate
AFIX	Arrival Fix
AFP	Airspace Flow Program
AGL	Above Ground Level
ALD	Airline Delayed Flag
ALM	Alarm
ALTRV	Altitude Reservation
ANSI	American National Standards Institute
AOCNET	Airline Operation Center Network
AP	Application Process
APT	Airport
ARINC	Aeronautical Radio Incorporated
ARR	Arrival
ARTA	Actual Runway Time of Arrival
ARTCC	Air Route Traffic Command Center
ARTD	Actual Runway Time of Departure
ASCII	American Standard Code for Information Interchange
ASLOT	Assigned Arrival Slot
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATV	Altitude Reservation Flag
BECMG	"Becoming" Weather Forecast Change Indicator
BENTRY	Base Element Entry Time
BETA	Base Estimated Time of Arrival
BETD	Base Estimated Time of Departure
BKT	Blanket Program

BKN	Sky Condition Covered 5-7 8th Coverage
BLKT	Blanket Program
CAT	CAT-III Landing Requirements
CAVOK	Ceiling and Visibility above Minimum Criteria
CDM	Collaborative Decision Making
CLS	Aircraft Class
CNX	Cancel
COMP	Compression
CONUS	Continental United States
CSA	Computer System Analyst
CT	Control Time
CTA	Controlled Time of Arrival
CTD	Controlled Time of Departure
CTL	Control
CTG	Aircraft Category
CX	Cancel Flag
DAS	Delay Assignment
DCENTR	Departure Center
DEP	Departure Airport
DEST	Destination Airport
DFIX	Destination Fix
DID	Data Item Description
DO	Dropout Flag
DOD	Department of Defense
DP	Departure Procedure
DTRSN	Departure Transition Fix
DV	Diversion
DVREC	Diversion Recovery
DVRSN	Diversion Flight
DVT	Diversion Recovery Flag
EAFT	Earliest Arrival Fix Time
ECR	EDCT Change Request
EDCT	Estimated Departure Clearance Time
EDFT	Earliest Departure Fix Time
EETA	Earliest Estimated Time of Arrival
EENTRY	Earliest Element Entry Time
ELEM	Element Definition
ERTA	Earliest Runway Time of Arrival
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
ETE	Estimated Time Error
ETMS	Enhanced Traffic Management System
EX	Exempt Flag

FA	Fuel Advisory
FAA	Federal Aviation Administration
FADT	Fuel Flow Advisory Delay Time
FCA	Flow Constrained Area
FCM	Federal Meteorological Handbook
FD	Flight Data Packet
FEA	Flow Evaluation Area
FLT	Flight
FM	"From" Weather Forecast Change Indicator
FSM	Flight Schedule Monitor
FTI	FAA Telecommunications Infrastructure
FX	FX-message Cancelled Flag
GA	General Aviation
GAAP	General Aviation Airport Programs
GCD	Great Circle Distance
GDP	Ground Delay Program
GS	Ground Stop
GSD	Ground Stop Delayed
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
ID	Identification
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IENTRY	Initial Element Entry Time
IGTA	Initial Gate Time of Arrival
IGTD	Initial Gate Time of Departure
INS	Inches (Barometric pressure measurement
IP	Internet Protocol
IR	Interface Requirement
IRD	Interface Requirement Document
IRS	Interface Requirement Specification
ISO	International Organization for Standardization
ISSP	Information Systems Security Plan
KM	Kilometer
KT	Knot
LFG	LIFEGUARD or Medevac Flight
LGTA	Airline Gate Time of Arrival
LGTD	Airline Gate Time of Departure
LRTA	Airline Runway Time of Arrival
LRTD	Airline Runway Time of Departure
LTOD	Length of Time Out Delay

METAR	Meteorological Aviation Report
NAS	National Airspace System
NM	Nautical Mile
NRP	National Route Program Flag
NSC	No Sky Cover
NSW	No Significant Weather
NWS	National Weather Service
OAG	Official Airline Guide
OCTA	Original Controlled Time of Arrival
OCTD	Original Controlled Time of Departure
OENTRY	Original Element Entry Time
OETA	Original Estimated Time of Arrival
OETD	Original Estimated Time of Departure
ORIG	Origin Airport
OSI	Open Systems Interconnect
OVC	Sky Condition Covered 8/8th
PGTA	Proposed Gate Time of Arrival
PGTD	Proposed Gate Time of Departure
PETE	Proposed Enroute Time Error
PROB	Probability Chance of Weather Occurrence
RCTL	DAS Controlled Time
RFC	Request For Comments
RBS	Ration By Schedule
RM	Remove Cancelled Flag
RS	RZ-message Cancelled Flag
RZ	NAS Cancelled Flag
SBRG	SCS/ECR Bridging
SCS	Slot Credit Substitution
SCT	Sky Condition Covered 3-4 8^{th} Coverage
SGTA	Scheduled Gate Time of Arrival
SGTD	Scheduled Gate Time of Departure
SH	Slot Hold Flag
SI	Substitution
SM	Statute Mile
SR	System Requirements
SS	Simplified Substitution Packet
SSR	Slot Substitution Request
SSS	System/Subsystem Specification
STAR	Standard Terminal Arrival Route
STD	Standard

SUB	Airline Substitution
SWP	Severe Weather Avoidance Plan Flight Flag
TAF	Terminal Aerodrome Forecast
TCP	Transmission Control Protocol
TEMPO	"Temporary" Weather Forecast Change Indic
TFM	Traffic Flow Management
TFMI	Traffic Flow Management Infrastructure
TFM-M	Traffic Flow Management - Modernization
TFMS	Traffic Flow Management System
TFMSID	TFMS Aircraft Computer ID
TMI	Traffic Management Initiative
TO	Time Out
TOD	Time Out Delay
TPC	TFMS Production Center
TRS	TFMS Remote Site
TSD	Traffic Situation Display
UBRG	Control times were assigned when creating a bridge for pop-up flight assignment during UDP.
UDP	Unified Delay Program
UPD	Update
USR	User
UTC	Universal Time Coordinate
UX	Update Cancelled Flag
VNTSC	Volpe National Transportation Systems Center
VRTM	Verification Requirements Traceability Matrix
VV	Sky Condition Totally Obscured by Surface-based Phenomena
WMO	World Meteorological Organization
WSOM	Weather Services Operations Manual
WXR	Severe Weather Reroute
WXRTE	Severe Weather Reroute
XML	Extensible Markup Language

Appendix A FSM – TFMS Tools

(The following was excerpted from ETMS Reference Manual v8.5 Volume II: FSM User's Guide, Section 3, item #5)

The ETMS Tools dropdown menu available on the main window of FSM contains seven core options:

- EDCT Commands,
- Command Line,
- Weather Request,
- ADL Request,
- ADL AAR,
- ADL ADR, and
- Delete Program Parameters.

Note: Only traffic management specialists at the ATCSCC have access to the ETMS Tools menu.

- ETMS Tools > EDCT Commands options:

  - > EDCT CHECK – Displays the current status of a single flight controlled by an EDCT program. When you issue this command, you get a one-line response showing the controlled departure time and whether the ETMS has issued a Control Time (CT) message to implement the control for this flight.

  - > EDCT CNX – Creates a report of all flights cancelled in EDCT programs for selected airports or a report listing only cancelled flights for specified airlines for selected airports.

  - > EDCT CTA LIST – Creates a report of all controlled and cancelled flights for a data set and/or an airline at a data set, as well as open slots.

  - > EDCT HOLD – Holds all slots in a GDP or AFP for all flights or only the flights belonging to a specified airline and its sub-carriers at a specified Airport or Airspace data set.

  - > EDCT LIST – Creates a report containing a list of all data sets currently controlled by EDCT programs.

  - > EDCT LOG – Creates a report of all EDCT files, cancellation messages, Simplified Substitution (SS) processing messages, and EDCT updates processed by the system in the order they were received.

  - > EDCT PURGE – Purges EDCT flight controls for a specified Airport or Airspace data set or for all data sets.

  - > EDCT RELEASE – Releases all slots in a GDP or AFP for all flights or only the flights belonging to a specified airline and its sub-carriers at a specified data set.

  - >EDCT SCS OFF -Suspends slot credit substituting for flights controlled by EDCT programs at a specified data set or at all data sets. To allow slot credit processing after

suspending slot credit substituting, you must activate processing with the EDCT SCS ON command.

- >EDCT SCS ON– Allows slot credit substituting for flights controlled by EDCT programs at a specified data set or at all data sets. To prohibit slot credit substituting, you must suspend processing with the EDCT SCS OFF command.

- > EDCT SHOW – Creates a report that contains detailed information on all flights controlled by EDCT programs for a specified data set, or for all data sets.

- > EDCT SLIST – Provides a slot list (using the same format that goes to the airlines) for a specified airport or an airline and its sub-carriers at a specified data set.

- > EDCT SLOTS – Creates a report list of all open slots for airlines at specified data sets.

- > EDCT SUB OFF – Suspends Substitution processing (SI) messages for flights controlled by EDCT programs at a specified data set or at all data sets.

- > EDCT SUB ON – Allows Substitution processing (SI) for any flights controlled by EDCT programs at a specified data set or at all data sets where substitution processing was previously suspended.

- >EDCT AC OFF - Allows users to turn Adaptive Compression off by entering the airport or FCA name, or ALL into the dialog box. Only Computer System Analysts (CSA) at the Air Traffic Control Systems Command Center (ATCSCC) can use this command.

- >EDCT AC ON - Allows users to turn Adaptive Compression on by entering the airport, FCA name, or ALL into the dialog box. Only Computer System Analysts (CSA) at the Air Traffic Control Systems Command Center (ATCSCC) can use this command.

- > EDCT SUB SHOW – Generates a report that shows the status of simplified substitution processing (SS) messages for all data sets.

- > EDCT UPDATE – Allows you to update a controlled flight with new departure and arrival times. After you issue this command, you get a one-line response stating that the update was successful.

- > EDCT REMOVE – Allows you to remove flights from the ETMS database, as if they never existed. Using this command can eliminate a duplicate flight or remove a specific incorrect flight. Only Computer System Analysts (CSA) at the Air Traffic Control Systems Command Center (ATCSCC) can use this command.

- > EDCT RESTORE – Allows you to “undo” the effects of the Remove command. It allows some or all of the flights that you did not want to remove from the database to be restored. Only Computer System Analysts (CSA) at the Air Traffic Control Systems Command Center (ATCSCC) can use this command.

- > EDCT UNASSIGNED SLOTS – Allows you to request, by airport identifier, an updated unassigned slots list generated by the hub site.

- ETMS Tools > Command Line – Displays a dialog box which allows the user to enter any EDCT FAA commands.

- ETMS Tools > Weather Request – Allows you to request current airport weather (METAR and TAF) for one or more airports (use the three letter airport identifiers separated by commas or spaces).
  Note: Weather Request is not applicable to FCAs and FEAs.
- ETMS Tools > ADL Request – Allows you to request a new ADL generated from the hub site for a particular data set.
- ETMS Tools > ADL AAR > Modify – Allows you to modify ADL Arrival Rates including the ability to assign several different Airport Arrival Rates (AARs) within the same hour (see Figure A-2).
- ETMS Tools > ADL AAR> Reset – Resets the Arrival Rate to the TFMS default arrival rate.
- ETMS Tools > ADL ADR> Modify – Allows you to modify ADL Departure Rates including the ability to assign several different Airport Departure Rates (ADRs) within the same hour (see Figure A-2).
  Note: ADL ADR is not applicable to FCAs and FEAs since departure rates do not apply to airspace data sets.
- ETMS Tools > ADL ADR> Reset – Resets the Departure Rate to the TFMS default departure rate.
  Note: ADL ADR is not applicable to FCAs and FEAs since departure rates do not apply to airspace data sets.

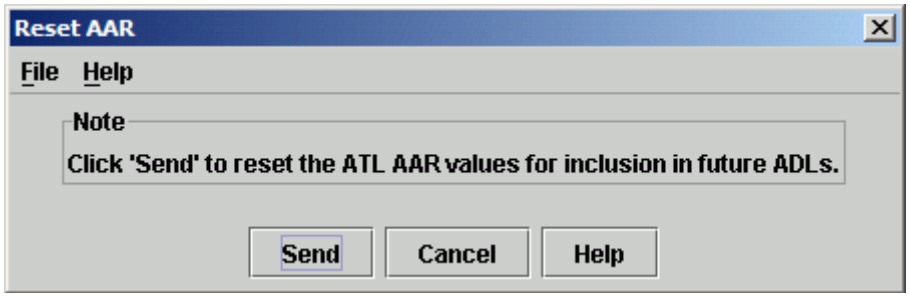

Figure A-1. Reset AAR Window

Note: When in Historical Mode, clicking Send resets the historical data to the first ADL update time. Reset AAR/ADR Window Menu items:

- File>Open – Opens a file selection window that you can use to browse to a previously saved rate file.
- File>Save As – Saves the current rates as a .txt file. You can give the file a unique name and save it to a location of your choice.
- File>Print – Prints the AAR/ADR window data.
- File > Close – Closes the Reset AAR/ADR window.
- Help > Demand Rates – Opens the on-line help information specific to the modifying demand rates. In Monitored Live mode:

- Click Send to reset AAR/ADR values to the default setting and send the information to ETMS. The reset AAR/ADR is reflected in the next ADL update.
- Click Cancel to close the Reset AAR/ADR window without taking any actions.
- Click Help to display a pop-up screen with additional information on the Send and Cancel buttons.

Use this component to change the AAR or ADR. The rates appear in the next ADL update.

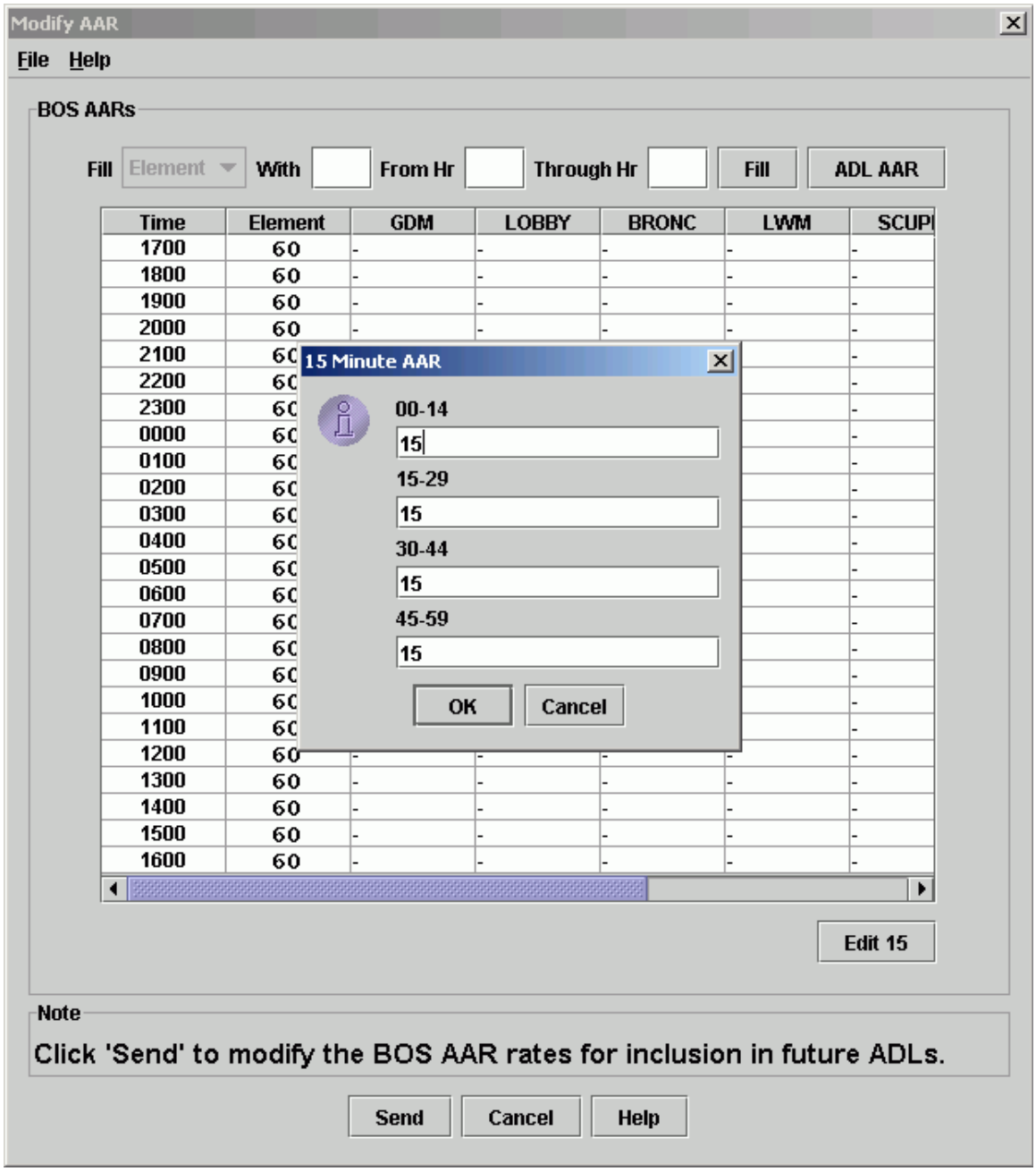

Figure A-2. Modify AAR Window

- ETMS Tools > Delete Program Parameters – Opens the Delete Program Parameters dialog box (see Figure A-3). Select the airport or FCA for which you want to delete parameters from the For Data Set drop down menu.

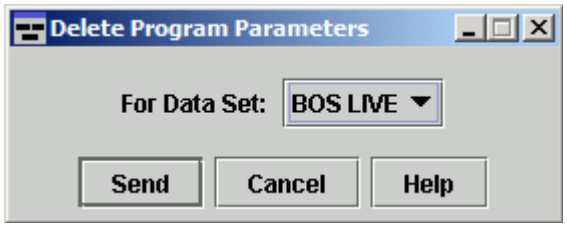

Figure A-3. Delete Program Parameters Window

Appendix B ADL & FSM Broadcast File Format Specifications

The content of this appendix is contained in a separate file that is represented by the icon below and is linked to this document. To expand the ADL & FSM Broadcast File Format Specifications file while viewing the ICD online, place your cursor on the icon below and "Ctrl+click". To print the contents of the ADL & FSM Broadcast File Format Specifications file do one of the following:

- Open the ICD, navigate to this page, place the cursor on the icon below and "Ctrl+click". This will open the file in Microsoft Word. Use the Microsoft Word print option.

- Open "Windows Explorer" and navigate to the directory containing this ICD. Right click on the "ADL File Specification v12.4doc" file and select the "Print" option.

ADL File Specification v12.4.doc

Appendix C FSM ADL Parameters Specification

The content of this appendix is contained in a separate file that is represented by the icon below and is linked to this document. To expand the FSM ADL Parameters Specification file while viewing the ICD online, place your cursor on the icon below and "Ctrl+click". To print the contents of the FSM ADL Parameters Specification file do one of the following:

- Open the ICD, navigate to this page, place the cursor on the icon below and "Ctrl+click". This will open the file in Microsoft Word. Use the Microsoft Word print option.

- Open "Windows Explorer" and navigate to the directory containing this ICD. Right click on the "FSM ADL Parameters Specification v5.4.doc" file and select the "Print" option.

FSM ADL Parameters Spec v5.4.doc

Appendix D CDM Message Protocol

There are four types of CDM message protocols:

- General CDM session Protocols
- ADL session Protocols
- Flight Data Message Protocols
- Simplified Substitution Protocols

With the exception of the Flight Data Message Protocols, the FSM interface utilizes three of the above four message protocols. These protocols are detailed in the CDM Message Protocol document that is represented by the icon below and is linked to this document. To expand the CDM Message Protocol file while viewing the ICD online, place your cursor on the icon below and "Ctrl+click". To print the contents of the CDM Message Protocol file, do one of the following:

- Open the ICD, navigate to this page, place the cursor on the icon below and "Ctrl+click". This will open the file in Microsoft Word. Use the Microsoft Word print option.

- Open "Windows Explorer" and navigate to the directory containing this ICD. Right click on the "CDM Message Protocol v2.4.doc" file and select the "Print" option.

CDM Message
Protocol v2.4.doc