

CSC

Traffic Flow Management System-to-Traffic Flow Management Data to Industry (TFMS-to-TFMDI) Interface Control Document (ICD) for the Traffic Flow Management-Modernization (TFM-M) Program



Final, Release 3

Contract Number: DTFAWA-04-C-00045
CDRL: E05

August 24, 2009

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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Release 3 Final August 24, 2009

INTERFACE CONTROL DOCUMENT
APPROVAL SIGNATURE PAGE
TFMS/TFMDI

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 Traffic Flow Management Data to Industry (TFMDI). 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), Proposed Revision 2.2, August 5, 2008. The IRS is a companion document to the CSC/TFMM-04/0025, System/Subsystem Specification (SSS) for the Traffic Flow Management–Modernization (TFM-M) Program, Baseline Revision 4.0, dated August 5, 2008. 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 the TFMS and the TFMDI
- Format of messages that are transmitted from TFMS to TFMDI

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
- TFMDI - FAA-ATO-R

1.3 Document Organization

This ICD is organized in six sections:

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, 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 implemented by this ICD.

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

Appendix A, **TFMDI Color Table**, provides a tabular breakout of color codes used in the TFMDI display.

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

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 |

Volpe Documentation:

| | |
|----------------|--|
| ETMS-TFMDI-003 | Traffic Flow Management Data to Industry: Interface Control Document, Version 1.7, May 9, 2007 |
|----------------|--|

Other Government Documents:

| | |
|---------|--|
| CDM ICD | CDM Message Protocol Interface Control Document, Version 2.2, December 2, 2005 |
|---------|--|

| | |
|-------------------|--|
| CSC/TFMM-04/0025 | System/Subsystem Specification (SSS) for the Traffic Flow Management–Modernization (TFM-M) Program, Release 3, Revision 5.0, May 19, 2009 |
| CSC/TFMM-04/0048 | Information Systems Security Plan (ISSP), Revision 2.2 for Traffic Flow Management–Modernization (TFM-M), June 2, 2009 |
| CSC/TFMM-05/0121 | Interface Requirements Specification (IRS) for the Traffic Flow Management – Modernization (TFM-M) Program, Release3, Revision 2.3, May 19, 2009 |
| CSC/TFMM-06/0171 | Traffic Flow Management System-to-Airline Operation Center Network (TFMS-to-AOCNET CDM) Interface Control Document (ICD), Release 3 Final, August, 24, 2009. |
| CSC/TFMM-05/0139 | Traffic Flow Management System-to-Aircraft Situation Display to Industry (TFMS-to-ASDI) Interface Control Document (ICD), Release 3, Final, August 24, 2009. |
| TFMM-ENGR-05(E05) | Traffic Flow Management Modernization (TFM-M), Data Item Description (DID), undated |

2.2 Non-Government Documents

International Organization for Standardization (ISO):

| | |
|----------------|--|
| ISO/IEC 7498-1 | Information Processing Systems – Open Systems Interconnect – Basic Reference Model, 1993 |
|----------------|--|

Request for Comment (RFC) Documents:

| | |
|----------|--|
| RFC 791 | Internet Protocol, Sep 1981 |
| RFC 793 | Transmission Control Protocol, Sep 1983 |
| RFC 959 | File Transfer Protocol (FTP), Oct 1985 |
| RFC 2616 | Hypertext Transfer Protocol -- HTTP/1.1, June 1999 |
| RFC 3076 | Canonical XML Version 1.0, Mar 2001 |

American National Standards Institute (ANSI):

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

Telecommunications Industry Association (TIA):

TIA-232-F Interface Between Data Terminal Equipment and Data
Circuit-Terminating Equipment Employing Serial
Binary Data Interchange, 1997

Institute of Electrical and Electronics Engineers (IEEE):

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

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 Volpe Documents

The Volpe National Transportation System Center (VNTSC) documents are available on the World Wide Web at the following address:

<http://www.fly.faa.gov/ASDI/asdi.html>

2.3.3 Request for Comment (RFC) Documents

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

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

2.3.4 TIA Documents

Copies of TIA standards may be obtained from TIA, 2500 Wilson Boulevard, Suite 300, Arlington, VA 22201.

2.3.5 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 interface between the TFMS and the TFMDI Clients.

The FAA provides both graphical and textual data to Collaborative Decision Making (CDM) Clients, Aircraft Situation Display to Industry (ASDI) Vendors, and designated FAA Clients. This is designated Traffic Flow Management (TFM) data. The FAA instituted the Traffic Flow Management Data to Industry (TFMDI) program in order to address identified restrictions in other data distribution systems.

The TFMS-to-TFMDI interface provides TFM data in a machine-readable format to industry clients, allowing clients the ability to utilize automation, to improve their tools, and to promote common situational awareness among the CDM clients and other TFMDI clients as necessary.

3.1 General Characteristics

This subsection identifies the interfacing subsystems and points of interface, and services provided by the interface.

TFMDI Clients are considered ‘external untrusted’ entities and can connect to the interface via the External Portal. There are two different ways the TFMDI Client can access the interface:

- AOCNET/CDM Clients – These are an airline, air carrier, air freight, military, or general aviation/business aviation operator Clients which have been authorized by the FAA to participate in collaborative decision making. The AOCNET/CDM Wide Area Network (WAN) connects to TFMS to receive TFMDI data.
- ASDI Vendor Clients – The Client is an ASDI Vendor, authorized to send the TFMDI to downstream clients. This Client connects using the FTI ED-8 Gateway system. This is a closed “untrusted” high speed connection system, allowing a communications link between the TPC and the ASDI Vendor.

Figure 3-1, TFMS-to-TFMDI Interface Block Diagram, provides a generalized diagram of the interface and the appropriate demarcation points. Refer to Figure 3-3 for the full physical details of the interface. Note - the demarcation points are illustrated as large black dots in Figure 3-1.

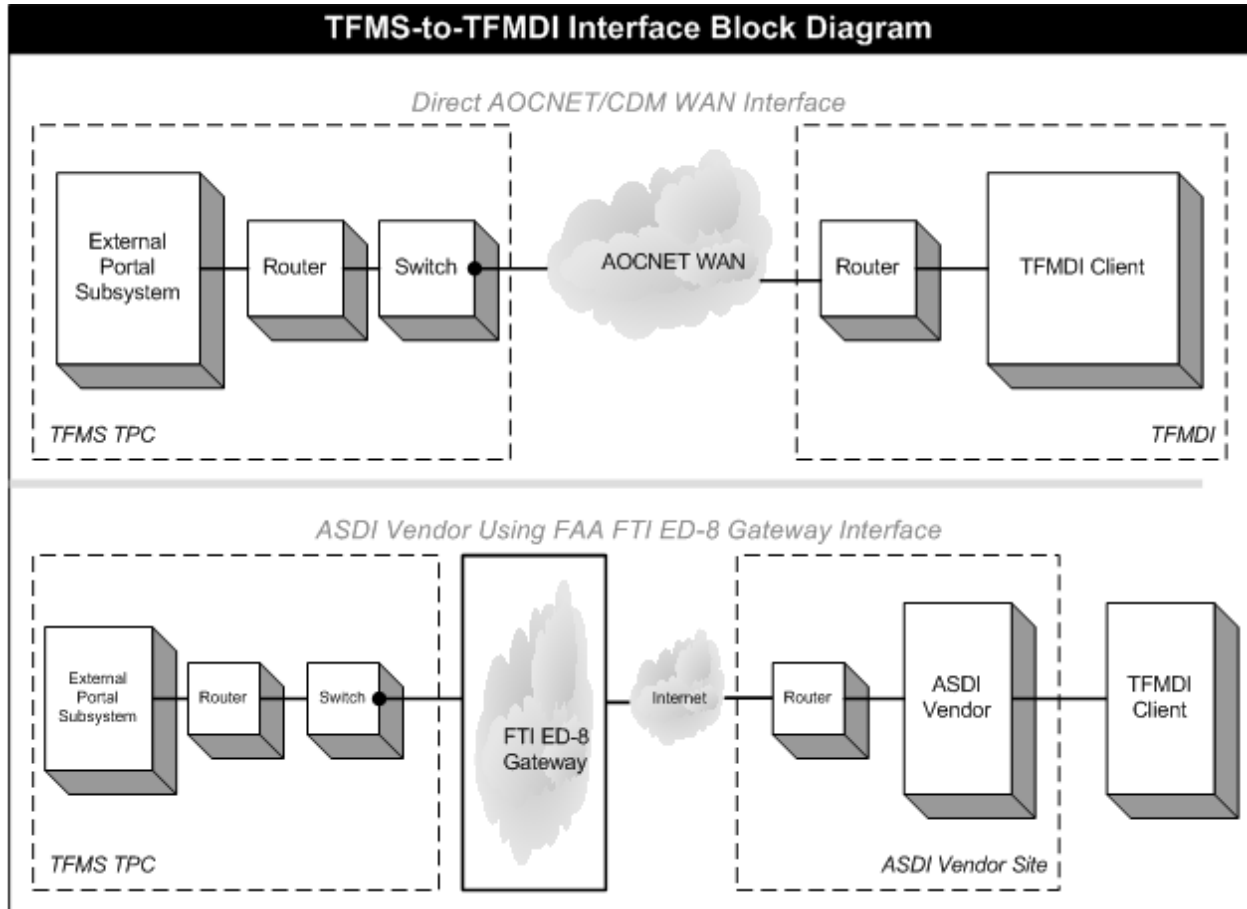


Figure 3-1. TFMS-to-TFMDI Interface Block Diagram

3.2 Functional Design Characteristics

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

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

TFMS provides TFMDI data to designated clients using the External Portal Message Interface Server contained within the External Portal AP.

The corresponding AP on the TFMDI Client side is a client-developed AP, following defined guidelines.

3.2.1.2 Category of Services Required by the AP

The TFMS-to-TFMDI interface implements the transfer of Traffic Flow Management data from the TFMS-to-TFMDI Clients. The following are currently transferred by the TFMS-to-TFMDI interface:

- TFMDI Index – This lists the current available files and the most recent update times.
- TFMDI Public Reroutes - This data defines active public reroutes. It is updated whenever a new public reroute is issued or when an existing public reroute is modified.
- TFMDI Public FEA/FCAs - This data defines current FCAs and public FEAs. It is updated whenever a new FCA or public FEA is issued or when an existing FCA or public FEA is modified.

Loss of the TFMS-to-TFMDI interface will impair full TFMS operation, but will not degrade TFMS operations to the point of inoperability. Loss of the interface will, however, cause a significant impact to the TFMDI Clients utilizing the interface. This interface is designated “essential” in accordance with NAS-SR-1000.

3.2.1.3 Information Units

This subsection describes the formats of the data files transferred from TFMS to TFMDI.

3.2.1.3.1 Information Code

The data transferred from TFMS to TFMDI is in eXtensible Markup Language (XML) format, which uses standard ASCII alphanumeric characters, in accordance with ANSI X3.4, American National Standard Code for Information Interchange (ASCII). The standards for XML format can be found in RFC 3076, Canonical XML Version 1.0.

3.2.1.3.2 Information Structure

The following subsections provide the details of the products transferred from TFMS to TFMDI. Table 3-I presents the TFMS-to-TFMDI Interface Messages, including the subsection reference.

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

| Product Name | ICD Subsection |
|---------------------------|----------------|
| TFMDI Index | 3.2.1.3.2.1 |
| TFMDI Public Reroute File | 3.2.1.3.2.2 |
| TFMDI Public FEA/FCA File | 3.2.1.3.2.3 |

The data files are in a subset of XML. (Note - The reader is assumed to have some familiarity with XML. More information on XML can be found at the following web addresses:

- For XML standards: <http://www.ietf.org/rfc/rfc3076.txt>
- For TFMDI documentation: <http://www.fly.faa.gov/ASDI/asdi.html>

The XML used in the TFMS-to-TFMDI interface is defined by XML Schema Definition (XSD) files. These XSD files are used to describe and validate the elements used in the XML files distributed via the TFMS-to-TFMDI interface. The following schema definition files are needed to validate, parse and process TFMDI XML documents:

- **TFMS_XIS.xsd** – The root schema, including all external interface schemas using the same name space.
- **MessageMetaData.xsd** – The schema definition representing common header type information for external interfaces.
- **NasXCommonMessages.xsd** – The schema definition describing common data sent and received over multiple TFMS interfaces.
- **NasXCoreElements.xsd** – This schema definition describes all common element types used by NasXCommonMessages.xsd.

These XSD files were developed as part of the TFMM program and as such contain additional element/attribute definitions supporting multiple TFMM data interfaces and in some cases, data is represented that will be available in future TFMM releases. These files are added as attachments to this ICD.

There are a number of set procedures and data rules for the XML TFMDI format, to provide uniformity and coherence to all clients. The basic rules for the TFM data files consist of:

- The files contain only printable ASCII characters.
- The file format follows standard XML structural conventions.
- The files are guaranteed to be:
 - Valid – The XML file content matches the proper schema and documentation.
 - Well-Formed - This indicates every opening tag has a corresponding closing tag, opening and closing tag pairs are 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, or ‘child’. Example:

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

Characters that are not between matching start and end tags are ignored. They are 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 TFMDI Index File

Clients use the TFMDI Index file to determine if there are any updates to the TFMDI data files (since the Client last retrieved files). The most current index file is always named

“TFMDIndex”

and can be found at the following URL (Note - TFMDI clients will be given the test and operational IP addresses.):

http://IPAddress/TFMDI/TFMDIndex

A Client retrieves this file using a standard HTTP GET command (utilizing a client-designed program).

The following bullets detail the possible elements in the TFMDI Index file:

- `<?xml version="2.1" standalone="yes" ?>` - This element indicates the XML version number and standalone status.
- `<TFMDI_INDEX_FILE>` – This element acts as the container for the entire index file.

- <VERSION> - This element indicates the version of the index file format. This helps maintain continuity with the Clients when file version XML is updated
- <TIMESTAMP> - The Index Creation Timestamp, indicating the date and time the index file was created. The format is a fourteen digit number in the following format *YYYYMMDDhhmms*:
 - YYYY – Year (of file creation)
 - MM – Month
 - DD – Day
 - hh – Hour
 - mm – Minute
 - ss – Second
- <REROUTE_FILES> - This element acts as a container for the individual Reroute elements contained within this Index. There may be multiple instances of the Reroute files contained within a single Index file.
- <REROUTE_FILE> – This element is a child element of the <REROUTE_FILES> container. It acts as a container for an individual Reroute file. It indicates a single instance of a Public Reroute.
- <REROUTE_NAME> - This element is a child element of the <REROUTE_FILE> container. It is the name assigned by the specialist who created the Reroute and may be as long or complex as the specialist decides it needs to be.
- <FILE_NAME> - This element is a child element of the <REROUTE_FILE> container. It is the actual file name for the Reroute file. The data file is available in both uncompressed and compressed versions. Compressed versions (which use the ‘*gzip*’ compression utility) will have a final “.gz” extension on the file name to indicate compression. TFMDI clients may retrieve either file, but the compressed files are preferred, due to the size of the uncompressed files and the amount of bandwidth it takes to transfer them. The compressed versions of these files can be uncompressed using the *gunzip* tool or other applicable compression tools which are available.
- <FILE_TIMESTAMP> - This element is a child element of the <REROUTE_FILE> container. This indicates the date and time the file was last created or updated. The format is a fourteen digit number as detailed in the <TIMESTAMP> element.
- <FCA_FILES> – This element acts as a container for the individual FEA/FCA elements contained within this Index. There may be multiple instances of the FEA/FCA files contained within a single Index file.

- <FCA_FILE> – This element is a child element of the <FCA_FILES> container. It acts as a container for an individual FEA/FCA file. It indicates a single instance of a Public FEA/FCA.
- <FCA_NAME> - This element is a child element of the <FCA_FILE> container. It is the name assigned by the specialist who created the FEA/FCA. Note: the name of an FEA/FCA can be modified, and at present this cannot be detected using only data from the index file. To find a name changed FEA/FCA, the client must refer to the FCA_ID value (obtained from the FEA/FCA definition file). This is assigned when the FEA/FCA is first created. The value is unique, and never changes. Therefore any FEA/FCA with different names but the same FCA_ID number have been renamed.
- <FILE_NAME> -This element is a child element of the <FCA_FILE> container. It is the actual file name for the FEA/FCA file. It follows the rules given for <FILE_NAME> above.
- <FILE_TIMESTAMP> - This element is a child element of the <FCA_FILE> container. This indicates the date and time the file was last created or updated. The format is a fourteen digit number as detailed in the <TIMESTAMP> element.
- <AFP_STATUS>. This element is a child element of the <FCA_FILE> container. It indicates TRUE or FALSE, indicating whether an AFP is associated with the FEA/FCA.
- <SECONDARY_FILTER> - This element is a child element of the <FCA_FILE> element. These are the secondary files used in the specified FEA/FCA. It acts as a parent container for the Secondary File elements.
- <SECONDARY_FILTER_NAME> - This element is a child element of the <SECONDARY_FILTER> container. It is the name assigned by the specialist who created the FEA/FCA and may be as long or complex as the specialist decides it needs to be.
- <SECONDARY_FILTER_FILE_NAME> - This element is a child element of the <SECONDARY_FILTER> container. It is the actual file name for the Secondary Filter file.
- <FILE_TIMESTAMP> - This element is a child element of the <SECONDARY_FILTER> container. This indicates the date and time the file was last created or updated. The format is a fourteen digit number as detailed in the <TIMESTAMP> element above.

3.2.1.3.2.2 TFMDI Public Reroute File

Reroute data files contain all the data associated with the reroute definition, including the initial flight list if one was generated. Reroute data file names are of the form:

RR.reroute_name.Dat (or RR.reroute_name.Dat.gz)
(example: *RR.BOS_ORD.Dat.gz*)

The URL of a Reroute data file is:

http://IPAddress/TFMDI/filename

Clients are provided a pair of designated IP addresses to retrieve the reroute files and secondary filter files. The filename are contained within the TFMDI Index file (Refer to Section 3.2.1.3.2.1). The Client uses an HTTP GET command to retrieve the designated files. If the compressed (zipped) version of the file has been retrieved, the file must first be uncompressed.

The following bullets detail the possible elements in the TFMDI Public Reroute file:

- `<?xml version="2.1" standalone="yes" ?>` - This element indicates the XML version number and standalone status.
- `<REROUTE>` - This element acts as the container for the entire Reroute file.
- `<VERSION>` - This element indicates the version of the Reroute file format. This helps maintain continuity with the Clients when file version XML is updated.
- `<CTR_HEAD>` - This element acts as a container for the Reroute Header data.
- `<ID>` - This element is a child element of the `<CTR_HEAD>` container. It is a computer-generated text string that acts as the identification of the Reroute.
- `<NAME>` - This element is a child element of the `<CTR_HEAD>` container. It is the assigned name of the Reroute. In the case of an FEA/FCA, the FEA/FCA name may be used with an additional suffix to provide a unique name.
- `<DOMAIN>` - This element is a child element of the `<CTR_HEAD>` container. The domain for TFMDI Reroute data is PUBLIC.
- `<LASTUPDATE>` - This element is a child element of the `<CTR_HEAD>` container. This provides the date and time the Reroute was last updated. The format is a fourteen digit number in the following format *YYYYMMDDhhmmss*:
 - YYYY – Year (of file creation)
 - MM – Month
 - DD – Day
 - hh – Hour
 - mm – Minute
 - ss – Second
- `<ORIGINAL_CREATE_TIME>` - This element is a child element of the `<CTR_HEAD>` container. This is the time and date the Reroute was initially created. The format is the same as `<LASTUPDATE>`.

- <SITE> - This element is a child element of the <CTR_HEAD> container. It indicates where the Reroute was created.
- <WKSTN> - This element is a child element of the <CTR_HEAD> container. It indicates where the Reroute was created.
- <STATUS> - This element is a child element of the <CTR_HEAD> container. This indicates whether the Reroute is PLANNED or ACTIVE.
- <SHOW> - This element is a child element of the <CTR_HEAD> container. It consists of four indicators (one digit each, with a “0” indicating “DON’T SHOW”, and “1” indicating “SHOW”):
 - Fixes
 - NAVAIDs
 - Reroute Labels
 - Reroutes
- <COLOR_ID> - This element is a child element of the <CTR_HEAD> container. It indicates the color used for the display. Refer to Appendix A for details of the color entries.
- <REROUTE_TIMETYPE> - This element is a child element of the <CTR_HEAD> container. It indicates what determining factor was used to select flights (ETA, ETD, or FCA).
- <REROUTE_STARTTIME> - This element is a child element of the <CTR_HEAD> container. It indicates when the Reroute comes into effect. The format is the same as <LASTUPDATE> .
- <REROUTE_ENDTIME> - This element is a child element of the <CTR_HEAD> container. It indicates when the Reroute ceases. The format is the same as <LASTUPDATE> .
- <FCA_NAME> - This element is a child element of the <CTR_HEAD> container. This entry will exist if the Reroute is based on an FCA, in the format “FCAdd”.
- <FCA_STARTTIME> - This element is a child element of the <CTR_HEAD> container. It indicates when the FCA comes into effect. The format is the same as <LASTUPDATE> . This entry will exist if the Reroute is based on an FCA.
- <FCA_ENDTIME> - This element is a child element of the <CTR_HEAD> container. It indicates when the FCA ceases. The format is the same as <LASTUPDATE> . This entry will exist if the Reroute is based on an FCA.
- <AIRBORNE> - This element is a child element of the <CTR_HEAD> container. It indicates the aircraft state affected by the Reroute (Airborne, Not Airborne, or All Flights)

- <CTR_ROUTE> - This element acts as a container for the Route Segments data.
- <CTR_SEG> - This element acts as a container for the Route Segments data and is a child element of the <CTR_ROUTE> element. There may be multiple <CTR_SEG> entries.
- <INCLUDE> - This element is a child element of the <CTR_SEG> container. It shows whether to Include or Exclude this segment.
- <ORIGIN> - This element is a child element of the <CTR_SEG> container. This element provides a list of originating airports and/or centers. If there are multiple centers/airports, each will be separated by a space.
- <DESTINATION> - This element is a child element of the <CTR_SEG> container. This element provides a list of destination airports and/or centers. If there are multiple centers/airports, each will be separated by a space.
- <FLTR_SUMMARY> - This element is a child element of the <CTR_SEG> container. It is a system-generated listing of any filters affecting this Route Segment.
- <FULL_ROUTE> - This element is a child element of the <CTR_SEG> container. This is one of three entries:
 - FULL – Indicates the entire route, end-to-end.
 - DEST – Indicates the final segment of the route.
 - ORIG – Indicates the first segment of the route.
- <ROUTE_STG> - This element is a child element of the <CTR_SEG> container. It is a detailed listing of the fixes and waypoints that comprise the Route Segment. Note - If the <ROUTE_TYPE> (see below) is indicated as NONE, the segment will be a specific route defined by a sequence of fixes and airways (which must contain waypoints). Such a reroute segment must contain waypoints. For any other entry, the entry is free-form text and does not contain Waypoints.
- <WAYPOINT> - This element is a child element of the <CTR_SEG> container. It defines the waypoints, fixes, and/or NAVAIDs used by the <CTR_SEG> . Each point is defined by the latitude, longitude, name, and type of point (F – Fix, N – NAVAID, W –Waypoint). Note- not all fixes have names. Unnamed waypoints are assigned a “?” as the name.
- <ROUTE_TYPE> - This element is a child element of the <CTR_SEG> container. It is an indicator assigned by the user, from a list of five entries (NONE, CDR ROUTE, RERTE, UNKN RTE, UPT RTE).
- <SEG_SOURCENAME> - This element is a child element of the <CTR_SEG> container. This entry is a Playbook name, if the Route Segment was obtained from the National Playbook.

- <SEG_REMARKS> - This element is a child element of the <CTR_SEG> container. This consists of free-text entries, providing any significant remarks.
- <SEG_ID> - This element is a child element of the <CTR_SEG> container. This element details which route grid row in which this segment appears.
- <SEG_FLTR> - This element is a child element of the <CTR_SEG> container. This element details which route grid row in which this segment appears.
- <CTL_FLTR> - This element is a child element of the <CTR_SEG> container. This element acts as a container for applicable filter conditions for the designated Route Segment. Note - DEST segments do not have this entry.
- <NOT_FROM> - This element is a child element of the <CTL_FLTR> container. This is a list of departure airports excluded from the Route Segment. Multiple airports are separated by spaces.
- <NOT_TO> - This element is a child element of the <CTL_FLTR> container. This is a list of arrival airports excluded from the Route Segment. Multiple airports are separated by spaces. Note – Only exists if the DESTINATION for this Route Segment is UNKN or has a center listed.
- <THRU> - This element is a child element of the <CTL_FLTR> container. This element provides a list of centers that a flight must pass through during this Route Segment. Multiple centers are separated by spaces. Note – A flight must, at a minimum, pass through one of the listed centers.
- <AIRWAY> - This element is a child element of the <CTL_FLTR> container. This is a list of airways by name. Multiple airways are separated by spaces. Note – A flight must, at a minimum, fly on one of the listed airways.
- <USE_FIX> - This element is a child element of the <CTL_FLTR> container. This is a list of fixes by name. Multiple fixes are separated by spaces. Note – A flight must, at a minimum, fly over one of the listed fixes.
- <AC_TYPE> - This element is a child element of the <CTL_FLTR> container. This is a list of aircraft by type. Multiple types are separated by spaces. Note – If this entry is present, any flights on this Route Segment must be one of these aircraft types.
- <FLIGHTLVLOW> - This element is a child element of the <CTL_FLTR> container. This element indicates the minimum cruising altitude for this Route Segment, from 0 (surface level) through 600 (60, 000 feet MSL).
- <FLIGHTLVHIGH> - This element is a child element of the <CTL_FLTR> container. This element indicates the maximum cruising altitude for this Route Segment, from 0 (surface level) through 600 (60, 000 feet MSL).
- <AC_CAT> - This element is a child element of the <CTL_FLTR> container. This lists the category of aircraft that can use this Route Segment (J – Jet, P – Prop, T – Turboprop). Any or all of the types may be listed, separated by

spaces. If this entry is present, any flight using this Route Segment must be one of the listed types.

- <WEIGHT_CLASS> - This element is a child element of the <CTL_FLTR> container. This lists the weight classes of aircraft that can use this Route Segment (L – Light, H – Heavy, S – Superheavy). Any or all of the classes may be listed, separated by spaces. If this entry is present, any flight using this Route Segment must be one of the listed classes.
- <USER_CAT> - This element is a child element of the <CTL_FLTR> container. This lists the category of aviation entities that can use this Route Segment (G – General Aviation, T – Air Taxi, F – Cargo, C – Commercial, M – Military). Any or all of the categories may be listed, separated by spaces. If this entry is present, any flight using this Route Segment must be one of the listed categories.
- <RVSM> - This element is a child element of the <CTL_FLTR> container. This element indicates the Reduced Vertical Separation Minimum (RVSM) limitations for this Route Segment (ALL, COMPLIANT, or NON-COMPLAINT) . Any flight using this Route Segment must conform to this entry (default entry is ALL).
- <FLTR_TIMETYPE> - This element is a child element of the <CTL_FLTR> container. This indicates whether the flights are filtered by the departure time or the arrival time. <FLTR_TIMETYPE>, <FLTR_STARTTIME>, and <FLTR_ENDTIME> are all present or absent.
- <FLTR_STARTTIME> - This element is a child element of the <CTL_FLTR> container. This indicates when the filter begins. Only flights departing or arriving after this time are to be included. The format is the same as <LASTUPDATE>.
- <FLTR_ENDTIME> - This element is a child element of the <CTL_FLTR> container. This indicates when the filter ends. Only flights departing or arriving after before time are to be included. The format is the same as <LASTUPDATE>.
- <CTR_FLIGHT_LIST> - This element is a container for the Flight Lists covered by the Reroute. It is only present if a Flight List was created when the Reroute was created.
- <FLIGHT_LIST_LASTUPDATE> - This element is a child element of the <CTR_FLIGHT_LIST> container. This element is the date and time the Flight List was update. It is in the same format as <LASTUPDATE>.
- <CTR_FLIGHT> - This element is a child element of the <CTR_FLIGHT_LIST> container and acts as a container for an individual flight. There is a minimum of one if the <CTR_FLIGHT_LIST> is present, and there may be multiple entries.

- <ACID> - This element is a child element of the <CTR_FLIGHT> container. It contains the flight's aircraft identification.
- <RVSM> - This element is a child element of the <CTR_FLIGHT> container. It indicates whether the flight is RVSM compliant (a “-“ if compliant, an “NC” if non-compliant).
- <E_TYPE> - This element is a child element of the <CTR_FLIGHT> container. It indicates the equipment type (i.e. the model of aircraft).
- <DCENTR> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's departure center.
- <ACENTR> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's arrival center.
- <ORIG> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's departure airport.
- <DEST> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's arrival airport.
- <ETD> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's estimated time of departure. It consists of a prefix (see below) followed by the time of departure in *HHmm* format (hour and minute of departure). Prefixes are:
 - S – Scheduled (Based on Official Airline Guide (OAG) data and/or CDM messages).
 - N – Early Intent. (An Early Intent message for the flight received).
 - P – Proposed (Based on flight plan).
 - T – Taxi (A “pushed back” message received).
 - A – Active (Flight is in air, this is actual departure time).
 - E – Estimated (Flight is in air, this is estimated departure time).
- <ETA> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's estimated time of arrival. It consists of a prefix (see below) followed by the time of arrival in *HHmm* format (hour and minute of arrival). Prefixes are:
 - A – Active (Flight has landed, this is actual arrival time).
 - E – Estimated (ETA is estimated arrival time).
- <PGTD> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's proposed gate time of departure. It is in *DDHHmm* format. (Date, hour, minute of departure).

- <ALT> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's requested flight altitude. The format is *ddd* (hundreds of feet from 000 to 600).
- <IGTD> - This element is a child element of the <CTR_FLIGHT> container. This is the flight's initial gate time of departure. It is in *DDHHmm* format. (Date, hour, minute of departure).
- <AC_CAT> - This element is a child element of the <CTR_FLIGHT> container. This lists the flight's category of aircraft (J – Jet, P – Prop, T – Turboprop).
- <SPEED> - This element is a child element of the <CTR_FLIGHT> container. This element is the flight's cruising speed in knots.
- <CTR_ASSIGNED_RTE> - This element is a child element of the <CTR_FLIGHT> container. It acts as a container for the specific flight's route.
- <ASSIGNED_RTE_TYPE> - This element is a child element of the <CTR_ASSIGNED_RTE> container. It is an indicator that was assigned by a user, from a list of five entries (NONE, CDR ROUTE, RERTE, UNKN RTE, UPT RTE).
- <INCLUDE_RTE> - This element is a child element of the <CTR_ASSIGNED_RTE> container. This element indicates whether to Include or Exclude this flight and assigned route.
- <DBKEY> - This element is a child element of the <CTR_FLIGHT> container. This element provides the Flight Key used by the Oracle database. It provides a way to match flights and assigned routes together correctly.
- <CTR_ADV_LIST> - This element acts as a container for the Advisory data for the Reroute.
- <ADV_NUMBER> - This element is a child element of the <CTR_ADV_LIST> container. It indicates the number assigned to the advisory (up to six digits). If there is no number, the entry “---“ will be present.
- <ADV_TYPE> - This element is a child element of the <CTR_ADV_LIST> container. This element indicates the whether a Message or Advisory was issued.
- <ADV_TEXT> - This element is a child element of the <CTR_ADV_LIST> container. This is a free text entry, with the element containing the entire advisory or message sent.
- <CTR_ADV> - This element is a child element of the <CTR_ADV_LIST> container and acts as a container for the individual Advisory data. Note - An advisory consists of multiple fields. Each of these field are saved in a <CTR_ADV>, which consist of two parts (as detailed below).
- <ADV_NAME> - This element is a child element of the <CTR_ADV> container. The Advisory field is one of the following:

- ACTION
 - ASSOCIATED RESTRICTIONS
 - CATEGORY
 - CONSTRAINED AREA
 - FACILITIES INCLUDED
 - INCLUDE TRAFFIC
 - MODIFICATIONS
 - PROBABILITY OF EXTENSION
 - REASON
 - REMARKS
- <ADV_DATA> - This element is a child element of the <CTR_ADV> container. It details the reason for the Advisory element, and consists of free text.

3.2.1.3.2.3 TFMDI Public FEA/FCA File

FEA/FCA definition files contain the primary data associated with the FEA/FCA definition. The FEA/FCA consists of two integral parts:

- Primary Filter – This is the main body of the FEA/FCA definition. It is included in the n the FEA/FCA data file.
- Secondary Filter – In many cases, there are secondary filters associated with the FEA/FCA file. These help further define and refine the FEA/FCA. There may be more than one secondary filter associated with the FEA/FCA. If there are multiple secondary filters, each is defined in a separate file, enabling the user to segregate and identify different sets of elements for the FEA/FCA.

The URL of an FEA/FCA file is:

http://(IPAddress)/TFMDI/(filename)

Clients are provided a pair of designated IP addresses to retrieve the FEA/FCA files and secondary filter files from. The filenames are contained within the TFMDI Index file (Refer to Section 3.2.1.3.2.1). The Client uses an HTTP GET command to retrieve the designated files. If the compressed (zipped) version of the file has been retrieved, the file must first be uncompressed. This applies to both the main FEA/FCA file and any Secondary filter files that are retrieved.

FEA/FCA data file names are in the following format::

FCA.FCA_name.Dat or FEA.FEA_name.Dat

FCA.FCA_name.Dat.gz or FEA.FEA_name.Dat.gz

Examples of this are:

FCA.FCA001.Dat or FEA.DC_METROS.Dat.gz

The following bullets detail the possible elements in the TFMDI Public FEA/FCA Filter Definition file:

Primary FEA/FCA Filter Definition

- `<?xml version="2.1" standalone="yes" ?>` - This element indicates the XML version number and standalone status.
- `<FCA>` - This element acts as the container for the entire FEA/FCA file.
- `<INDEX_INFO>` - This element is a legacy ETMS entry and is ignored by TFMS
- `<FCA_ID>` - This element is a child element of the `<FCA>` container. It is a computer-generated text string that acts as the identification of the FEA/FCA.
- `<NAME>` - This element is a child element of the `<FCA>` container. It is the name of the FEA/FCA assigned by the traffic Management specialist.
- `<DOMAIN>` - This element is a child element of the `<FCA>` container. The domain for TFMDI FEA/FCA data is PUBLIC.
- `<LASTUPDATE>` - This element is a child element of the `<FCA>` container. This provides the date and time the FEA/FCA was last updated. The format is a fourteen digit number in the following format *YYYYMMDDhhmmss*:
 - YYYY – Year (of file creation)
 - MM – Month
 - DD – Day
 - hh – Hour
 - mm – Minute
 - ss – Second
- `<UP_WKSTN>` - This element is a child element of the `<FCA>` container. It indicates the ID of the workstation used to last update the FEA/FCA.
- `<UP_SITE>` - This element is a child element of the `<FCA>` container. It indicates the ID of the site used to last update the FEA/FCA.
- `<CR_WKSTN>` - This element is a child element of the `<FCA>` container. It indicates the ID of the workstation used to create the FEA/FCA.
- `<CR_SITE>` - This element is a child element of the `<FCA>` container. It indicates the ID of the site used to create the FEA/FCA.
- `<SHARE_SITE>` - This element is a child element of the `<FCA>` container. It indicates the IDs of site the FEA/FCA was shared with. If there are multiple sites, they will be separated by a space.

- <REASON> - This element is a child element of the <FCA> container. This is the reason the FEA/FCA was issued (from the following selections):
 - NONE
 - EQUIPMENT
 - OTHER
 - RUNWAY
 - VOLUME
 - WEATHER
- <TYPE> - This element is a child element of the <FCA> container. This element indicates whether this is an FEA or FCA.
- <COLOR_ID> - This element is a child element of the <FCA> container. It indicates the color used for the display. Refer to Appendix A for details of the color entries.
- <START> - This element is a child element of the <FCA> container. The start time of the FEA/FCA in the format listed in <LASTUPDATE>.
- <END> - This element is a child element of the <FCA> container. The end time of the FEA/FCA in the format listed in <LASTUPDATE>.
- <EXTENDED> - This element is a child element of the <FCA> container. This indicates whether the FEA is an Extended FEA (TRUE or FALSE). This entry is only used for FEAs.
- <LOOK_AHEAD> - This element is a child element of the <FCA> container. It is the time (from current) that TFMS will determine FCA flights (with a range of 1 to 15 hours. This entry only applies to FCA flights.
- <FSM_ELIGIBLE> - This element is a child element of the <FCA> container. This indicates whether the FEA/FCA is eligible to be monitored by the Flight Schedule Monitor (FSM).
- <POLYGON> - This element is a child element of the <FCA> container and acts as a container element for a custom polygon delineated FEA/FCAs.¹
- <LINE> - This element is a child element of the <FCA> container and acts as a container element for a multi-segment line FEA/FCAs.
- <CIRCLE> - This element is a child element of the <FCA> container and acts as a container element for a circle delineated FEA/FCAs.
- <NAS> - This element is a child element of the <FCA> container and acts as a container element for a NAS element delineated FEA/FCAs.

¹ Note – Only one of these designators (POLYGON, LINE, CIRCLE, or NAS) is used for a designated FEA/FCA.

- <CEILING> - This element is a child element of the <POLYGON/LINE/CIRCLE> containers. It provides the upper altitude limit of the FEA/FCA in hundreds of feet from 000 (Surface) to 600 (60,000).
- <FLOOR> - This element is a child element of the <POLYGON/LINE/CIRCLE> containers. It provides the lower altitude limit of the FEA/FCA in hundreds of feet from 000 (Surface) to 600 (60,000).
- <POINTS> - This element is a child element of the <POLYGON/LINE/CIRCLE> containers. It details the points used to draw the FEA/FCA boundaries. Each point is latitude/longitude (separated by commas) in hundredths of degrees (Latitude is assumed North, Longitude West assumed). There may be up to 60 individual points, with multiples separated by a space.
- <DIRECTION> - This element is a child element of the <POLYGON/LINE> containers. This element provides direction of movement, if this is a moving FEA/FCA. It is in whole degrees (0 – 360).
- <SPEED> - This element is a child element of the <POLYGON/LINE> containers. This element provides speed of movement, if this is a moving FEA/FCA. It is in whole knots.
- <DRAWING> - This element is a child element of the <POLYGON/LINE> containers. If the FEA/FCA is a moving polygon/line, there will be one of two entries:
 - FALSE - if the points specified define the initial points of the line/polygon when it was drawn (not the start time of the FEA/FCA)
 - TRUE - if the points specified define the points of the line/polygon at the start time of the FEA/FCA (not the drawing time of the FEA/FCA).
- <CENTER> - This element is a child element of the <CIRCLE> container. This indicates the center point of a Circle FEA/FCA. It provides the latitude (in *DDmmL* (DD – degrees, mm – minutes, L – N or S), and longitude (*DDDmmL*).
- <RADIUS> - This element is a child element of the <CIRCLE> container. This element provides the radius of a Circle FEA/FCA, in nautical miles.
- <AIRPORT> - This element is a child element of the <NAS> container. This indicates the element category is an airport, and provides the airport name.
- <SECTOR> - This element is a child element of the <NAS> container. This indicates the element category is a dynamic-state sector, and provides the sector name.
- <BASE_SECTOR> - This element is a child element of the <NAS> container. This indicates the element category is a baseline-state sector, and provides the sector name.

- <TRACON> - This element is a child element of the <NAS> container. This indicates the element category is a dynamic-state TRACON, and provides the TRACON name.
- <BASE_TRACON> - This element is a child element of the <NAS> container. This indicates the element category is a baseline-state TRACON, and provides the TRACON name.
- <ARTCC> - This element is a child element of the <NAS> container. This indicates the element category is an ARTCC, and provides the ARTCC name.
- <FIX> - This element is a child element of the <NAS> container. This indicates the element category is a fix type, and provides the fix name.
- <SUA> - This element is a child element of the <NAS> container. This indicates the element category is a Special Use Area (SUA), and provides the SUA name.
- <FCA_DISPLAY_PREFERENCES> - This element is a child element of the <FCA> container and acts as a container for the <FCA_DISPLAY_PREFERENCES> elements.
- <FCA_TIMELINE> - This element is a child element of the <FCA_DISPLAY_PREFERENCES> container and acts as a container for the <FCA_TIMELINE> elements.
- <FCA_TIMELINE> - This element is a child element of the <FCA_TIMELINE> container. It provides the visible time range default value, in minutes.
- <VISIBLE_TIME_RANGE> - This element is a child element of the <FCA_TIMELINE> container. It provides the visible time range default value, in minutes.
- <FLIGHT_COUNT_UNIT> - This element is a child element of the <FCA_TIMELINE> container. It indicates the rule for flight count selection (PEAK, TOTAL, or ENTRY).
- <SELECTED_TIME_RANGE> - This element is a child element of the <FCA_TIMELINE> container. It provides the selected time range default value for displaying flights and flight data, in minutes.
- <LIST_SORT> - This element is a child element of the <FCA_DISPLAY_PREFERENCES> container and acts as container for the Dynamic List Sort options elements.
- <CTR_SORT_LEVEL> - This element is a child element of the <LIST_SORT> container and acts as container for the sorting options for the Sort Level. Note – there are ALWAYS containers for each of the three levels (from 1 (the highest) to 3 (the lowest)) even if there is no child element for that level.
- <SORT_LEVEL> - This element is a child element of the <CTR_SORT_LEVEL> container. It indicates which of the three Sort Levels this element set covers.

- <COLUMN_HEADER> - This element is a child element of the <CTR_SORT_LEVEL> container. This shows the column to be sorted, (or is blank if this sort level is unused) from the following list:
 - Abbreviated Route
 - Aircraft Type
 - Airline
 - Arrival Center
 - Arrival Time
 - Centers Traversed
 - Control Element
 - Controlled Arrival Time
 - Controlled Departure Time
 - Current Altitude
 - Current Center
 - Destination
 - Departure Center
 - Departure Time
 - Entry Time
 - Exit Time
 - FCA Indicator
 - Filed Speed
 - Flight Status
 - Full Route
 - NRP Indicator
 - Origin
 - Original Gate Time of Departure
 - Requested Altitude
 - RVSM
 - Time to Intersect
- <SORT_ORDER> - This element is a child element of the <CTR_SORT_LEVEL> container. It indicates which direction the column is to be sorted (ASCENDING or DESCENDING).
- <CTR_COLUMN_DISPLAY> - This element is a child element of the <FCA_DISPLAY_PREFERENCES> container and acts as a container for

defining all of the columns to be displayed by default in the FEA/FCA dynamic list.

- <CTR_COLUMN_DISPLAY> - This element is a child element of the <CTR_COLUMN_DISPLAY> container. This provides the name of the column data item, listed in the order to be displayed. The column types are detailed in the <COLUMN_HEADER> element above.
- <PRIMARY_FILTER> - This element is a child element of the <FCA> container. It acts as the container for the Primary Filter elements.

The FEA/FCA Filter uses a set of definitions, both for the Primary Filter listed above, (which is contained within the FEA/FCA primary file) and the Secondary Filters (which are extra files and are not always present.) The bulleted list below details the possible Filter Elements (These elements may be found in the Primary and Secondary Filters)

FEA/FCA Primary and Secondary Filter Element Definitions

- <CONDITIONS> - This element is a child element of the <PRIMARY_FILTER> container and acts as a container for conditions that make up the Filter. All of the filter conditions allow multiple entries within the element, and if there are multiple entries in an element, they will be separated by spaces.²
- <ANY> - This element is a child element of the <CONDITIONS> container and acts as a container for conditions that should be “OR”ed when filtering the flights.
- <ALL> - This element is a child element of the <CONDITIONS> container and acts as a container for conditions that should be “AND”ed when filtering the flights.
- <DEPARTS_ANY> - This element is a child element of the <ANY/ALL> container. Only flights departing one of the centers or airports on this list are included in the FEA/FCA.
- <DEPARTS_NONE> - This element is a child element of the <ANY/ALL> container. Flights departing one of the centers or airports on this list are excluded from the FEA/FCA.
- <ARRIVES_ANY> - This element is a child element of the <ANY/ALL> container. Only flights arriving at one of the centers or airports on this list are included in the FEA/FCA.

² Note - Filter conditions may be “AND’ed” or “OR’ed” to define the desired set of flights. Conditions that are “AND’ed” are grouped together in the ALL container; conditions that should be “OR’ed” are in the ANY container.

- <ARRIVES_NONE> - This element is a child element of the <ANY/ALL> container. Flights arriving at one of the centers or airports on this list are excluded from the FEA/FCA.
- <TRAVERSE_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that fly through **any** of the listed centers, sectors and/or fix names are included in the FEA/FCA.
- <TRAVERSE_ALL> - This element is a child element of the <ANY/ALL> container. Only flights that fly through **all** of the listed centers, sectors and/or fix names are included in the FEA/FCA.
- <TRAVERSE_NONE> - This element is a child element of the <ANY/ALL> container. Flights that fly through any of the listed centers, sectors and/or fix names are excluded from the FEA/FCA.
- <USE_AIRWAY_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that fly through **any** of the listed airway names are included in the FEA/FCA.
- <USE_AIRWAY_ALL> - This element is a child element of the <ANY/ALL> container. Only flights that fly through **all** of the listed airway names are included in the FEA/FCA.
- <USE_AIRWAY_NONE> - This element is a child element of the <ANY/ALL> container. Flights that fly through any of the listed airway names are excluded from the FEA/FCA.
- <LOCATED_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that are currently located within the listed center or sector names are included in the FEA/FCA.
- <LOCATED_NONE> - This element is a child element of the <ANY/ALL> container. Flights that are currently located within the listed center or sector names are excluded in the FEA/FCA.
- <TYPE_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that match the listed aircraft types are included in the FEA/FCA..
- <TYPE_NONE> - This element is a child element of the <ANY/ALL> container. Flights that match the listed aircraft types are excluded in the FEA/FCA.
- <REMARKS_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that file **any** of these remarks are included in the FEA/FCA.
- <REMARKS_ALL> - This element is a child element of the <ANY/ALL> container. Only flights that fly through **all** of these remarks are included in the FEA/FCA.

- <REMARKS_NONE> - This element is a child element of the <ANY/ALL> container. Flights that file any of these remarks are excluded from the FEA/FCA.
- <HEADING_IS> - This element is a child element of the <ANY/ALL> container. Only flights whose heading is within the specified tolerance of the specified heading are included in the FEA/FCA. Format is (heading 0 to 360 degrees), a space, then the tolerance (from 0 to 180 degrees).
- <HEADING_NOT> - This element is a child element of the <ANY/ALL> container. Only flights whose heading is within the specified tolerance of the specified heading are excluded from the FEA/FCA. Format as stated in <HEADING_IS>.
- <ACID_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that match the listed aircraft call signs (aircraft IDs) are included in the FEA/FCA.
- <ACID_NONE> - This element is a child element of the <ANY/ALL> container. Flights that match the listed aircraft call signs (aircraft IDs) are excluded in the FEA/FCA.
- <FLIGHT_LEVEL> - This element is a child element of the <ANY/ALL> container. This element presents the upper and lower flight altitude limits of the FEA/FCA, in hundreds of feet. Only flights that are within the specified flight levels are included in the FEA/FCA.
- <AIRCRAFT_CATEGORY_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that match the listed aircraft category (J – Jet, P – Prop, T – Turboprop) are included in the FEA/FCA.
- <WEIGHT_CLASS_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that match the listed weight class (S – Superheavy, H – Heavy, L – Light) are included in the FEA/FCA.
- <USER_CATEGORY_ANY> - This element is a child element of the <ANY/ALL> container. Only flights that match the listed user category (T – Air Taxi, G – General Aviation, C – Commercial, M – Military, F- Cargo) are included in the FEA/FCA.
- <STATUS> - This element is a child element of the <ANY/ALL> container. It indicates on of the following:
 - ACTIVE - FEA/FCA includes only airborne flights
 - PROPOSED, FEA/FCA includes only flights currently on the ground.
- <RVSM> - This element is a child element of the <ANY/ALL> container. One of two entries:
 - Compliant - FEA/FCA includes only flights that are RVSM compliant at the time they are in the FEA/FCA

- Non-Compliant - FEA/FCA includes only flights that are RVSM non-compliant at the time they are in the FEA/FCA
- <DEPARTURE_TIME_RANGE> - This element is a child element of the <ANY/ALL> container. Only flights with a departure time that falls within the given start and end times for the FEA/FCA are included in the FEA/FCA. Format for start and end times are given below, and are separated by a space in the element:
 - YYYY – Year (of file creation)
 - MM – Month
 - DD – Day
 - hh – Hour
 - mm – Minute
 - ss – Second
- <ARRIVAL_TIME_RANGE> - This element is a child element of the <ANY/ALL> container. Only flights with an arrival time that falls within the given start and end times for the FEA/FCA are included in the FEA/FCA. Format is the same as given in <DEPARTURE_TIME_RANGE> above.

In addition, the Secondary Filter files may have the following elements, detailed in the bulleted list below:

Secondary FEA/FCA Filter Definitions

- <?xml version="2.1" standalone="yes" ?> - This element indicates the XML version number and standalone status.
- <SECONDARY_FILTER> - This element acts as the container for the FEA/FCA Secondary Filter elements.
- <INDEX_INFO> - This element is a child element of the <SECONDARY_FILTER> container. This element is a legacy ETMS entry and is ignored by TFMS
- <FILTER_ID> - This element is a child element of the <SECONDARY_FILTER> container. It is a computer-generated text string that acts as the unique identification of the Secondary Filter.
- <FCA_ID> - This element is a child element of the <SECONDARY_FILTER> container. It identifies the FEA/FCA the Secondary Filter is associated with.
- <NAME> - This element is a child element of the <SECONDARY_FILTER> container. It is the name of the FEA/FCA assigned by the user. Note – This name must be unique within the set of Secondary Filter files, allowing for no duplication of names.

- <DOMAIN> - This element is a child element of the <SECONDARY_FILTER> container. The domain for TFMDI FEA/FCA data is PUBLIC.
- <FCA_DOMAIN> - This element is a child element of the <SECONDARY_FILTER> container. The domain associated FEA/FCA data, which is PUBLIC.
- <LASTUPDATE> - This element is a child element of the <SECONDARY_FILTER> container. This provides the date and time the FEA/FCA was last updated. The format is a fourteen digit number in the following format *YYYYMMDDhhmmss*:
 - *YYYY* – Year (of file creation)
 - *MM* – Month
 - *DD* – Day
 - *hh* – Hour
 - *mm* – Minute
 - *ss* – Second
- <UP_WKSTN> - This element is a child element of the <SECONDARY_FILTER> container. It indicates the ID of the workstation used to last update the FEA/FCA Secondary Filter.
- <UP_SITE> - This element is a child element of the <SECONDARY_FILTER> container. It indicates the ID of the site used to last update the FEA/FCA Secondary Filter.
- <CR_WKSTN> - This element is a child element of the <SECONDARY_FILTER> container. It indicates the ID of the workstation used to create the FEA/FCA Secondary Filter.
- <CR_SITE> - This element is a child element of the <SECONDARY_FILTER> container. It indicates the ID of the site used to create the FEA/FCA Secondary Filter.
- <SHOW> - This element is a child element of the <SECONDARY_FILTER> container. It indicates whether the FEA/FCA Secondary Filter should be shown by default (Y or N)
- <PRIORITY> - This element is a child element of the <SECONDARY_FILTER> container. It indicates the priority of the Secondary Filter. It is an integer value (or -1 if no priority is assigned) which corresponds to the default order the Secondary Filters are applied and displayed. Filters are displayed from the top down starting with filter number 1. If a particular flight matches more than one filter, it is displayed as belonging to the higher filter.

- Filter Definition – After these elements, the Secondary Filter then employs the common filter elements defined under FEA/FCA Primary and Secondary Filter Element Definitions.

3.2.1.3.3 Information Unit Segmentation

No segmentation is necessary for the TFMS-to-TFMDI interface.

3.2.1.3.4 Direction of Information Flow

Information flow in the TFMS-to-TFMDI interface is bidirectional. The TFMDI Client sends a request for data, and TFMS returns the requested data.

3.2.1.3.5 Frequency of Transmission

TFMS-to-TFMDI interface frequencies are listed in Table 3-III.

3.2.1.3.6 Responses

TFMS responds to specific HTTP GET requests from Clients by transferring the appropriate requested data files. No other responses are provided or expected.

3.2.1.4 Quality of Service

Not Applicable.

3.2.1.5 AP Error Handling

No specific error handling is imposed for the transfer of TFMDI data. Any data which is not useable can be downloaded again.

3.2.1.6 Interface Summary Table

Table 3-II 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 name of the data transferred and the direction of flow. The right hand column lists the TFMDI AP.

Table 3-II. TFMS-to-TFMDI Interface Summary Table

| Subsystem A TFMS AP | Data | Direction | Subsystem B TFMDI AP |
|--|---------------------------|-----------|------------------------------|
| External Portal Message Interface Server | HTTP 'GET' Request | A←B | TFMDI Client-Developed AP |
| External Portal Message Interface Server | TFMDI Index | A→B | TFMDI Client-Developed AP |
| External Portal Message Interface Server | TFMDI Public Reroute File | A→B | TFMDI Client-Developed AP |

| Subsystem A TFMS AP | Data | Direction | Subsystem B TFMDI AP |
|--|---------------------------|-----------|------------------------------|
| External Portal Message Interface Server | TFMDI Public FEA/FCA File | A→B | TFMDI Client-Developed AP |

3.2.2 Protocol Implementation

The TFMS-to-TFMDI interface communications functions will be 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 protocols implemented for each layer of the interface. For the layers not used, this text will be used "This layer is not implemented within the TFMS-to-TFMDI interface."

- a. Application Layer (Layer 7) - The TFMS-to-TFMDI uses Hypertext Transfer Protocol (HTTP) as the Application layer.
- b. Presentation Layer (Layer 6) - This layer is not implemented within the TFMS-to-TFMDI interface.
- c. Session Layer (Layer 5) - This layer is not implemented within the TFMS-to-TFMDI interface.
- d. Transport Layer (Layer 4) - The TFMS-to-TFMDI interface uses the TCP as its Transport layer protocol.
- e. Network Layer (Layer 3) - The TFMS-to-TFMDI interface uses the standard IP as its Network layer protocol.
- f. Data-Link Layer (Layer 2) - The TFMS-to-TFMDI 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 TFMS-to-TFMDI interface uses a standard Category 5 (Cat-5) Ethernet cable as its Physical layer protocol for FTI ED-8 Clients and a standard RS-232 communications cable for AOCNET WAN Clients.

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

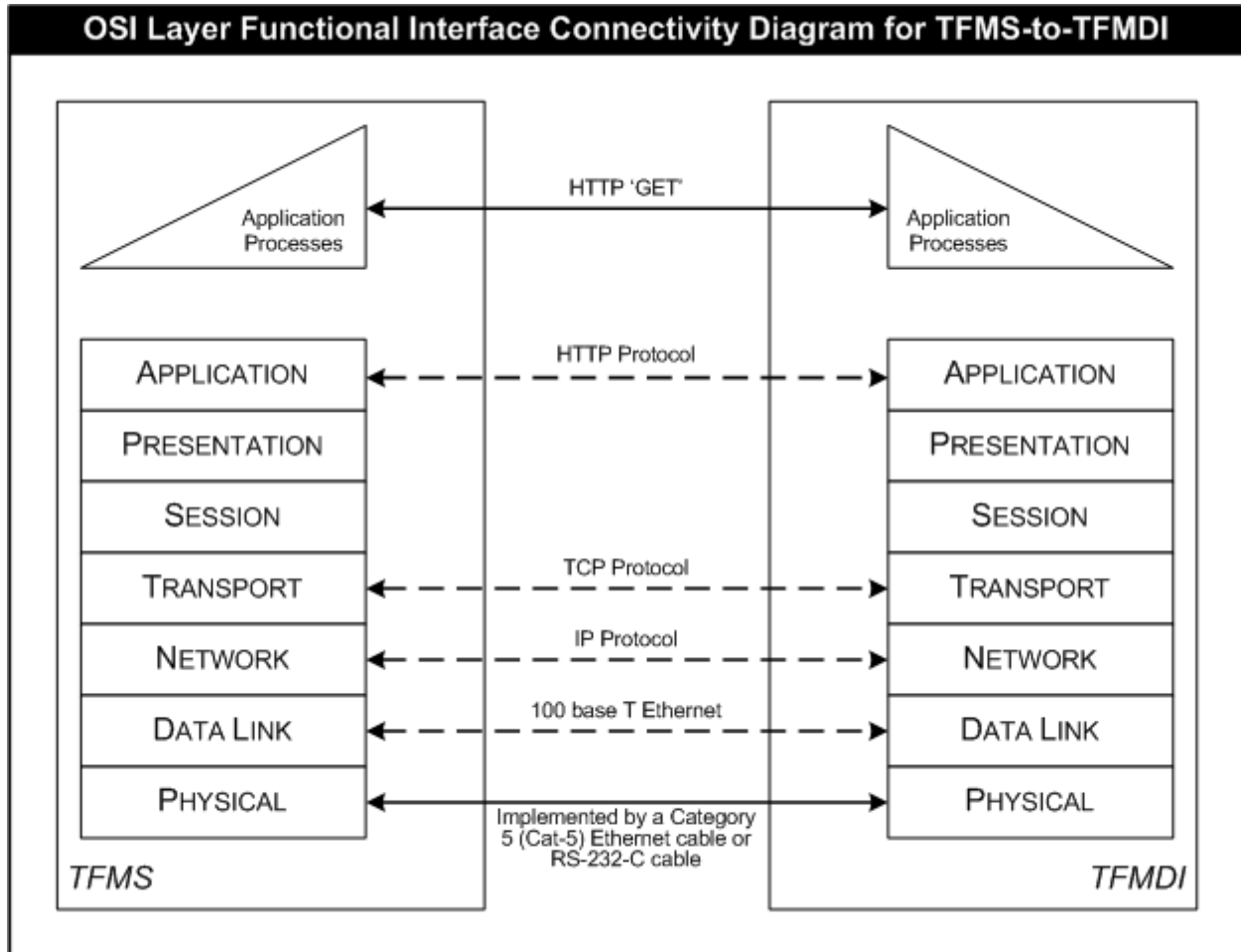


Figure 3-2. OSI Layer Functional Interface Connectivity Diagram for TFMS-to-TFMDI

3.2.2.1 Application Services

Once per minute, each TFMDI Client begins the process below, following these procedural steps to obtain TFMDI data:

1. TFMDI Client sends a HTTP GET request and retrieves the TFMDI Index data from TFMS.
2. After checking the TFMDI Index data for the time and date of the most recent update, the TFMDI Client either:
 - a. Determines their TFMDI data is current and no update needs to be retrieved.
 - b. Determines there is an update and proceeds to Step 3.
3. If there is a more recent update for one of the TFMDI data files, the TFMDI Client uses a HTTP GET to retrieve the appropriate data (Public Reroute, Public FCA/FEA, or both.)
4. The TFMDI Client repeats Steps 1 through 3 as necessary to obtain current data.

3.2.2.2 Network Services

The TFMS-to-TFMDI interface uses the established standards of HTTP in accordance with RFC 2616, Hypertext Transfer Protocol -- HTTP/1.1, Transmission Control Protocol (TCP) in accordance with RFC 793, Transmission Control Protocol, and Internet Protocol (IP) in accordance with RFC 791, Internet Protocol.

3.2.2.3 Naming and Addressing

TFMDI Clients are provided two operational IP addresses, one for each of the operational TFMDI servers. The servers that are accessed by these two IP addresses are equivalent (not a primary/backup systemology). Clients can access either server and will get the same data, apart from minor differences due to timing.

Each TFMDI Client is identified within the TFMDI system, so that only designated authorized clients can retrieve the data. Refer to the Information Systems Security Plan (ISSP) for Traffic Flow Management–Modernization (TFM-M) for further detailing on identification and authentication of TFMDI Clients.

The addresses of the data files are provided in their individual sections above.

3.2.3 Security

TFMS implements FAA information security guidelines in accordance with the 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 and outgoing information into TFMS.

3.2.4 Interface Design Characteristics Table

Subsection 3.2.4 summarizes the interface functional characteristics in an interface design characteristics table or matrix in addition to the text. The Interface Design Characteristics Table serves as a "quick-look" reference.

Table 3-III. Interface Design Characteristics of the TFMS-to-TFMDI Interface

| Message Name | Format | Size (Bytes) | Time Constraints | Frequency |
|-----------------------|--------|--------------|------------------|-------------|
| Ref: ETMS-TFMDI-003 | | | | |
| HTTP 'GET' Request | HTTP | | None | As Req |
| TFMDI Index | XML | 493/501* | None | 1 minute |
| TFMDI Public Reroutes | XML | 2111/5666* | None | 5 minutes** |
| TFMDI Public FEA/FCAs | XML | 969/6006 | None | 5 minutes** |

| Message Name | Format | Size (Bytes) | Time Constraints | Frequency |
|---|--------|--------------|------------------|-----------|
| *Note – Some entries in these messages are variable, and may require more than one of any particular entry tag. The given maximum is valid if all entries do not exceed one entry tag. | | | | |
| **Note – This is the minimum update time for the particular data. The Client will determine whether to download these files based on whether the file has updated, according to the TFMDI Index file. | | | | |

3.3 Physical Design Characteristics

The TFMS-to-TFMDI uses two different communication paths to transmit and receive data (illustrated in Figure 3-3):

- TFMDI Clients using the AOCNET WAN interface with the Dataprobe WAN Fallback Switch (designated AB-TAPS) for the physical interface. The data flows through the Cisco 7206 Router/Switch (designated EXTRTR) which acts as a gateway to the subsystems of the TFMS. The data is passed through the Firewall into the External Portal Message Interface Server, an HP ProLiant DL380 (designated PRSR_3). The physical demarcation point is the AB-TAPS switch.
- TFMDI Clients using the ASDI Vendor system require a connection to the ASDI system. ASDI interfaces with TFMS using the ED-8 gateway, connecting to ports on the two Cisco Catalyst 3560G switches (designated SWPT_4) on the TPC side of the interface. The data flows through the Cisco 7206 Router/Switch (designated EXTRTR) and follows the same path into the TFMS subsystems as the AOCNET WAN Clients.

Note – The Demarcation points are shown as a large dot in Figure 3-3.

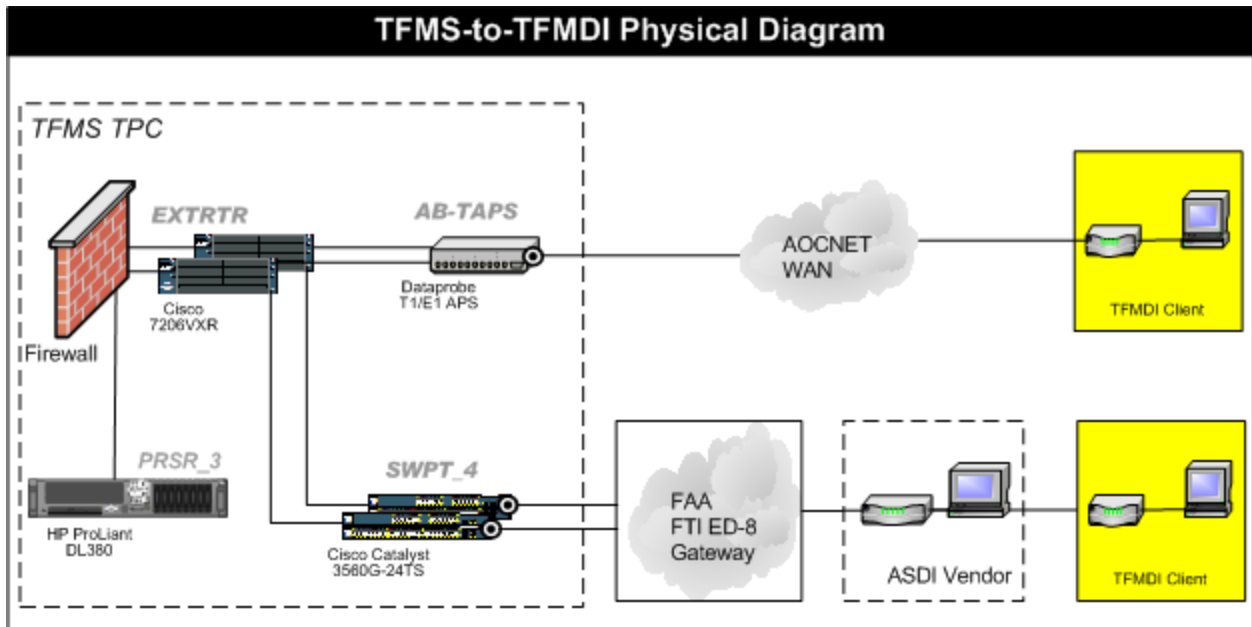


Figure 3-3. TFMS-to-TFMDI Physical Diagram

3.3.1 Electrical Power and Electronic Characteristics

There are no specific 3.3.1 characteristics applicable to the TFMS-to-TFMDI interface.

3.3.1.1 Connectors

The TFMS-to-TFMDI interface used by AOCNET WAN Client employs a standard RS-232 connector as the interface connection. Standard RS-232 pin assignments are used in this case.

The TFMS-to-TFMDI interface used by the ASDI Vendor employs a standard RJ-45 Ethernet connector as the interface connection. Standard RJ-45 pin assignments are used in this case.

3.3.1.2 Wire/Cable

Standard RS-232 communication cable is used for the TFMS-to-TFMDI interface instances used by the AOCNET WAN.

Standard Cat-5 Ethernet cabling with RJ-45 connectors is used for the TFMS-to-TFMDI interface instances used by the ASDI Vendors.

3.3.1.3 Electrical Power/Grounding

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

3.3.1.4 Fasteners

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

3.3.1.5 Electromagnetic Compatibility

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

4 Verification Provisions

4.1 Responsibility for Verification

Following are the verification provisions for the TFMS-to-TFMDI interface.

1. Each project is required to perform conformance testing.
2. Each project is required to perform interoperability testing at an FAA-approved test facility.
3. Noninterference testing will be conducted on the TFMS-to-TFMDI interface.

4.2 Special Verification Requirements

No special verification requirements exist for this ICD.

4.3 Verification Requirements Traceability Matrix (VRTM)

No VRTM is applicable to this ICD.

5 Preparation for Delivery

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

6 Notes

6.1 Definitions

None

6.2 Abbreviations and Acronyms

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

| | |
|--------|--|
| AFP | Airspace flow Program |
| ANSI | American National Standards Institute |
| AOCNET | Airline Operation Center Network |
| AP | Application Process |
| ARTCC | Air Route Traffic Control Center |
| ASCII | American Standard Code for Information Interchange |
| ASDI | Aircraft Situation Display to Industry |
| CDM | Collaborative Decision Making |
| DEST | Destination |
| DID | Data Item Description |
| ETMS | Enhanced Traffic Management System |
| FAA | Federal Aviation Administration |
| FCA | Flow Constrained Area |
| FEA | Flow Evaluation Area |
| FSM | Flight Schedule Monitor |
| FTI | Federal Telecommunications Infrastructure |
| FTP | File Transfer Protocol |
| HTTP | Hyper Text Transfer Protocol |
| ICD | Interface Control Document |
| IEC | International Electrotechnical Commission |
| IEEE | Institute of Electrical and Electronics Engineers |
| IP | Internet Protocol |
| IRD | Interface Requirements Document |
| IRS | Interface Requirements Specification |
| ISO | International Organization for Standardization |
| ISSP | Information System Security Plan |
| MSL | Mean Sea Level |

| | |
|--------|---|
| NAS | National Airspace System |
| NAVAID | Navigational Aide |
| NRP | North American Route Program |
| OAG | Official Airline Guide |
| ORIG | Originating |
| OSI | Open Systems Interconnect |
| RGB | Rd/Green/Blue |
| RFC | Request For Comment |
| RVSM | Reduced Vertical Separation Minimum |
| SSS | System/Subsystem Specification |
| STD | Standard Practice |
| SUA | Special Use Are |
| TCP | Transmission Control Protocol |
| TFM | Traffic Flow Management |
| TFMI | Traffic Flow Management Infrastructure |
| TFM-M | Traffic Flow Management – Modernization |
| TFMM | Traffic Flow Management Modernization |
| TFMDI | Traffic Flow Management Data to Industry |
| TFMS | Traffic Flow Management System |
| TPC | TFM Production Center |
| VRTM | Verification Requirements Traceability Matrix |
| WAN | Wide Area Network |
| XML | Extensible Markup Language |
| XSD | XML Schema Definition |

Appendix A TFMDI Color Table

The display of TFMDI data requires a defined color palette, represented in the data files as a Color ID code, in the XML tag <COLOR_ID>. Table A-I below defines the color IDs, the color names, and the Red-Green-Blue (RGB) values. This table was extracted from the Volpe document *Traffic Flow Management Data to Industry: Interface Control Document, Version 1.7, 9 May 2007, Appendix A*.

Table A-I. TFMDI Color Code Table

| Color Code | Color Name | Red | Green | Blue |
|------------|---------------|-----|-------|------|
| 0 | Black | 0 | 0 | 0 |
| 1 | Gray40 | 102 | 102 | 102 |
| 2 | Gray60 | 153 | 153 | 153 |
| 3 | azure3 | 193 | 205 | 205 |
| 4 | White | 255 | 255 | 255 |
| 5 | AntiqueWhite2 | 238 | 223 | 204 |
| 6 | red4 | 139 | 0 | 0 |
| 7 | red1 | 255 | 0 | 0 |
| 8 | OrangeRed | 255 | 69 | 0 |
| 9 | Coral | 255 | 114 | 86 |
| 10 | LightPink | 255 | 182 | 193 |
| 11 | bisque | 255 | 228 | 196 |
| 12 | purple3 | 125 | 38 | 205 |
| 13 | Plum | 197 | 72 | 155 |
| 14 | magenta3 | 205 | 0 | 205 |
| 15 | VioletRed1 | 255 | 62 | 150 |
| 16 | plum1 | 255 | 187 | 255 |
| 17 | LightCyan | 224 | 255 | 255 |
| 18 | RoyalBlue4 | 39 | 64 | 139 |
| 19 | Blue | 0 | 0 | 255 |
| 20 | SteelBlue3 | 79 | 148 | 205 |
| 21 | SkyBlue | 114 | 159 | 255 |
| 22 | Cyan | 0 | 255 | 255 |
| 23 | PaleTurquoise | 175 | 238 | 238 |
| 24 | OliveDrab4 | 105 | 139 | 34 |
| 25 | LimeGreen | 0 | 175 | 20 |
| 26 | DarkSeaGreen | 143 | 188 | 143 |
| 27 | khaki3 | 205 | 198 | 115 |

| Color Code | Color Name | Red | Green | Blue |
|-------------------|----------------------|------------|--------------|-------------|
| 28 | LightSeaGreen | 32 | 178 | 170 |
| 29 | chartreuse | 127 | 255 | 0 |
| 30 | chocolate3 | 205 | 102 | 29 |
| 31 | Orange | 255 | 135 | 0 |
| 32 | Gold | 218 | 170 | 0 |
| 33 | LightSalmon1 | 255 | 160 | 122 |
| 34 | Yellow | 255 | 255 | 0 |
| 35 | LightGoldenrodYellow | 250 | 250 | 210 |