



U.S. Department  
of Transportation

**Federal Aviation  
Administration**


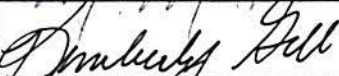
## **JAVA Messaging Service Description Document**

### **SWIM Terminal Data Distribution System (STDDS)**

### **Surface Movement Event Service (SMES)**

JAVA Messaging Service Description Document  
STDDS Surface Movement Event Service

Approval Signatures

Name	Organization	Signature	Date Signed
AJM	Enterprise Programs		3/29/17
ANG	NAS Requirements and Interface Management Group		4/3/17

JAVA Messaging Service Description Document  
STDDS Surface Movement Event Service

Revision Record

<b>Revision</b>	<b>Description</b>	<b>Revision Date</b>	<b>Entered By</b>
	Updated baseline for R3.2 (CCD N35889)	11/30/2015	King
A	Updated for R3.3 changes	1/19/2017	King

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## **1 SCOPE**

This JAVA Messaging Service Description Document (JMSDD) describes the System Wide Information Management (SWIM) Terminal Data Distribution System (STDDS) Surface Movement Event Service (SMES) for SWIM. The SMES publishes surface track data received from the Airport Surface Detection Equipment Model X (ASDE-X) and Airport Surface Surveillance Capability (ASSC) to authorized SWIM service consumers via the National Airspace System (NAS) Enterprise Messaging Service (NEMS). In addition, SMES extracts surface movement events from the ASDE-X/ASSC surveillance data (e.g. spot out, takeoff, landing, spot in) and sends this data to authorized SWIM service consumers via NEMS. The SMES also publishes safety logic alert reports, safety logic hold bar messages and status generated from ASDE-X/ASSC. This JMSDD was prepared in accordance with Federal Aviation Administration (FAA) Standard (STD) FAA-STD-073 and satisfies that the implementation of the STDDS SMES complies with the STDDS Web Services Requirements Document (WSRD), developed in accordance with FAA-STD-070.

### **1.1 Background**

STDDS provides Service Oriented Architecture (SOA) interfaces for tower and Terminal Radar Approach Control (TRACON) systems to send terminal events to the NEMS for subscription by NAS and non-NAS consumers using SWIM compliant infrastructure and interface standards. The STDDS interfaces with Runway Visual Range (RVR) system, Electronic Flight Strip Transfer System (EFSTS), ASDE-X system, ASSC system, and Tower Data Link Service (TDLS) system at airports to accept, derive and publish airport information.

The STDDS also interfaces with the STARS General NAS User Services (GeNUS) interface at TRACONs.

The Infrastructure, System Monitor and Control (ISMC) service publishes status information for all external links at an STDDS site. This service also publishes detailed information about the overall STDDS status.

### **1.2 Intended Use**

This JMSDD is intended to be used by clients of the STDDS SMES to facilitate the development and operation of service client applications. It may also be used by the FAA staff who may administer these services.

## 2 APPLICABLE DOCUMENTS

### 2.1 Government Documents

[FAA-STD-063] XML Namespaces, 1 May 2009.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-063.pdf>

[FAA-STD-064] Web Service Registration, 1 May 2009.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-064.pdf>

[FAA-STD-073] Preparation of Java Message Service Description Document, W3C Working Draft, 29 January 2014.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-073.pdf>

[FAA-STD-066] Web Service Taxonomies, 26 February 2010.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-066.pdf>

[FAA-STD-068] Preparation of Standards, 4 December 2009.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-068.pdf>

[NAS-WSRD-4307-001] SWIM Terminal Data Distribution System (STDDS) Web Services Requirements Document (WSRD), R3.3 Rev A, 15 February, 2017.

[NAS-IC-XXXXXXXXXX] NAS Enterprise Messaging Service (NEMS) Asynchronous Messaging Interface Control Document (ICD), Rev 4 Draft, 17 June 2013.

[ASSC 790-034480] Interface Control Document (ICD) Airport Surface Surveillance Capability (ASSC) Data Distribution (DD) to End Users, Version 3(A) Draft, March 16, 2016.

[790-010712] Interface Control Document for Airport Surface Detection Equipment (ASDE-X) Data Distribution (DD) to End Users, version 13(M), 28 August 2014.

[NAS-JMSDD-4307-002] JMSDD STDDS Infrastructure System Monitor and Control (ISMC), Rev A, 19 January 2017.

### 2.2 Non-Government Standards and Other Publications

[W3C XML Recommendation] World Wide Web Consortium eXtensible Markup Language (XML) Version 1.9, Fifth edition, 26 Nov 2008. <http://www.w3.org/TR/2008/REC-xml-20081126/>

[IEE 802.3] Information Technology – Telecommunication & Information Exchange between Systems – LAN/MAN – Specific Requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, 2002.



[WSDR] Web Services Description Requirements, W3C Working Draft, 28 October 2002.  
<http://www.w3.org/TR/2002/WD-ws-desc-reqs-20021028/>

[RFC 2119] Key words for Use in RFCs to Indicate Requirement Levels, Network Working Group, March 1997. <http://www.rfc-editor.org/rfc/rfc2119.txt>

[ISO/IEC 11179-1] Information Technology – Metadata Registries (MDR) – Part 1: Framework, 15 September 2004. <http://metadata-standards.org/11179/>

[WS Glossary] Web Services Glossary, W3C Working Draft, 14 November 2002.  
<http://www.w3.org/TR/2002/WD-ws-gloss-20021114/>

[WSA] Web Services Architecture, W3C Working Group Note, 11 February 2004.  
<http://www.w3.org/TR/ws-arch>

### **3 DEFINITIONS**

#### **3.1 Terminology**

Within the SWIM service-oriented architecture (SOA) environment, there are key elements that must be defined to properly identify boundaries, functionality, and components. The key high-level entities are identified in the list below:

- Client
- Service
- Service Interface Implementation
- NAS Enterprise Messaging Service (NEMS)

##### **3.1.1 Client**

A client is an external entity that interacts with a service. A client makes a request of a service and receives a response from the service. The client may also request a subscription and receive messages when a service publishes information. A client may be a software system, software application, or another service. A client may be a NAS client or a non-NAS client. It should be noted that the terms “consumer” and “end-user” can be and are used interchangeably with “client”.

##### **3.1.2 Service**

In the most general sense, a service is a set of functionality that is performed upon demand based upon a defined interface. A defined request must be provided by the client that invokes the service, and the service returns a defined response to the client. For the STDDS environment, a service is a combination of software components running on the STDDS Application Server and the NEMS. At a minimum, the service requires an XML message that is transported over TCP/IP. In this context, "service" refers to all of the implementation components including the service interface implementation and the service logic.

##### **3.1.3 Service Interface Implementation**

The service interface implementation is the hardware and software that handles the interaction between the client and the rest of the service. The definition and the implementation are independent of each other. It is possible to maintain the same service interface definition and replace the implementation. The Publish/Subscribe service interface implementation is based on the software in the NEMS.

##### **3.1.4 NEMS**

NEMS contains the consumer topics used to provide the appropriate information to a consumer of the Publish/Subscribe service. STDDS will publish data onto queues on the NEMS. Consumers will connect to NEMS to retrieve data from their subscribed topic(s).

### 3.2 Abbreviations and Acronyms

AIG	Application Interface Gateway
APDS	Airport Data Service
API	Application Programming Interface
ARTCC	Air Route Traffic Control Center
ASCII	American Standard Code for Information Interchange
ASDE-X	Airport Surface Detection Equipment Model X
ASSC	Airport Surface Surveillance Capability
EFSTS	Electronic Flight Strip Transfer System
FAA	Federal Aviation Administration
FNTB	FTI National Test Bed
FTI	FAA Telecommunications Infrastructure
GeNUS	General NAS User Services
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IP	Internet Protocol
ISMC	Infrastructure System Monitor and Control
ISO	International Standards Organization
JMS	Java Messaging Service
JMSDD	Java Messaging Service Description Document
MTBF	Mean Time Between Failures
NA	Not Applicable
NA	Not Adapted (airport)
NAS	National Airspace System
NEMS	NAS Enterprise Messaging Service
NSRR	NAS Service Registry Repository
PM	Program Manager
R&D	Research and Development
RVR	Runway Visual Range
SMES	Surface Movement Event Service
SOA	Service Oriented Architecture
SPI	Special Purpose Indicator

SSD	System Specification Document
SSI	Sensitive Security Information
STD	Standard
STARS	Standard Terminal Automation Replacement System
STDDS	SWIM Terminal Data Distribution System
SUI	Sensitive Unclassified Information
SWIM	System-Wide Information Management
TCP	Transmission Control Protocol
TDLS	Tower Data Link Service
TRACON	Terminal Radar Approach Control facility
URL	Uniform Resource Locator
UTC	Universal Time Coordinated/ Coordinated Universal Time
WJHTC	William J. Hughes Technical Center
WSRD	Web Services Requirements Document
XML	eXtensible Markup Language

#### 4 Service Profile

This section provides the information needed to discover and use the STDDS SMES.

Service Profile	
<b>Name</b>	STDDS Surface Movement Event Service
<b>Description</b>	The Surface Movement Event Service publishes derived surface movement events for all aircraft monitored at towers associated with a STDDS TRACON. The service also publishes track positions for all aircraft and vehicles collected from towers associated with a STDDS TRACON. Track positions originate from ASDE-X/ASSC System Track Reports (CAT11), Multilaterated (MLAT) Plot Reports (CAT10), or Automatic Dependent Surveillance-Broadcast (ADS-B) Plot Reports (CAT10). In addition, the service publishes safety logic alert reports and safety logic hold bar messages.
<b>Namespace</b>	urn:us:gov:dot:faa:atm:terminal:entities:v3-0:smes
<b>Version</b>	3.0
<b>Service category</b>	FAA-STD-066 category 1.3.1.2.1, Air Traffic Command and Control Information Exchange Service
<b>Lifecycle stage</b>	Production
<b>Service criticality</b>	Essential

#### 4.1 Service Provider

The STDDS SMES is provided by FAA Air Traffic Organization (ATO), Enterprise Programs.

##### 4.1.1 Point of Contact

Point of Contact	
<b>Name</b>	Melissa Matthews
<b>Organization</b>	Federal Aviation Administration Enterprise Programs
<b>Title</b>	SWIM Capabilities Manager
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<b>Email</b>	Melissa.Matthews@faa.gov

#### 4.2 Service Consumers

The potential clients for the STDDS SMES services are authorized NAS and non-NAS end-users. SMES is available for both NAS and non-NAS users.

STDDS will provide sample client applications as reference models. However clients are responsible for implementing their own applications to consume SMES data.

### 4.3 Service Functionality

STDDS SMES publishes the data listed below. For more information about individual message types see section 5.3.

- Publishes Derived spot out, off (takeoff), on (landing), spot in events from surface surveillance (SurfaceMovementEventMessage)
- Publishes ASDE-X or ASSC CAT11 System track message (ASDEXMessage)
- Publishes ASDE-X or ASSC System Status message (ASDEXMessage)
- Publishes ASDE-X or ASSC CAT10 MLAT Plot Report (ASDEXMessage)
- Publishes ASDE-X or ASSC CAT10 ADS-B Plot Report (ASDEXMessage)
- Publishes ASDE-X or ASSC Safety Logic Alert Report (SafetyLogicAlertReport)
- Publishes ASDE-X or ASSC Safety Logic Hold Bar message (SafetyLogicHoldBarMessage)

### 4.4 Security

NEMS manages all security features for Publish/Subscribe services for authorized NAS and non-NAS consumers and NAS producers.

Access controls are supported through the use of username and password credentials supplied when establishing connections to NEMS interfaces. Username and password credentials are unique to each NEMS client and established during on-ramping.

STDDS obtains updated Sensitive Flight Data (SFD) identification files via the FAA Aeronautical Data Exchange (ADX) website on a periodic basis or as directed by System Operations Services (AJR) for time critical requirements. Following the FAA-approved Security Program for Sensitive Flight Data Identification, the STDDS SMES uses the information in those files to mark, or tag, service messages as containing sensitive or non-sensitive flight data. During the SWIM on-boarding process, each client is authorized to receive either sensitive or non-sensitive flight data, and is configured accordingly when on-ramped to NEMS. NEMS uses the client configuration and each message’s “sendTo” tag to ensure messages with sensitive flight data are only sent to clients authorized to receive sensitive flight data. Flight data marked as sensitive under this FAA Security Program is Sensitive Security Information (SSI) in accordance with 49 CFR 15.5(a)(16) and 49 USC 40119(a) and must be protected in accordance with FAA Order 1600.75, Protecting Sensitive Unclassified Information (SUI).

### 4.5 Qualities of Service

STDDS SMES Quality of Service parameters are listed in the following table.

**Table 1 : Quality of Services Parameters**

QoS Parameter	Value	Unit	Definition	Calculation
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QoS Parameter	Value	Unit	Definition	Calculation
Availability	0.999	ratio	The probability that a system or constituent piece may be operational during any randomly selected instant of time. (Definition from NAS-RD-2012)	$MTBF/(MTBF + MDT)$
Data Latency	1 second (mean) and 5 seconds (95 <sup>th</sup> percentile)	seconds	Time interval from the time an input message is received and a corresponding message is published to NEMS.	Continuous measurement
NEMS Re-connection Time	3	Minutes	Maximum time interval from the time a connection failure to NEMS occurs to the time that the STDDS has reconnected to NEMS.	Continuous measurement

#### 4.6 Service Policies

No specific service policies are applied to the STDDS SMES.

#### 4.7 Environmental Constraints

This service covers three NEMS operating environments:

- 1) Research & Development (R&D) NEMS at Melbourne, Florida
- 2) FAA Telecommunications Infrastructure (FTI) National Test Bed (FNTB) NEMS at WJHTC
- 3) NAS-OPS NEMS deployed to ARTCCs.

**Table 2 : Environmental Constraints**

<b>Service Constraints</b>	FTI environment
<b>Deployed NEMS Environment</b>	R&D, FNTB and NAS-OPS
<b>Message Producer Type</b>	NAS application
<b>Record Type</b>	Live

## 5 Service Interfaces

The following sections provide detailed information about the types and content of messages that the STDDS SMES publishes. The service is also described in terms of the interfaces that it communicates with.

### 5.1 Interface

The STDDS SMES follows the “point to point” messaging model and employs a single queue interface to NEMS, through which all published data can be subscribed to and received. Each client interested in subscribing to STDDS SMES data establishes a connection to a custom data topic provided by NEMS and defined during on-ramping.

### 5.2 Operations

STDDS SMES publishes surface track data derived from system surface radar and multilaterated reports received from ASDE-X as well as multilaterated reports received from ASSC. STDDS SMES extracts surface movement event data (e.g. spot out, takeoff, landing, spot in) from the input surface track data and publishes it to authorized SWIM consumers via NEMS. In addition STDDS SMES publishes status, safety logic alert report and hold bar data provided by ASDE-X or ASSC. SMES data may contain only ASDE-X data, only ASSC data or a combination of the two.

#### 5.2.1 Processing Considerations

While processing input from ASDE-X/ASSC, STDDS SMES determines if the given data contains sensitive information. Sensitive data includes military flights, flights operated on behalf of foreign dignitaries, state governors, law enforcement agencies, and private citizens who have requested the FAA to consider their flight to be sensitive. NEMS uses the routing information in the output message header to determine the authorized recipient of the data.

Input ASDE-X/ASSC surface track data and derived surface movement event data is evaluated for sensitivity and tagged accordingly:

- Messages that do not contain sensitive information are published with a designation of “all” in the “sendTo” message header field and are sent to all end-users, NAS and non-NAS.
- Messages containing sensitive information are published with a designation of “authorized” in the “sendTo” message header field and are sent only to authorized users, generally NAS users.
- Copies of messages containing sensitive information are published with the sensitive information anonymized and the “sendTo” message header field set to “filtered”, and are sent only to NAS users.  
Note: STDDS will correct the “filtered” tag to a more appropriate value (e.g. “anonymized”) in the next software release.

Input ASDE-X/ASSC surface track data is published as position reports in XML format by the STDDS SMES. To improve bandwidth, position reports are delta encoded and batched when they are published. The first time a track is seen, or every configurable interval, all data fields are filled out in the published messages. The “full” attribute for such messages is set to true.



Subsequent position report messages contain only fields whose values have changes from the previous published message. The “full” attribute for such messages is set to false. If a field has been removed from the previous track report, the field is marked with a removed attribute (r=”1”) and contains the previous value received if necessary for the output XML to be valid. Position reports are also grouped into batches. A batch is sent out to NEMS when either a configurable number of milliseconds have elapsed since the last batch or a maximum number of messages have been added to the current batch. Batches are separated by ASDE-X/ASSC airport and sensitivity.

ASDE-X/ASSC status messages, ASDE-X/ASSC safety logic hold bar messages and SMES status messages contain no sensitive information and are published with a designation of “all” in the “sendTo” message header field.

ASDE-X/ASSC safety logic alert reports contain sensitive information and are published with a designation of “authorized” in the “sendTo” message header field.

STDDS publishes MLAT and ADSB Plot Reports which are located in the non-movement area of an airport.

### 5.3 Messages

The foundation for the external message format for STDDS SMES is based upon the W3C XML standard. Publish/Subscribe services deliver messages using an asynchronous message exchange pattern. The following messages are published by STDDS SMES via NEMS. Each message has a header and a payload. The header contains routing data used by NEMS to deliver messages to the correct subscriber. Note that the MsgType column defines the two character abbreviation that is used in the JMS header to delineate the message type.

**Table 3 : List of Messages**

Name	Definition	MsgType
ASDEXMessage	Sent upon the receipt of a System Track message, a Status message, an ADS-B Plot Report, or a MLAT Plot Report from ASDE-X or ASSC. The MsgType indicates the type of message as follows: AT – PositionReport AY – SystemStatus AD - adsbReport ML - mlatReport	AT, AY, AD, or ML
SafetyLogicAlertReport	Sent upon the receipt of a Safety Logic Alert Report from ASDE-X or ASSC.	SA

Name	Definition	MsgType
SafetyLogicHoldBarMessage	Sent periodically (nominally every 60 seconds) and upon change of any published fields received from ASDE-X or ASSC.	SH
SurfaceMovementEventMessage	Provides surface movement events derived from ASDE-X or ASSC position data.	SE

STDDS SMES publishes ASDE-X/ASSC system status or a group of position reports in a single ASDEXMessage. A single ASDEXMessage can contain one and only one type of data as designated by the MsgType field. Note that ASDEXMessage messages with a MsgType field of AG containing Generic Flight Information or a MsgType field of SM containing SMR Track Reports are deprecated in the current version of STDDS SMES.

### 5.3.1 ASDEXMessage Data Elements

The following table lists the header for an ASDEXMessage.

**Table 4 : ASDEXMessage Header**

Data Element	Description	Cardinality	Type
msgType	Defines the type of message	1	string
version	Version number of STDDS schema	1	string
timestamp	UTC date and time of message generation	1	dateTime
tracon	FAA location identifier (three alphanumeric characters) of the producer STDDS installation	1	string
airport	ICAO code of the source airport	1	string
sendTo	Authorization flag; permissible value: all, authorized, or filtered.	1	string

The following table lists the data elements in the payload of an ASDEXMessage.

Deleted elements will be tagged with an r="1" attribute and the last known value will be included in cases where a value is needed for XML validity.

**Table 5 : ASDEXMessage Data Elements**

Data Element	Description	Cardinality	Type
airport	ICAO code of the source airport	1	string
positionReport	List of CAT11 position reports	0...50	positionReportType
adsbReport	List of CAT10 ADS-B reports	0...50	adsbReportType
mLatReport	List of CAT10 MLAT reports	0...50	mLatReportType

Data Element	Description	Cardinality	Type
systemStatus	ASDE-X or ASSC mode and state	0..1	systemStatusType

### 5.3.2 SurfaceMovementEventMessage Data Elements

The following table lists the header for a SurfaceMovementEventMessage.

**Table 6 : SurfaceMovementEventMessage Header**

Data Element	Description	Cardinality	Type
msgType	Defines the type of message	1	string
version	Version number of STDDS schema	1	string
timestamp	UTC date and time of message generation	1	dateTime
tracon	FAA location identifier (three alphanumeric characters) of the producer STDDS installation	1	string
airport	ICAO code of the source airport	1	string
sendTo	Authorization flag; permissible values: all, authorized, or filtered	1	string

The following table lists the data elements in the payload of a SurfaceMovementEventMessage.

**Table 7 : SurfaceMovementEventMessage Data Elements**

Data Element	Description	Cardinality	Type
track	Fused track number	1	short
stid	STDDS Surface Track Identifier	1	long
callsign	Flight Callsign or UNK if not available or ANON if filtered	1	AircraftIdentifier
mode3ACode	Mode 3A code of the flight. ANON if filtered.	1	BeaconCode
acAddress	Mode S assigned address of the airframe or ground vehicle, expressed in six hexadecimal digits	0..1	hexBinary
time	UTC date and time that the event occurred	1	dateTime
event	Type of event (spot in, on, off, spot out)	1	surfaceEventType
status	Surface status of flight (undefined, airborne, onramp, onsurface)	1	flightStatusType
position	2D position of the flight	1	positionType
altitude	Altitude of flight in feet	1	altitudeType
events	List of past events	1	surfaceEventListType

### 5.3.3 SafetyLogicAlertReport Data Elements

The following table lists the header for a SafetyLogicAlertReport.

**Table 8 : SafetyLogicAlertReport Header**

Data Element	Description	Cardinality	Type
msgType	Defines the type of message	1	string
version	Version number of STDDS schema	1	string
timestamp	UTC date and time of message generation	1	dateTime
tracon	FAA location identifier (three alphanumeric characters) of the producer STDDS installation	1	string
airport	ICAO code of the source airport	1	string
sendTo	Authorization flag; permissible value: authorized.	1	string

The following table lists the data elements in the payload of a SafetyLogicAlertReport.

**Table 9 : SafetyLogicAlertReport Data Elements**

Data Element	Description	Cardinality	Type
airport	ICAO code of the source airport	1	string
alert	Unique alphanumeric identifier assigned to alert	1	AlertIdentifier
audio	Audio alert string	0...1	AlertString
curSeverity	Current alert severity as a result of check alert before hysteresis.	1	AlertSeverity
cycleNum	AXSL check alerts cycle number	1	unsignedLong
encounter	Type of encounter sensor generating alert.	1	AlertEncounterType
repSeverity	Reported alert severity after alert hysteresis.	1	AlertSeverity
situation	Alert situation. This field can have values of 0 to 65535	1	integer
separation	Separation type.	1	AlertSeparationType
text	Text alert string	0...1	AlertString
time	Alert time	1	dateTime
type	Alert type	1	AlertType
version	Version of the report	1	unsignedShort

Data Element	Description	Cardinality	Type
cleared	Flag indicating if the alert situation has cleared. Will be sent only in the last alert report sent for an alert situation	0...1	unsignedShort
location	Alert locations	0...1	AlertLocation
track1	Alert track1 data	0...1	AlertTrackData
track2	Alert track2 data	0...1	AlertTrackData

### 5.3.4 SafetyLogicHoldBarMessage Data Elements

The following table lists the header for a SafetyLogicHoldBarMessage.

**Table 10 : SafetyLogicHoldBarMessage Header**

Data Element	Description	Cardinality	Type
msgType	Defines the type of message	1	string
version	Version number of STDDS schema	1	string
timestamp	UTC date and time of message generation	1	dateTime
tracon	FAA location identifier (three alphanumeric characters) of the producer STDDS installation	1	string
airport	ICAO code of the source airport	1	string
sendTo	Authorization flag; permissible value: all.	1	string

The following table lists the data elements in the payload of a SafetyLogicHoldBarMessage.

**Table 11 : SafetyLogicHoldBarMessage Data Elements**

Data Element	Description	Cardinality	Type
airport	ICAO code of the source airport	1	string
control	Binary value to indicate whether hold bars are enabled or disabled.	1	short
status	Hex string conveying the bit map status of each hold bar (1...256) indicating visibility (0: Not Visible, 1: Visible). The bits are assigned sequentially, starting at bit 0 in word 8 and working backwards (i.e. Hold Bar 256 is represented by bit 31 in word 1). This field will not be published if the hold bars are disabled.	0...1	HoldbarsStatus

## 5.4 Exception Handling

The SurfaceMovementEventServiceStatus message described in the ISMC JMSDD contains status information for each external ASDE-X or ASSC link at an STDDS site. A degraded or failed external link may result in loss of data.

## 5.5 Data

The following tables describe the data types defined in the STDDS SMES messages.

Specific formats required for any data types will be included in the types' definition text. The detail for the obligation and maximum occurrences of the data types and elements is included in the schema definitions within the NSRR.

A type listed as *complex* means that the entity consists of one or more sub-entities, which are detailed in the entity's definition.

**Table 12 : Simple Data Types**

Name	Definition	Permissible Values	Data Type	Format
dateTime	This type defines the date and time. It is a primitive data type.	Valid date and time	primitive	yyyy-mm-ddThh:mm:ss.sssZ
latitudeType	Latitude in degrees	-90 to 90	double	NA
longitudeType	Longitude in degrees	-180 to 180	double	NA
stidType	Unique identifier assigned by STDDS.	NA	long	NA
AircraftIdentifier	This type defines an aircraft identifier	NA	string	.{1,8}
BeaconCode	Aircraft Mode 3/A code in octal representation	0000 to 7777	string	[0-7]{4}

Name	Definition	Permissible Values	Data Type	Format
SurfaceEventType	Surface Event as determined by surface movement service. The events are On (for landing), off (for Takeoff), Spot Out (for exiting a ramp area), Spot In (for entering a ramp area)	On Off Spot Out Spot In	string	NA
FlightStatusType	Flight Status as determined by surface movement event service from the system track reports.	Undefined Airborne Onramp OnSurface	string	NA
AltitudeType	Fused track altitude received in a system track report.	6.25 foot increment	double	
seqNumType	ASDE-X/ASSC sequence number	0-255	int	NA
timeType	Time at which a position report message was produced	NA	dateTime	NA
mode3ACodeType	Mode 3/A Code (Beacon code)	NA	string	[0-7]{4,4} ANON
trackType	Fused Track Number	0-4095	short	NA
AlertIdentifier	Alert identifier	NA	string	.{1,10}
AlertType	Ground alert	ground arrival	string	NA
AlertString	Audio and text alert string	NA	string	NA
AlertSeverity	Alert severity	none cautionary warning	string	NA
AlertEncounterType	Alert encounter	single target dual target converging taxi intersecting runway	string	NA
AlertSeparationType	Alert separation	CSEP PSEP	string	NA
HoldbarsStatus	Status of hold bars	NA	string	[0-9A-Fa-f]{64}

**Table 13 : Complex Data Types**

Name	Definition	Permissible Values	Data Type	Format	Obligation
surfaceEventListType	This type defines a list of surface event records	NA	Complex	NA	NA
surfaceEventListType.eventRecord	This subelement provides the list of surface events.	NA	SurfaceEventRecordType	NA	Optional
SurfaceEventRecordType	This type defines a surface event record	NA	Complex	NA	NA
SurfaceEventRecordType.at	This subelement indicates the time at which the event occurred.	NA	dateTime	NA	Required
SurfaceEventRecordType.event	This subelement of a surface event record defines the type of event	NA	SurfaceEventType	NA	Required
PositionType	This type defines a two dimensional position for CAT11 data	NA	Complex	NA	NA
PositionType.latitude	This subelement defines the latitude in a 2D position for CAT11 data	NA	LatitudeType	NA	Required
PositionType.longitude	This subelement defines the longitude in a 2D position for CAT11 data	NA	LongitudeType	NA	Required
positionGroupType	This type defines a two dimensional position for CAT10 data	NA	Complex	NA	NA
positionGroupType.lat	This subelement defines the latitude in a 2D position for CAT10 data	NA	latitudeType	NA	Required
positionGroupType.lon	This subelement defines the longitude in a 2D position for CAT10 data	NA	longitudeType	NA	Required
positionGroupType.x	This subelement defines the x location in Cartesian coordinates for CAT10 data.	NA	cartCoordType	NA	Optional



Name	Definition	Permissible Values	Data Type	Format	Obligation
positionGroupType.y	This subelement defines the y location in Cartesian coordinates for CAT10 data.	NA	cartCoordType	NA	Optional
velocityGroupType	Calculated velocity in Cartesian coordinates.	NA	Complex	NA	Optional
velocityGroupType.x	Calculated x velocity in Cartesian coordinates.	NA	double	NA	Optional
velocityGroupType.y	Calculated y velocity in Cartesian coordinates.	NA	double	NA	Optional
mode3ACodeDataType	Mode 3/A Code type with a modifier	NA	Complex	NA	NA
mode3ACodeDataType.code	Mode 3/A Code type	NA	Mode3ACodeType	[0-7]{4,4} ANON	Optional
mode3ACodeDataType.g	Binary value indicating a garbled Mode 3/A code.	NA	bitType	0 or 1	Optional
AlertLocation	Alert location	NA	Complex	NA	NA
AlertLocation.location1	ID from XML adaptation for the first alert location	NA	short	NA	Optional
AlertLocation.location2	ID from XML adaptation for the second alert location	NA	short	NA	Optional
AlertLocation.location	The alphanumeric name of the alert location. When two alert locations are available both names will be included separated by a space.	NA	string	NA	Optional
AlertTrackData	Alert track data	NA	Complex	NA	NA
AlertTrackData.id	Track number	0...4095	short	NA	Optional
AlertTrackData.callsign	Callsign	NA	AircraftIdentifier	NA	Optional
AlertTrackData.mode3a	Mode 3/A code of track	NA	BeaconCode	NA	Optional
AlertTrackData.acAddress	Aircraft address	NA	acAddress	NA	Optional

Name	Definition	Permissible Values	Data Type	Format	Obligation
AlertTrackData.surface	Track surface ID	NA	AlertIdentifier	NA	Optional
AlertTrackData.latitude	Track latitude	NA	latitudeType	NA	Optional
AlertTrackData.longitude	Track longitude	NA	longitudeType	NA	Optional

The data types used exclusively in the ASDEXMessage in the us:gov:dot:faa:atm:terminal:entities:smes namespace are reverse engineered for compatibility with a legacy system and are presented hierarchically below.

**Table 14 : ASDEXMessage Structure**

Name	Parent	Definition	Permissible Values	Data Type	Obligation
positionReport	asdexMsg	A report published every second and containing the most recently received movement data for the aircraft / vehicle. This may be a full report or a partial update. This is generated by a CAT11 compacted binary position report.	NA	Complex	NA
full	positionReport	Attribute indicating if this is a complete message or an update.	NA	boolean	Optional
seqNum	positionReport	Sequence numbers are incremented each time a System Track Report is transmitted by ASDE-X or ASSC	NA	seqNumType	Required
time	positionReport	The time of the track update	NA	timeType	Required
track	positionReport	The track number assigned to this aircraft / vehicle.	NA	trackType	Required
stid	positionReport	STDDS Surface Track Identifier	NA	stidType	Required
flightId	positionReport	Flight identification information.	NA	Complex	NA
acAddress	flightId	The Mode S assigned address of the airframe or ground vehicle, expressed in six hexadecimal digits.	NA	hexBinary	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
aircraftId	flightId	Callsign associated with aircraft or vehicle. "ANON" when blocked for distribution to unauthorized users. Callsign associated with the target, 'UNKN' or 'ANON'. The callsign contains one to eight printable characters. Some examples are 'AAL1234', 'COA23', 'OPS 4', '447', 'UNKN' or "ANON".	.{1,8}	string	Optional
mode3ACode	flightId	Four octal digit beacon code assigned to the flight. "ANON" when blocked for distribution to unauthorized users.	[0-7]{4,4} ANON	mode3ACodeType	Optional
flightInfo	positionReport	Aggregation of flight information.	NA	Complex	NA
acType	flightInfo	Aircraft type in ICAO format with two to four characters. "ANON" when blocked for distribution to unauthorized users. This field is omitted for ground vehicles. Some examples are 'G4', 'B737' or 'A310'.	.{1,4}	string	Optional
fix	flightInfo	Exit fix derived from the flight plan. Typically, this is the three letter airport code for arrival flights.	.{1,3}	string	Optional
runway	flightInfo	Departure or arrival runway name. This can be one to three characters with the first one or two characters in the range of 1 to 36 and the next optional character being one of 'L', 'R' or 'C'. This field can also contain the keyword 'filtered' or 'unassigned'.	(([1-9][12][0-9]3[0-6])[LRC]{0,1}) filtered unassigned	string	Optional
tgtType	flightInfo	Target type  Note: unknown_aircraft indicates that it has a mode 3/A code, but not a flight plan or aircraft type.	'unknown', 'aircraft', 'vehicle', 'unknown_aircraft'	string	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
wake	flightInfo	Wake class of the airframe. It can have the values "L", "H", "M" or another character received from the flight plan interface.	NA	string	Optional
manual	positionReport	This report contains manually entered fields. These are typically from the category 11 expansion field.	NA	Complex	NA
acType	manual	The mode Aircraft/vehicle type obtained via manual tag. "ANON" when blocked for distribution to unauthorized users. This field contains the type of airframe. The acType is in ICAO format with two to four characters. Some examples are 'G4', 'B737' or 'A310'.	.{1,4}	string	Optional
callNum	manual	Callsign associated with the target, 'UNKN' or 'ANON'. The callsign contains one to eight printable characters. Some examples are 'AAL1234', 'COA23', 'OPS 4', '447', 'UNKN' or "ANON".	.{1,8}	string	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
category	manual	Wake vortex class obtained via manual tag. The value of this field can be any alphabetic character or "none".  Possible values:  "B" = Heavy with RNAV "F" = B757 "H" = Heavy "J" = A380 "L" = B757 with RNAV "M" = A380 with RNAV "R" = RNAV "X" = High Performance Turbo-prop	[A-Z]	string	Optional
fix	manual	Paired fix obtained via manual tag.	.{1,3}	string	Optional
mode3ACode	manual	Four octal digit beacon code assigned to a target obtained via manual tag. "ANON" when blocked for distribution to unauthorized end-users.	[0-7]{4,4}	string	Optional
scratchpad1	manual	First line of free form text obtained via manual tag. Up to seven characters long. This field has a value of "none" when input data is not available.	.{1,7}	string	Optional
scratchpad2	manual	Second line of free form text obtained via manual tag. Up to seven characters long. This field has a value of "none" when input data is not available.	.{1,7}	string	Optional
movement	positionReport	Aggregation of movement information.	NA	Complex	NA

Name	Parent	Definition	Permissible Values	Data Type	Obligation
ax	movement	Calculated X component of the fused track acceleration in m/sec <sup>2</sup> .	-31 to 31	double	Optional
ay	movement	Calculated Y component of the fused track acceleration in m/sec <sup>2</sup> .	-31 to 31	double	Optional
heading	movement	Smoothed heading of the vehicle / aircraft.	0 - 360	double	Optional
speed	movement	Smoothed speed of the vehicle / aircraft in knots.	NA	short	Optional
vx	movement	The calculated X component of the aircraft velocity in m/sec	-8192 to 8192	double	Optional
vy	movement	The calculated Y component of the aircraft velocity in m/sec	-8192 to 8192	double	Optional
position	positionReport	Aggregation of position information.	NA	Complex	NA
altitude	position	Altitude in feet above MSL of the fused track.	NA	double	Optional
extendedX	position	X component of the Cartesian coordinates. Each unit represents one meter from the ASDE-X/ASSC reference point. This is typically the control tower. The range is +/- 1159548. These are for aircraft over 17NM from the airport.	+/- 1159548	int	Optional
extendedY	position	Y component of the Cartesian coordinates. Each unit represents one meter from the ASDE-X/ASSC reference point. This is typically the control tower. The range is +/- 1159548. These are for aircraft over 17NM from the airport.	+/- 1159548	int	Optional
flightLevel	position	Flight level of the aircraft.	-12 to 1500	double	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
latitude	position	Latitude component of the aircraft / vehicle position. This is a double precision floating point value. Positive values are in the northern hemisphere.	-90 to 90	double	Optional
longitude	position	Longitude component of the aircraft / vehicle position. This is a double precision floating point value. Negative values are in the CONUS hemisphere.	-180 to 180	double	Optional
x	position	The x component of the Cartesian coordinates. Each unit represents one meter from the ASDE-X or ASSC reference point. This is typically the control tower.	NA	short	Optional
y	position	The y component of the Cartesian coordinates. Each unit represents one meter from the ASDE-X or ASSC reference point. This is typically the control tower.	NA	short	Optional
slc	positionReport	This report contains the ASDE-X or ASSC internal table indices for various flight states.	NA	Complex	NA
coastNum	slc	Coasted track number	300 - 999	short	Optional
localAvNum	slc	Local aircraft vehicle list number	101 - 276	short	Optional
suspNum	slc	Suspended track number	0 - 26	short	Optional
status	positionReport	Aggregation of status information, mostly derived from the bit masks in the category 11 expansion field.	NA	Complex	NA
a9s	status	Set to one if the ASR9 source fused bit is set to true.	NA	short	Optional
af	status	Alert filter	'unfiltered', 'filtered' or 'highlight'	string	Optional
ap	status	Set to one if the coast in apron bit is set to true	NA	short	Optional
aq	status	Set to one if the coast association question indicator bit is set to true	NA	short	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
aq1090	status	Address Qualifier from CAT033 report (if S1 bit is set). Set to one of the following values, 'adsbicao', 'adsbsa', 'tisbicao', 'tisbtfi', 'vehicle' or 'beacon'. These map directly to the binary values of 0 to 5 in the compacted data. See the ASDE-X or ASSC ICD expansion field UATAQ for additional information	'adsbicao', 'adsbsa', 'tisbicao', 'tisbtfi', 'vehicle' or 'beacon'	string	Optional
aqUat	status	Address Qualifier from CAT033 report (if SU bit is set).	'adsbicao', 'adsbsa', 'tisbicao', 'tisbtfi', 'vehicle', 'beacon' or ''	string	Optional
as	status	Set to one if the ADSB source fused bit is set to true	NA	short	Optional
at	status	This field is set to one if the ATCRBS source fused bit is set to true	NA	short	Optional
da	status	Set to one if the duplicate discrete mode A indicator is set to true.	NA	short	Optional
df	status	Duplicate flight indicator set to one if the df bit is set to true.	NA	short	Optional
di	status	Set to one if the display indicator bit is set to true	NA	short	Optional
gbs	status	Indicates if the aircraft is not on the ground by setting it to be true. This is a pass through from the transponder from the 'weight on wheels' switch and may not be valid for all tracks	NA	short	Optional
gm	status	Set to one if the GPS position is more than 100 feet from the multilaterated position	NA	short	Optional



Name	Parent	Definition	Permissible Values	Data Type	Obligation
gnd	status	Alert ground indicator.	'unknown', 'onground' or 'arrival'	string	Optional
ls	status	Set to one if the lost coast sensor support indicator bit is set to true	NA	short	Optional
lv	status	Set to one if the local vehicle association bit is set to true	NA	short	Optional
lv1090	status	Derived from expansion field 1090LV link version	0 - 7	short	Optional
lvUat	status	Derived from expansion field UATLV link version	0 - 7	short	Optional
m3c	status	Set to one if the mode 3/A code has changed	NA	short	Optional
mon	status	Indicates if the track is a monosensor track by setting it to be true	NA	short	Optional
mrh	status	Indicates if the reported altitude is 'barometric' from aircraft sensors or 'geometric' from multilateration	NA	short	Optional
ms	status	Set to one if the Mode S source fused bit is set to true	NA	short	Optional
nc	status	Set to one if the multipath non-cooperative bit is set to true.	NA	short	Optional
op	status	Set to one if the coast in oscillation period indicator bit is set to true	NA	short	Optional
quality	status	Quality	0...100	short	Optional
rt	status	Set to one if the reference transmitter track bit is set to true. Display the track only if in maintenance mode.	NA	short	Optional
s1	status	Set to one if the SBS 1090ES ADSB source was fused for this track.	NA	short	Optional
si	status	Binary value indicating if the safety logic processing has been inhibited on the track bit.	NA	short	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
sim	status	Set to zero if the track is from live data. It is set to one if the data is in engineering playback mode.	NA	short	Optional
spi	status	Set to one if the last report contained a Special Purpose Indicator (SPI). A transponder can be configured to provide this signal to aid in distinguishing between non-discretes.	NA	short	Optional
src	status	This field indicates the fused height source.	"none", "gps", "radar", "triang", "coverage", "lookup", "default", "multilat"	string	Optional
ss	status	Set to one if the SMR source fused bit is set to true.	NA	short	Optional
st	status	Set to one if the suspended track indicator bit is set to true.	NA	short	Optional
su	status	Set to one if the SBS UAT ADSB source was fused for this track.	NA	short	Optional
tc	status	Set to one if the manual/automatic tag conflict indicator bit is set to true.	NA	short	Optional
aa	status	Set to one if the ADSB associated flag is set to true.	NA	short	Optional
av	status	SBS ADSB Lat/Lon validation status based on comparison with other sensor data.	"unknown", "invalid", "reserved", "valid"	string	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
sil	status	Source integrity level – probability of exceeding NIC Containment Radius.  Possible values: 0: Unknown 1: < 10-3 2: < 10-5 3: < 10-7	0,1,2,3	short	Optional
nic	status	Navigation integrity category  Possible values: 0: ≥ 20 NM or Unknown 1: < 20 NM 2: < 8 NM 3: < 4 NM 4: < 2 NM 5: < 1 NM 6: < 0.6 NM 7: < 0.2 NM 8: < 0.1 NM 9: < 75 m 10: < 25 m 11: < 7.5 m	0-11	short	Optional
NACp	status	Navigation accuracy category for position  Possible values: 0: ≥ 10 NM 1: < 10 NM 2: < 4 NM 3: < 2 NM 4: < 1 NM 5: < 0.5 NM 6: < 0.3 NM 7: < 0.1 NM 8: < 0.05 NM 9: < 30 m 10: < 10 m 11: < 3 m	0-11	short	Optional
vs	status	Source of the data used to compute the vertical rate	“geometric”, “barometric	string	Optional
ud	status	Vertical rate direction (up/down).	“up”, “down”	string	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
vertRate	status	Vertical rate of the current track that depicts whether the aircraft is climbing or descending.  Permissible values: “unavailable” 0: 0 1: 32 2: 64 *** 1021: 32672 1022: > 32688	“unavailable” 0-1022	string	Optional
uncorrBaroAlt	status	Most recent barometric pressure altitude reported by the aircraft; coasted for an adaptable number of seconds.  Permissible values: “unavailable” -8191 : -204775 feet - 8190 : -204750 feet *** -2 : -50 feet -1 : - 25 feet 0 : 0 feet 1 : 25 feet 2 : 50 feet *** 8190 : 204750 feet 8191 : >= 204775 feet	“unavailable” 0-8191	string	Optional
tse	status	Set to one if this were the last message for the track. (track service end).	NA	short	Optional
ua	status	Set to one if the UAT source was fused for this track.	NA	short	Optional
x	status	Set to one if the ATCRBS X bit is set.	NA	short	Optional
targetExtent	positionReport	Aggregation of target extent information.	NA	Complex	NA
startAzimuth	targetExtent	SMR target extent start azimuth	0 - 360	double	Optional
startRange	targetExtent	SMR target extent start range	0 - 65535	short	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
endAzimuth	targetExtent	SMR target extent end azimuth	0 - 360	double	Optional
endRange	targetExtent	SMR target extent end range	0 - 65535	short	Optional
estimate	targetExtent	Corresponds to the Extent field in the ASDE-X and ASSC ICDs.	0...127	short	Optional
plotCount	positionReport	Plot number assigned by the source subsystem.	0 - 14	Complex	NA
systemStatus	asdexMsg	Current state of the ASDE-X or ASSC	NA	Complex	NA
mode	systemStatus	Basic state of the ASDE-X or ASSC subsystem.	'operational' or 'maintenance'	string	Required
state	systemStatus	Augmented state of the ASDE-X or ASSC subsystem.	'online', 'degraded', 'offline', 'startup' or 'shutdown'	string	Required
adsbReport	asdexMsg	An ADS-B aircraft/vehicle position report generated from CAT10 ASDE-X or ASSC data. This may be a full report or a partial update.	NA	Complex	NA
mlatReport	asdexMsg	An MLAT aircraft/vehicle position report generated from CAT10 ASDE-X or ASSC data. This may be a full report or a partial update.	NA	Complex	NA
full	adsbReport or mlatReport	Attribute indicating if this is a complete message or an update.	NA	boolean	Optional
report	adsbReport or mlatReport	Report portion of the ADSBReport or MLATReport message	NA	Complex	NA
descriptor	adsbReport or mlatReport	Descriptor portion of the ADSBReport or MLATReport message	NA	adsbTargetDescriptor or mlatTargetDescriptor	NA

Name	Parent	Definition	Permissible Values	Data Type	Obligation
status	adsbReport or mlatReport	Status portion of the ADSBReport or MLATReport message	NA	adsbStatus Type or mlatStatus Type	NA
extent	adsbReport or mlatReport	Extent portion of the ADSBReport or MLATReport message	NA	adsbReport Expansion Type or mlatReport Expansion Type	NA
basicReport	report	Basic report portion of the ADSBReport or MLATReport message	NA	Complex	NA
time	basicReport	The time of the track update	NA	timeType	Required
track	basicReport	The track number assigned to this aircraft / vehicle.	NA	trackType	Required
position	basicReport	X/Y and Lat/Lon position values of the track.	NA	positionGroupType	Required
velocity	basicReport	Calculated X and Y components of the aircraft velocity.	NA	velocityGroupType	Optional
mode3ACode	report	Four octal digit beacon code assigned to a target. "ANON" when blocked for distribution to unauthorized end-users.	NA	Mode3ACodeDataType	Optional
acAddress	report	The Mode S assigned address of the airframe or ground vehicle, expressed in six hexadecimal digits.	NA	hexBinary	Optional
level	report	Flight level of the aircraft.	NA	double	Optional
height	report	Flight altitude in feet.	NA	double	Optional
crt	adsbReport. descriptor or mlatReport. descriptor	Binary value indicating if replies are corrupted.	0 or 1	bitType	Optional
dcr	adsbReport. descriptor	Binary value indicating ADSB differential correction.	0 or 1	bitType	Optional
rab	adsbReport. descriptor or mlatReport. descriptor	Binary value indicating if this is a reference transmitter report.	0 or 1	bitType	Optional

Name	Parent	Definition	Permissible Values	Data Type	Obligation
spi	adsbReport.descriptor or mlatReport.descriptor	Binary value indicating if the plot contains Special Purpose Indicator (SPI). A transponder can be configured to provide this signal to aid in distinguishing between non-discretes.	0 or 1	bitType	Optional
gbs	adsbReport.descriptor or mlatReport.descriptor	Binary value indicating if ground bit is set.	0 or 1	bitType	Optional
tot	adsbReport.descriptor or mlatReport.descriptor	Type of target.	“undetermined”, “aircraft”, or “surface”.	string	Optional
cnf	adsbReport.status or mlatReport.status	Track status.	“new” or “confirmed”	string	Optional
dou	adsbReport.status or mlatReport.status	Binary value indicating low confidence (1) or high confidence (0).	0 or 1	bitType	Optional
gm	adsbReport.extent or mlatReport.extent	This field is set to 1 if the GPS position is more than 100 feet from the multilaterated position.	0 or 1	bitType	Optional
s1	adsbReport.extent	Binary value indicating if the plot is SBS 1090ES ADSB.	0 or 1	bitType	Optional
su	adsbReport.extent	Binary value indicating if the plot is UAT ADSB.	0 or 1	bitType	Optional
type	mlatReport.descriptor	Permissible values: 0 = ATCRBS multilateration 1 = Mode S or UAT multilateration.	0 or 1	bitType	Optional
u	mlatReport.extent	Binary value indicating if this is a UAT plot.	0 or 1	bitType	Optional
x	mlatReport.extent	Binary value indicating the state of the ATCRBS source fused bit.	0 or 1	bitType	Optional

## **6 Service Implementation**

The STDDS SMES is implemented as a JMS-Publish service. All access points to the service are wholly contained within NEMS. STDDS SMES publishes data to NEMS via a JMS queue. Clients connect to a topic established by NEMS in order to receive STDDS SMES data. The endpoint for the subscribe STDDS SMES operation is described in the following sections.

### **6.1 Bindings**

#### **6.1.1 ActiveMQ Binding**

All STDDS SMES messages are bound to the NEMS JMS interface through ActiveMQ.

##### **6.1.1.1 Data format**

All STDDS SMES data is published to NEMS in XML format.

##### **6.1.1.2 Message Protocol**

The message protocol for the STDDS SMES is JMS.

##### **6.1.1.3 Transport Protocol**

The transport protocol is Transmission Control Protocol (TCP).

### **6.2 End Points**

The TCP/IP addresses are not included in this document for security reasons. Please refer to NEMS On-Ramping forms and section 4.1.1 Point of Contact for more details.

### **6.3 Subscribe Flow**

An STDDS SMES client may subscribe to a NEMS specified topic to obtain distributed reports. Individual subscriber topics will be identified as part of a client's on-ramping process.

The message flow to publish a message is asynchronous and starts with the client requesting a connection and a subscription from NEMS. As data becomes available from the STDDS SMES, it is published to the NEMS. The NEMS stores the messages on each client's registered topic. If the client is connected to its topic, the messages will be delivered from the client's topic to the client. If the client is not connected to its topic, the message is purged from the queue after its time-to-live has expired. The subscription request (steps 1 and 2 below) is performed once for each desired subscription, and the messages are published to the client until the subscription is cancelled.

A detailed message flow for receiving a message is shown below:

1. The client connects to the NEMS and requests a subscription.
2. The NEMS accepts the connection, validates the client's security, and replies with the status of the subscription.
3. STDDS SMES transforms legacy external data to XML messages.
4. STDDS SMES publishes the messages to the assigned queue on the NEMS.
5. The NEMS publishes the message to the topics of each client that has registered for the message.



- Each client connected to the NEMS pulls the message out of its topic.

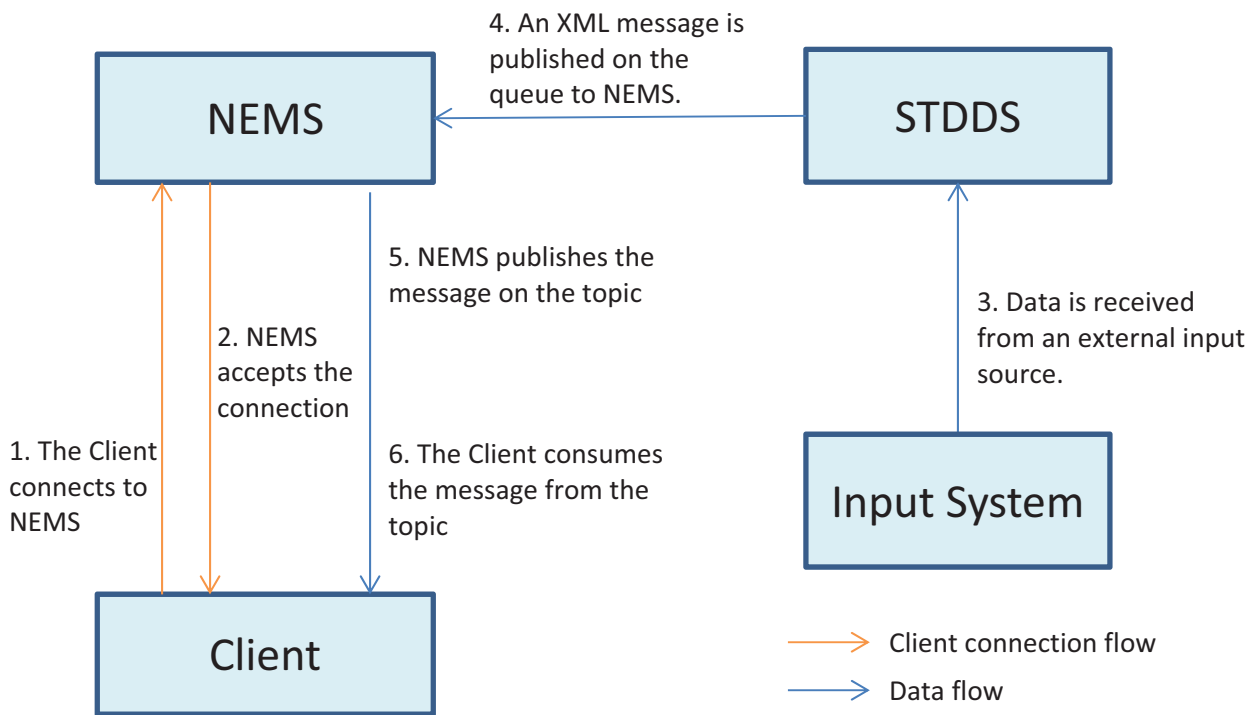


Figure 1 - Subscribe Flow