



SWIM Bidirectional JMS ↔ AMQP Mediation

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- Support international ATM data interoperability harmonization through participation in the European SESAR SWIM Masterclass Demonstration November 2014
- Demonstrate infrastructure capabilities and services for transparently mediating and exchanging SWIM content internationally
- Content Providers: FAA SWIM, Flight Aware Live Data
- Content Consumers: JMS, AMQP Clients
- Content Format: FIXM 3.0, XML, JSON



2014 Categories:

SWIM Infrastructure
SWIM Info Services
SWIM-Enabled Apps

Single European Sky ATM Research (SESAR) SWIM Master Class

What: Collaborative Project by the SESAR as a Public-Private Partnership

Who: In 2014 50+ ANSPs & vendors provided data and information services

When & Where: June – November 2014; Kick off June 24th in Brussels, Belgium

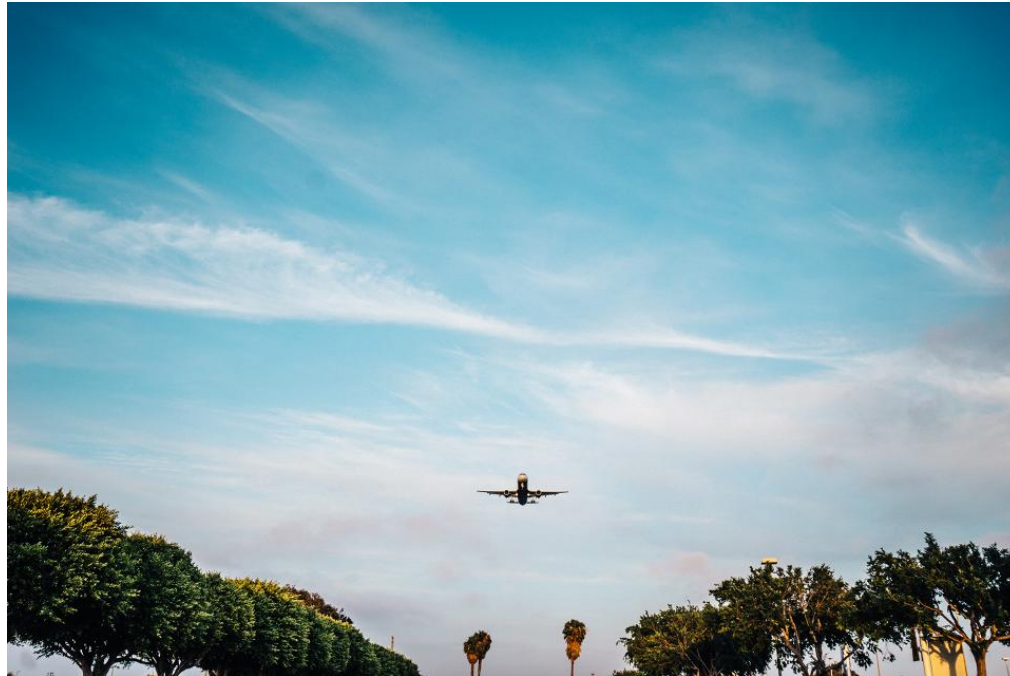
Why: The objective is for participants to present their SWIM-enabled applications and/or information services within a non-operational environment. The contest also enables collaboration between various parties on entries and an opportunity for outreach .

More Information: <http://www.sesarju.eu/newsroom/events/swim-master-class-2014>

- Participate in, and contribute to, international SWIM interoperability demonstrations
- Demonstrate the capability of SWIM infrastructure to provide interoperable data exchange Services between the JMS messaging that the FAA utilizes for the exchange of air traffic management (ATM) content and the European preferred AMQP v1.0 publish-subscribe messaging protocol.
- Demonstrate services to transform live flight and surveillance content from legacy formats into the new FIXM 3.0 data interchange format.

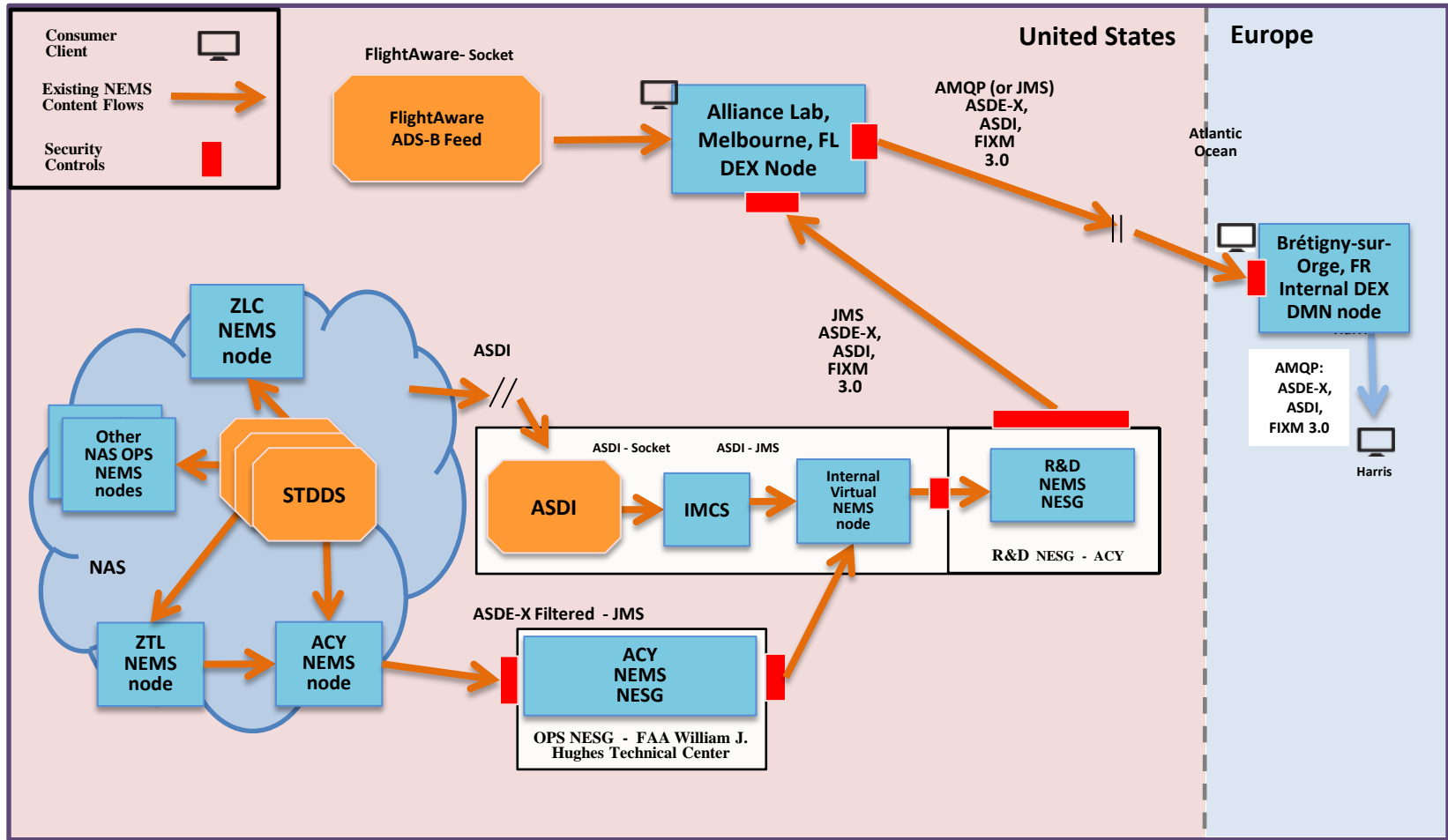
- Across the global landscape of ATM and SWIM, a variety of data formats and protocols have been utilized, which constitute barriers to SWIM interoperability.
- FIXM, AIXM, and WXXM are successfully eliminating information exchange data format barriers and enabling data interoperability.
- The publish/subscribe message exchange pattern is very effective and popular for information distribution. FAA SWIM and other industries have been very successful in standardizing on the mature JMS API for pub/sub. However, an interoperability limitation exists in that the implementation of the wire-level protocol for JMS is vendor dependent.
- SESAR/Eurocontrol are interested in AMQP v1.0 publish/subscribe message protocol as a promising new ISO, IEC, and OASIS international standard, that offers SWIM an open publish-subscribe messaging protocol.
- A primary advantage is AMQP v1.0 provides wire-level and vendor interoperability that Java Messaging Service (JMS) lacks. Thus, similar to http and ftp protocols, AMQP is vendor agnostic.

- Demonstrate mediating SWIM content between JMS and AMQP clients.
- Demonstrate transforming legacy ATM information to FIXM 3.0



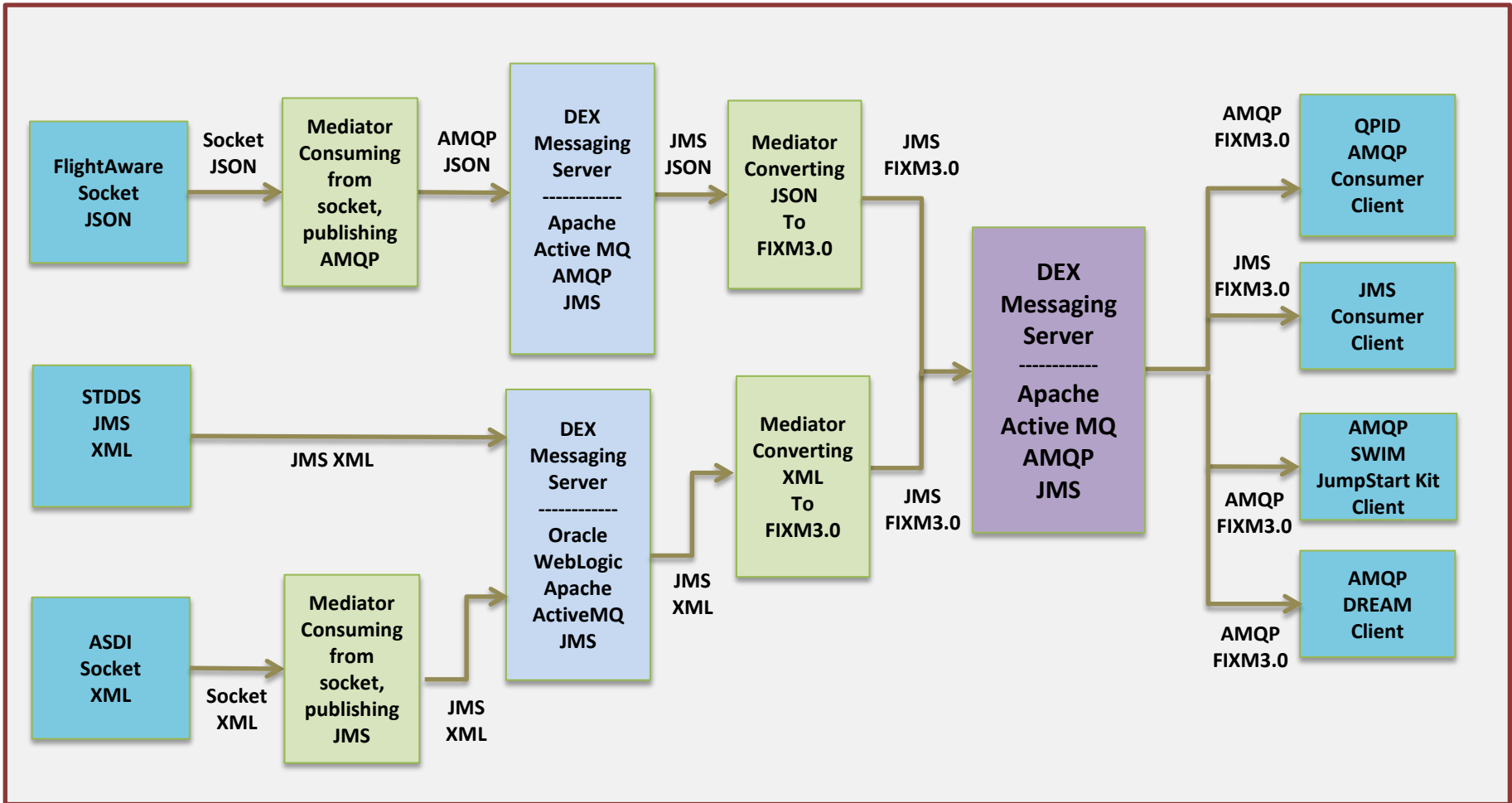
- Publishers
 - FAA supplies 5 minute delayed Data Feeds from FAA OPS to R&D
 - ASDI Flight Plan data (20 msgs/sec)
 - ASDE-X Airport Surface Surveillance data (10 msgs/sec)
 - FlightAware providing live ADS-B Flight tracking data (10 msg/sec)
- Consumer Clients
 - Qpid Apache simple text client
 - Eurocontrol Jumpstart Desktop graphic client
 - Harris Dream graphic client
- SWIM DEX Infrastructure
 - FAA R&D facility (WJHTC, ACY, NJ)
 - Alliance lab SWIM DEX (Melbourne, FL)
 - DEX SWIM messaging node at Brétigny-sur-Orge, France.

Demonstration Data Flow



ASDI, ASDE-X, and ADS-B Live Data Feeds and Data Flow

Mediation



JMS ↔ AMQP
 XML, JSON → FIXM3.0
 TCP Socket → JMS, AMQP

SESAR Jumpstart Desktop Client-



The screenshot displays the SESAR Jumpstart Desktop Client interface. The main window is titled "MainWindow" and contains a configuration panel on the left and a map of North America on the right. The configuration panel includes sections for "dd batch", "address", "SSL/TLS", "SASL", "id address", "id session", "ind Session", "type", "mode", "id type", "Close Link", "Open Sender Link", "Open Receiver Link", "Attach Link", "priority", "Message1", "o", "applicationProperty1", "fello world of AMQP v1.0!", "Stop sending", "counter", "linkname", "timestamp", "message", and "stop receiving". The map shows yellow dashed lines indicating flight paths or connections across the United States and Canada. A log window in the top right corner displays the following messages:

```
2014-11-24 23:48:32.1848 <-> Open ReceiverLink 0 using AMQP, Session 0 Connection 0 topic://ASDEX.TOPIC01.OUT amqp://eurodexconsumer:SQ6x7FpNfx54v@myym:5672
2014-11-24 23:51:38.9466 <-> Close ReceiverLink 0 using AMQP, Session 0 Connection 0 amqp://eurodexconsumer:SQ6x7FpNfx54v@myym:5672
2014-11-24 23:52:01.6766 <-> Open ReceiverLink 0 using AMQP, Session 0 Connection 0 topic://ASDI.TOPIC01.OUT amqp://eurodexconsumer:SQ6x7FpNfx54v@myym:5672
2014-11-24 23:52:52.7823 <-> Close ReceiverLink 0 using AMQP, Session 0 Connection 0 amqp://eurodexconsumer:SQ6x7FpNfx54v@myym:5672
2014-11-24 23:53:16.0421 <-> Open ReceiverLink 0 using AMQP, Session 0 Connection 0 topic://FLIGHTAWARE.TOPIC01.OUT amqp://eurodexconsumer:SQ6x7FpNfx54v@myym:5672
```

The taskbar at the bottom shows the Windows Start button, several application icons, and the system tray with the time 7:14 PM and date 11/24/2014.

Dashboard Viewer | <https://dream.harris.com/#/dashboards/viewer?id=89>

dream Dashboards Search Harris SMC

SMC Flight Data Viewer

Source: Departure: Arrival: ACID:

SMC Flights Total Flights: 375

2014-11-25T00:10:07+00:00 (23 updates)

Aircraft Details		Received Messages	
Time	2014-11-25T00:02:55.000+00:00	Time	2014-11-24 23:53:55 +0000
GUFID	b280af2e-06d1-477d-9722-c622432b57c8	Message Type	trackInformation
ACID	DAL82	Time	2014-11-24 23:53:46 +0000
Latitude	47.40	Message Type	trackInformation
Longitude	-52.43	Time	2014-11-24 23:53:46 +0000
Bearing	NOT PROVIDED	Message Type	trackInformation
Altitude	35000 FEET	Time	2014-11-24 23:52:55 +0000
Speed	530 KNOTS	Message Type	trackInformation
Airline	DAL	Time	2014-11-24 23:52:46 +0000
Departure Airport	KATL	Message Type	trackInformation
Departure Time	2014-11-24T20:49:00.000Z	Time	2014-11-24 23:52:46 +0000
Arrival Airport	LFPG	Message Type	trackInformation
Arrival Time	2014-11-25T04:39:09.000Z	Time	2014-11-24 23:51:55 +0000
		Message Type	trackInformation
		Time	2014-11-24 23:51:46 +0000
		Message Type	trackInformation
		Time	2014-11-24 23:51:46 +0000
		Message Type	trackInformation

« 1 2 3 4 5 6 7 ... 49 »

- Successful interoperability demonstration of mediation
 - JMS \leftrightarrow AMQP
 - ASDE-X Surface Surveillance XML \rightarrow FIXM3.0
 - ADS-B JSON \rightarrow FIXM3.0
 - ASDI Flight Information XML \rightarrow FIXM3.0
 - TCP Socket \rightarrow JMS, TCP Socket \rightarrow AMQP

- Major AMQP Result Observations
 - No throughput performance issues observed.
 - No functional issues observed.
 - No issues with Payload mediation (payload integrity).
 - No issues with user defined JMS properties and values mediated to AMQP properties.
 - Encountered bug in JMS expiration mapping to AMQP time-to-live header.

- Demo Server
 - ActiveMQ Broker 5.10.0
 - Apache ServiceMix 5.1.2

- Clients
 - JMS Clients ActiveMQ 5.5.1
 - QPID Proton Messenger 0.7
 - SESAR Jumpstart Client 1.5.1
 - Harris Dream Client