

Open Geospatial Consortium

Technology Office

4899 North Old State Road 37
Bloomington, IN 47408

Telephone: +1-812-334-0601
Facsimile: +1-812-961-2053

Request For Quotation

And

Call For Participation

In the

**FEDERAL AVIATION ADMINISTRATION (FAA) SPECIAL ACTIVITY
AIRSPACE (SAA) DISSEMINATION PILOT**

(FAA SAA DISSEMINATION PILOT)

Annex B – FAA SAA Dissemination Pilot Architecture

RFQ Issuance Date: September 20, 2010

Proposal Due Date: October 18, 2008

Table Of Contents

Annex B: FAA SAA Dissemination Pilot Architecture.....	3
1 Introduction	3
1.1 Scope	4
1.2 Requirements	4
1.3 Deliverables	5
2 Enterprise Viewpoint.....	7
2.1 NextGen	7
2.2 FAA SWIM	7
2.3 SAA Concept of Operations.....	9
2.4 SWIM Compliance	10
2.5 Stakeholders and Participants in the FAA SAA Dissemination Pilot.....	11
2.6 Use Cases	11
2.6.1 SR/NASR Use Cases.....	12
2.6.2 OR/SAMS Use Cases.....	15
3 Information Viewpoint.....	19
3.1 Aeronautical Information Exchange Model (AIXM)	19
3.2 Geography Markup Language (GML)	20
3.3 Filter Encoding (FE).....	21
3.4 OGC Keyhole Markup Language (KML)	21
3.5 Styled Layer Descriptor (SLD)	21
3.6 GeoRSS	22
3.7 Events & Notifications.....	22
3.8 Applicable SWIM Compliance Standards.....	22
4 Computational Viewpoint	22
4.1 Web Feature Service (WFS)	23
4.2 Feature Portrayal Service (FPS)/Component Web Map Service (WMS).....	24
4.3 Event Service.....	24
4.4 OASIS Web Services Notification	25
4.5 Catalog Service for the Web	26
4.6 SAA SWIM Services.....	26
4.7 Applicable SWIM Compliance Standards.....	27
5 Engineering Viewpoint.....	27
6 Technology Viewpoint	28
Appendix A: Selected Excerpts of SAA Management Concept of Operation	30
Appendix B: SAA Interface Requirements Document – No Security	30
Appendix C: SAA SR WSSD Document – No Security	30

Annex B: FAA SAA Dissemination Pilot Architecture

This document introduces the FAA SAA Dissemination Pilot Architecture using the ISO RM-ODP architectural viewpoints, highlighting areas where open geospatial technologies and standards contribute to meeting the objectives of the Pilot. This architecture provides an opportunity to better understand and evaluate the concept of using OGC Web Services within/in conjunction with the SWIM SOA environment.

This document builds on various documents provided by FAA. In particular, selected excerpts of the following documents are referenced throughout the Architecture and are provided as Appendices:

- Appendix A provides excerpts of the SAA Management Concept of Operations (this document describes the transition from the current/legacy systems to the proposed/SWIM implementation),
- Appendix B is an edited version of the Interface Requirements Document (IRD) for SAA SWIM Services,
- Appendix C is an edited version of the SR Web Services Description Document (WSDD).

Note that the above documents are only selected excerpts from the original FAA documents, which are still under development and continue to be updated at the time of this RFQ.

1 Introduction

The FAA SAA Dissemination Pilot will extend the benefits of the SAA SWIM services by enabling interoperability of SAA services with external stakeholders, by:

- 1- Providing access to static and dynamic SAA information (in AIXM) via OGC Web Services to increase the dissemination potential of SAA information to external users,
- 2- Exposing SAA information services to the NAS stakeholders, particularly airlines, to support flight dispatch and planning,
- 3- Developing and exercising a standards-based Service-Oriented Architecture (SOA) that can accommodate future requirements related to automated scheduling and information synchronization with the DoD.

To achieve the above objectives, the FAA SAA Dissemination Pilot Architecture builds on the current SAA SWIM Management Concept of Operations (selected excerpts included as Appendix A) to support the automated dissemination and portrayal of static and dynamic SAA information (including updates) to National Airspace System (NAS) stakeholders and other external users via OGC Web Services. More specifically, the requirements and use cases presented in this document focus on the application of the Web Feature Service (WFS), the Feature Portrayal Service (FPS)/Component Web Map Service (WMS) and the Event Service to access, filter and portray SAA information as well as notify subscribed users of SAA updates and schedule changes.

In addition to supporting the RFQ requirements and use cases, the FAA SAA Dissemination Pilot Architecture is forward-looking to support the targeted end-to-end automated information flow from the Department of Defense (DoD) originators of SAA activation requests to airlines and other NAS stakeholders. Supporting the end-to-end automation of information flow will lead to improved compliance, utilization, reporting and efficiency of DoD and FAA cooperation on SAA usage.

1.1 Scope

The FAA SAA Dissemination Pilot will focus on the **dissemination** aspects of the SAA Concept of Operations (selected excerpts included in Appendix A), describing the transition from the current/legacy systems to the proposed/SWIM implementation. As such, the pilot will focus on the following requirements:

- Retrieval of SAA (static and dynamic) information in AIXM format - via the Web Feature Service (WFS) based on queries expressed using the Filter Encoding (FE) standard,
- Portrayal of SAA (static and dynamic) information - using the Feature Portrayal Service (FPS)/Component Web Map Service (WMS) - based on the application of user-defined or community-defined styles - using the Styled Layer Descriptor (SLD) standard,
- Subscription and un-subscription of users to SAA updates and schedule changes - using the Event Service proposed standard,
- Notification of relevant SAA updates and schedule changes based on user subscription criteria - by means of the Event Service.

Note that the OGC Web Services mentioned above are not intended to replace the SAA SWIM Services, but to rather use them to meet the requirements. In particular, the WFS will act as an SAA SWIM Client and will use the underlying SAA SWIM information services to retrieve SAA information in response to a user query. Similarly, the Event Service will act as a client to the SAA SWIM JMS services to fulfill the notification and subscription requirements.

The following use cases are out of scope for the FAA SAA Dissemination Pilot but should be considered in the development/refinement of the Architecture and the selection of technologies and products by the FAA SAA Dissemination Pilot team:

- Creation or edit of SAA features,
- Process for proposing/approving/uploading/synchronizing/propagating SAA schedule changes, reservations, etc,
- Interaction with or support for any other SWIM service.

1.2 Requirements

The requirements of the FAA SAA Dissemination Pilot are to:

1. Provide access to the SAA Static Repository (SR)/National Airspace System Resource (NASR) and the Operational Repository (OR)/Special Use Airspace Management System (SAMS) in the AIXM 5.1 format via the OGC Web Feature Service (WFS 2.0),
2. Support the querying for and filtering of SAA SR/NASR and SAA OR/SAMS information via the OGC Filter Encoding (FE 2.0),
3. Lower the implementation barrier for using SAA SR/NASR and SAA OR/SAMS information by supporting access to the information as pictures/maps (via the use of the OGC Feature Portrayal Service (FPS) and the Web Map Service (WMS), and the application of the Styled Layer Descriptor (SLD) standard),

4. Enable application clients to subscribe/un-subscribe to and receive notifications about newly created SAAs, updated SAAs and schedule and reservation changes and updates, via the OGC Event Service (currently under-development).

1.3 Deliverables

The FAA SAA Dissemination Pilot requires three types of deliverables:

- **Engineering Reports and Documents:** will be prepared in accordance with OGC published templates as defined on the OGC portal. Engineering Reports will be delivered by posting on the OGC Portal Pending Documents list when complete and have achieved a satisfactory level of consensus among interested participants, contributors and editors. Engineering Reports are the formal mechanism used to deliver results of the Interoperability Program to sponsors and to the OGC Specification Program Domain and Specification Working Groups for consideration.
- **Components: Services, Adaptors and Clients:** will be provided in accordance with Annex C Section 2.5 (FAA SAA Dissemination OGC Pilot Network Integration and Solution Transfer): Components shall be hosted at participants' sites with FAA providing the necessary access to FAA-hosted components as needed for the Pilot. Components shall remain running and maintained for a duration of 1 year beyond the end of the Pilot to support further evaluations and demonstrations by FAA and its partners. Licensed demonstration copy/copies of those components shall be delivered to FAA for further testing and demonstration.
- **Demonstration material:** including presentations, screen captures, voice commentaries, and videos that will be used during various events (including demonstration events, OGC meetings, conferences, etc), and will be posted on the OGC website (and possibly distributed as DVDs to interested parties).

1.3.1.1 Engineering Reports (ERs) and Documents

- 1) FAA SAA Dissemination Pilot Architecture Engineering Report
 - a) Documentation of the FAA SAA Dissemination Pilot Architecture and use cases as developed, refined and validated during the Pilot,
 - b) Recommendations for expanding the architecture to leverage other OGC services and other standards to meet requirements related to the submission, approval, synchronization and propagation of status and schedule changes in the OR/SAMS,
 - c) Documentation of lessons learned and best practices for using OGC Web Services and other international standards in conjunction with the FAA SWIM infrastructure.
- 2) Change Requests/recommendations for extensions and adaptations to standards and technologies used during the Pilot, including but not limited to,
 - a) AIXM 5.1,
 - b) GML 3.2,
 - c) SLD,
 - d) OGC Web Services (WFS, FE, Event Service, FPS, CSW, etc),
 - e) SWIM Services.

1.3.1.2 Components: Services, Adapters and Clients

Proposing organizations may propose against more than one component and may also propose the combination of components in a single offering/product.

1) One or more AIXM 5.1 WFS 2.0 adapter supporting Filter Encoding FE 2.0
a) WFS 2.0 adapter shall act as an SAA SWIM Client and use the underlying SAA SWIM Services to filter and retrieve SR/NASR and OR/SAMS data, (as such the filtering capabilities of the WFS may be limited to those supported by the SWIM services), b) WFS 2.0 adapter shall support the mapping of AIXM 5.0 returned by the SAA SWIM Services to AIXM 5.1, c) WFS 2.0 shall be compliant with technical SWIM requirements using SWIM standards for data exchange, service interface definition, messaging and transport, and security.
2) A FPS/Component WMS for portraying AIXM 5.1 information based on SLD-based user-defined or community-defined rules
a) FPS shall be capable of connecting, as needed, to a CSW registry hosting relevant styles and symbology artifacts, b) FPS shall be compliant with technical SWIM requirements using SWIM standards for data exchange, service interface definition, messaging and transport, and security.
3) CSW styles registry for use by the FPS and clients
a) CSW shall be compliant with technical SWIM requirements using SWIM standards for data exchange, service interface definition, messaging and transport, and security.
4) Event Service supporting the subscription/un-subscription to SAA updates and schedule changes, and the notification to users of relevant updates and changes
a) Event Service should deliver the notifications to subscribed clients in AIXM 5.1, b) Event Service shall be compliant with technical SWIM requirements using SWIM standards for data exchange, service interface definition, messaging and transport, and security.
5) One or more Event Service Adapter that interfaces with the JMS services provided by the SR/NASR and OR/SAMS SWIM Services,
a) Event Service Adapter shall support the mapping between the JMS and Event Service subscriptions/un-subscriptions and map notification messages to AIXM 5.1, b) Event Service Adapter shall act as a WFS client to retrieve additional information needed by the subscribing clients to support the use cases.
6) One or more (preferably Open Source) Application Client(s) using OGC Web Services to
a) Retrieve, integrate and portray SAA Information (via the WFS and/or the FPS/WMS), b) Subscribe/un-subscribe to SAA information updates and schedule changes and get notified of relevant ones, c) Receive updates from the Event Service, d) Support the FAA SAA Dissemination Pilot scenario(s) and demonstrations.

1.3.1.3 *Demonstration Material*

1) One or more realistic scenario(s) as high-level objectives for organizing the work of the Pilot and for providing a basis for the final demonstration of the results
a) The scenario(s) should prompt the exercising of services, adapters, clients and encodings used/developed and deployed during the Pilot,

- b) The scenario(s) should incorporate all Pilot architectural use cases.

2 Enterprise Viewpoint

The enterprise viewpoint describes business perspective, purpose, scope and policies.

The System Wide Information Management (SWIM) program within FAA is a National Airspace System (NAS)-wide information system that supports the Next Generation Air Transportation System (NextGen) goals. As part of the FAA SWIM Segment 1 activities, the Aeronautical Information Management (AIM) Community of Interest (COI) is developing the capability to exchange static and dynamic Special Activity Airspace (SAA) information between operational air traffic management systems. The SWIM Segment 1 SAA efforts focus on the electronic process for storage, dissemination and scheduling of SAAs. Future segments will focus on the design, approval, and tracking of SAAs.

This section provides an overview of the NextGen program, the SWIM objectives and the SAA Concept of Operations. This information will feed directly into the use cases of the FAA SAA Dissemination Pilot architecture.

2.1 NextGen

NextGen encompasses the operational and technological changes needed to increase the US NAS capacity, to meet future demands and avoid gridlock in the sky and in the airports (http://www.faa.gov/regulations_policies/reauthorization/). NextGen requires improved common situational awareness, integration of air traffic management and control, consistent use of weather data and forecasts for flight planning and better coordination of responses to adverse conditions. The FAA is a key participant in the US Joint Program Development Office (JPDO) which is a multi-agency initiative overseeing the evolution of NextGen concepts.

AIXM provides the foundation for NextGen (Figure 1). Upon that foundation rests many of the next generation operational improvements including on-demand NAS information, continuous flight day evaluations, trajectory-based management, constrained flight planning, collaborative air traffic management and reduced weather impacts amongst others.

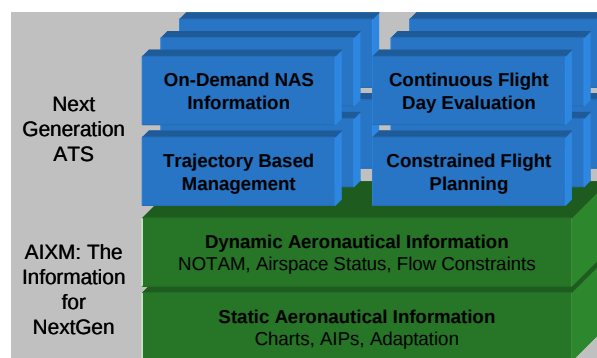


Figure 1 AIXM as Foundation for NextGen

2.2 FAA SWIM

The FAA SWIM Program (<http://www.swim.gov>) is part of the NextGen portfolio of programs and is focused on enabling reusable, loosely coupled interfaces; reducing time and complexity for building new

applications and interfacing existing applications; and providing common shared services for information management replacing costly redundancies. One of the outcomes of the SWIM Program is to provide a secure NAS-wide information web to connect FAA systems to one another, and enable interaction with other members of the decision-making community.

SWIM will provide policies, standards, and core infrastructure to support data management, based on existing systems and networks to the extent practicable, and using proven technologies to reduce cost and risk. SWIM will allow airline operations, air traffic managers and controllers, Federal Air Marshals, and the military to share information in near real-time.

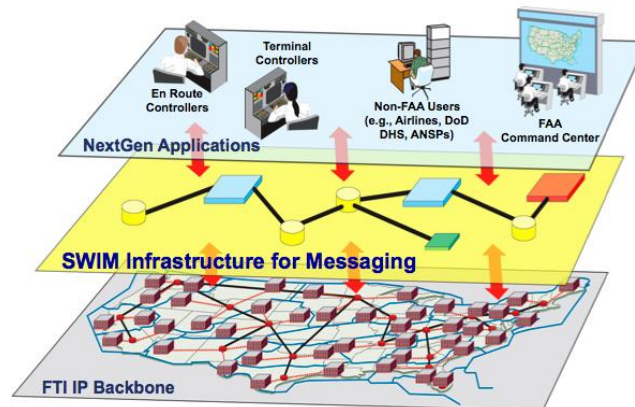


Figure 2 FAA SWIM Conceptual Overview

The goal of SWIM is to achieve systems interoperability and information management for diverse Air Traffic Management (ATM) systems platforms and software implementations by realizing a Service-Oriented Architecture (SOA). The program will provide SOA-based standards, guidance, and core capabilities software to NAS programs that will host the software on their existing hardware. The goal is to ultimately provide the benefits of reuse of services and the elimination of duplicative functionality across traditional organizational boundaries, enabling greater agility of the enterprise to adapt to changing business requirements. Therefore ensuring interoperability and reuse are key goals of this effort.

SWIM is being implemented in segments. In each segment, an appropriate set of NAS applications will be developed and integrated into SWIM. To define segment 1, SWIM collaborated with Communities of Interest (COI), groups of stakeholders that collectively possess the expertise to accurately describe how information is currently used in the NAS. COIs also provided information pertaining to future NAS information needs and helped analyze how to best fulfill those needs using a net-centric solution. The COIs identified nine capabilities, pictured in Figure 3, that SWIM Segment 1 will provide in the time period 2009-2013. Segment 2 is likely to start in 2012 followed by Segment 3 in approximately 2015.

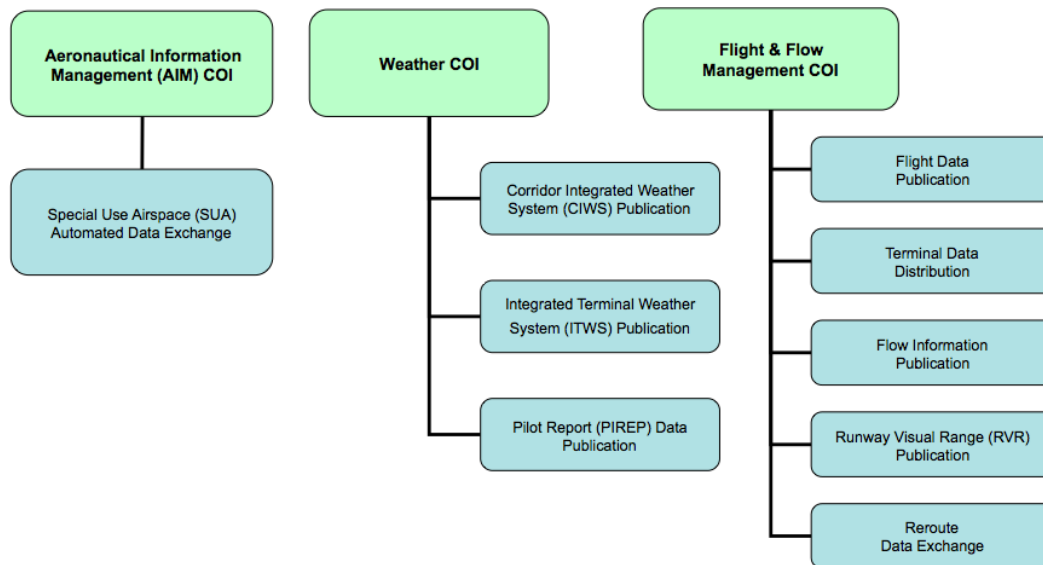


Figure 3 FAA SWIM Segment 1 Capabilities

As shown in Figure 3, Segment 1 includes developing the capability to exchange static and dynamic Special Use Airspace information between operational air traffic management systems. The next section provides an overview of that activity within SWIM.

2.3 SAA Concept of Operations

SAA refers to both Special Use Airspaces (SUA) and Air Traffic Control Assigned Airspace (ATCAA). A SUA is a region of airspace designated to be used by the military and thus needs to ensure that no other air traffic uses that airspace during scheduled times. An ATCAA is an airspace assigned by Air Traffic Control (ATC) to provide air traffic segregation between the specified activities being conducted within the assigned airspace and other Instrument Flight Rules (IFR) traffic. An ATCAA can be considered the analogue of a SUA in Positive Control Airspace (PCA).

The SWIM Segment 1 SAA efforts focus on the electronic process for storage, dissemination and scheduling of SAAs. Future segments will focus on the design, approval, and tracking of SAAs. From a technical perspective, the SAA SWIM web services are SOAP over http web services designed to use the Aeronautical Information Exchange Model (AIXM) version 5.0, use the Java Messaging Service (JMS) web services for notification and implement the SWIM Web Services Interoperability Organization (WS-I) Basic Profile. The AIXM and SOA were selected for use for the automated exchange of SAAs because they provide a consistent data exchange architecture where it is easy to initiate and maintain a connection to the data source.

Appendix A “Excerpts from FAA’s Aeronautical Information Management – Special Activity Airspace Management – Concept of Operations” provides selected excerpts describing the proposed automation of the SAA Management processes within the SWIM program. These processes include the creation of new SAA, management and distribution of SAA definitions, and coordination and management of military scheduling of SAA by the appropriate FAA controlling agencies. The AIM SAA Management System (Figure 4) includes an SAA Editor and Project Repository to manage the development and approval process of new SAA, a Static Repository (SR) subsystem to retain and manage airspace static reference data, and an Operational Repository (OR) subsystem to retain and manage the activity schedules for military use of the SAA.

Appendix A provides more details on the different components shown in Figure 4 along with the interfaces used to interact with those components.

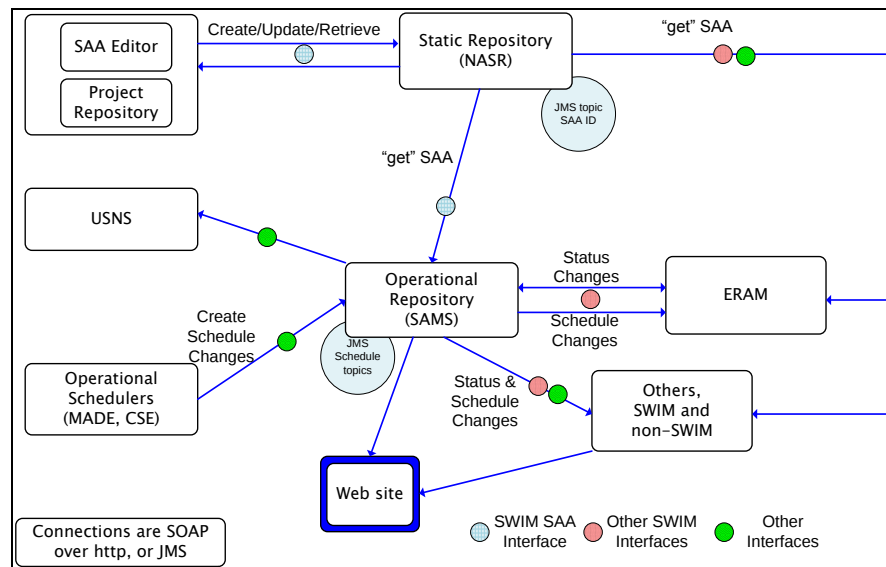


Figure 4 SWIM SAA Management System (extracted from Appendix A)

The SR implements an AIXM 5.0 web service for accessing SAA static definitions from the NASR database. The SR notifies subscribers of new SAAs created and old SAAs updated via JMS and provides the SAA definitions to users in AIXM 5.0 via SOAP request/response web services.

The OR implements an AIXM 5.0 web service for accessing airspace and time of use definitions from the SAMS database. The OR accepts schedule requests and airspace status changes via SOAP request/response web services and distributes schedule and airspace status updates via JMS pub/sub services.

More information about the SR and OR as well as their underlying databases can be found in Appendix A.

2.4 SWIM Compliance

SWIM provides the basis for information exchange between systems. For applications and systems to be accessible and interoperable via SWIM services, it is necessary for these applications and systems to be SWIM-compliant.

SWIM compliance includes standards and policy categories (Figure 5). Four types of standards-related compliance components are categorized as Data Compliance, SOA Service Interface Compliance, Service Messaging and Transport Compliance, and SWIM Programmatic Compliance. The Policy category includes Service Policy Compliance component. Specific standards and/or policies are associated with each of these compliance categories.

The SWIM Requirements and Governance team continues to work compliance issues, associated standards and policies, compliance classes due to the incremental development of SWIM and the varying needs of SWIM services from different NAS applications/ systems. For more information on SWIM compliance, refer to

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/compliance/.

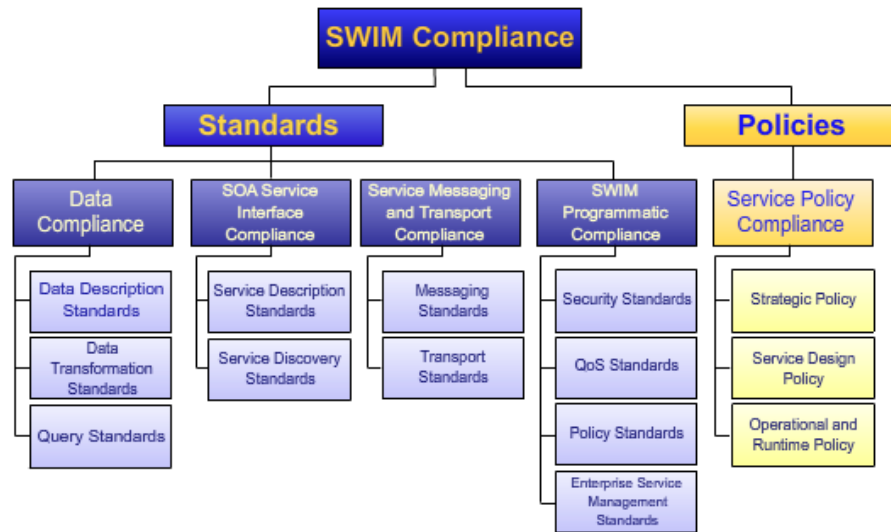


Figure 5 SWIM Compliance Structure

2.5 Stakeholders and Participants in the FAA SAA Dissemination Pilot

The goal of this pilot is to increase the dissemination potential of SAA information by providing access to that information via OGC Web Services and international exchange standards. To achieve that goal, the following group of stakeholders and participants will collaborate to refine and realize all the aspects of the architecture presented in this document:

- SAA SWIM Team of FAA's AIM, providing general and technical guidance on using the SWIM infrastructure, and using/connecting to the SWIM SAA services, as well as supporting use case and scenario development and testing,
- Implementers (vendors, developers, administrators) providing components/adapters meeting deliverable requirements and supporting interoperability and scenario testing,
- Airline representatives or members of Aviation-associated organizations (such as the RTCA, National Business Aviation Association, Air Transport Association, Aircraft Owners and Pilots Association, etc), acting as representatives of FAA partners in the airline industry using SAA information for flight dispatch and planning.

Other stakeholders that may also benefit from the Pilot effort include:

- Military users, who submit schedule requests for SUA reservations to FAA,
- Public users, who may review current and future SUA/TFR reservation schedules for potential conflict with flight plans.

2.6 Use Cases

Appendix B provides information about all the actors and use cases pertaining to the operational use of the SR/NASR and OR/SAMS databases. The FAA SAA Dissemination Pilot focuses on a subset of those use cases (SAA-Read and SAA Schedule-Read) pertaining to the dissemination of the SAA static and dynamic information via OGC Web Services. Use cases related to the update, creation and scheduling of SAAs are out of scope for the pilot.

This section lists the use cases to be supported by the FAA SAA Dissemination Pilot. Each use case represents a single, repeatable interaction that a user or "actor" experiences when using the system. A use

case typically includes one or more "scenarios" which describe the interactions that go on between the Actor and the System, and documents the results and exceptions that occur from the user's perspective. Use cases may include other use cases as part of a larger pattern of interaction and may also be extended by other use cases to handle exceptional conditions.

The use cases provided below are only **draft** use cases that are expected to change and evolve based on the responses to the RFQ. The draft use cases will be refined at the Pilot Kickoff and in accordance with the Pilot demonstration scenario(s) and the sponsor requirements.

2.6.1 SR/NASR Use Cases

- User client queries SR/NASR for SAA static information,
- User subscribes/un-subscribes to SAA update notifications,
- User receives SAA update notification.

Use Case Id:	SAA #1	Use Case Name:	Query SR/NASR
Use Case Description:	This use case describes the process of querying the SR/NASR via the OGC Web Service deployed as part of the FAA SAA Dissemination Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, SAA Editor, etc		
Pre-Conditions: - SAA SWIM Services are accessible		Post-Conditions: - Requested SAA information has been successfully retrieved and provided to SAA User	
System Components - SR/NASR WFS Adapter, - SR/NASR FPS/WMS, - Style Registry/Catalog, - SR/NASR SWIM Service, - Application Client			

Use Case Id:	SAA #1	Use Case Name:	Query SR/NASR
Basic Course of Action			
1.	User queries SR/NASR ○ For a specific SAA by name or UUID, ○ For SAA(s) that meet certain criteria (based on spatial, temporal and/or property filters), ○ For all SAA names of a specified SAA type, ○ For UUID of an existing SAA, ○ For the list of names of all Units, ○ Others as determined by demonstration scenarios and sponsor requirements		
2.	User's Application Client formulates corresponding WFS 2.0 request with relevant FE 2.0 filter a. WFS 2.0 Adapter receives request and formulates corresponding SAA SWIM Service query and transforms response from SAA SWIM Service into AIXM 5.1 format,		
3.	User's Application Client may a. Portray resultant information locally using local styles or styles retrieved from the registry, b. Or formulate corresponding FPS query for retrieval of information as an image, c. Or formulate simple WMS query for pre-defined pre-styled layers.		
4.	Relevant SAA information is returned to the user in the format requested (AIXM 5.1 or image/map) and displayed appropriately on the Application Client		

Use Case Id:	SAA #2	Use Case Name:	Subscribe/Un-subscribe to SR/NASR
Use Case Description:	This use case describes the process of subscribing/un-subscribing to SAA updates via OGC Web Services deployed as part of the FAA SAA Dissemination Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, SAA Editor, etc		
Pre-Conditions: - SAA SWIM Services are accessible		Post-Conditions: - User successfully subscribes/un-subscribes from SAA updates	
System Components - Event Service, - SR/NASR WFS Adapter, - SR/NASR Event Service Adapter, - SR/NASR SWIM Service, - Application Client			

Use Case Id:	SAA #2	Use Case Name:	Subscribe/Un-subscribe to SR/NASR
Basic Course of Action			
1. User subscribes/un-subscribes to SAA updates a. Application Client formulates appropriate subscription/un-subscription request to the Event Service i. Subscription may contain criteria related to spatial, temporal or property parameters, and may be related to one or more SAAs, ii. Un-subscription may refer to a unique subscription id obtained upon subscription, 2. Event Service Adapter interfaces with SR/NASR SWIM JMS Service and formulates/maps the equivalent subscription/un-subscription requests and parameters to the JMS Service, a. Event Service Adapter may also interface with the SR/NASR WFS Adapter to retrieve additional information to perform the mapping, 3. Event Service returns subscription/un-subscription status to Application Client			

Use Case Id:	SAA #3	Use Case Name:	Receive SAA Update Notifications
Use Case Description:	This use case describes the process of providing the user with the SAA update notifications based on their subscription criteria, using OGC Web Services deployed as part of the FAA SAA Dissemination Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, SAA Editor, etc		
Pre-Conditions: - SAA SWIM Services are accessible - User successfully subscribed for notifications using spatial, temporal and/or property criteria		Post-Conditions: - User receives Event (encoded in AIXM 5.1) with relevant SAA update notifications	
System Components - Event Service, - SR/NASR Event Service Adapter, - SR/NASR WFS Adapter, - SR/NASR SWIM Service, - Application Client			

Use Case Id:	SAA #3	Use Case Name:	Receive SAA Update Notifications
Basic Course of Action			
1. SAA update in the SR/NASR triggers a JMS message, 2. Event Service Adapter maps JMS message into an AIXM Message, and forwards it to the Event Service, a. If needed, the Event Service Adapter may include additional information to enabling Event-User matching by the Event Service. This may include requests to the WFS Adapter for information about features affected by the original JMS message, 3. Event Service matches incoming Event with subscription criteria of subscribed users, 4. Event Service forwards Event to relevant users/application clients,			

2.6.2 OR/SAMS Use Cases

- User client queries OR/SAMS for SAA status and usage information,
- User subscribes/un-subscribes to SAA usage and status update notifications,
- User receives SAA usage/status update notification.

Use Case Id:	SAA #4	Use Case Name:	Query OR/SAMS
Use Case Description:	This use case describes the process of querying the OR/SAMS via the OGC Web Service deployed as part of the SAA SWIM Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, operational schedulers (MADE, CSE), ERAM, etc		
Pre-Conditions: - SAA SWIM Services are accessible		Post-Conditions: - Requested SAA status/update information has been successfully retrieved and provided to SAA User	
System Components - OR/SAMS WFS Adapter, - OR/SAMS FPS/WMS, - Style Registry/Catalog, - OR/SAMS SWIM Service, - Application Client			

Use Case Id:	SAA #4	Use Case Name:	Query OR/SAMS
Basic Course of Action			
1. User queries OR/SAMS for SAA, 2. User's Application Client formulates corresponding WFS 2.0 request with relevant FE 2.0 filter a. WFS 2.0 Adapter receives request and formulates corresponding SAA SWIM Service queries (to the OR/SAMS and possibly the SR/NASR SWIM Services) and transforms/combines responses from SAA SWIM Service into AIXM 5.1 format, 3. User's Application Client may a. Portray resultant information locally using local styles or styles retrieved from the registry, b. Or formulate corresponding FPS query for retrieval of information as an image, c. Or formulate simple WMS query for pre-defined pre-styled layers. 4. Relevant SAA information is returned to the user in the format requested (AIXM 5.1 or image/map) and displayed appropriately on the Application Client			

Use Case Id:	SAA #5	Use Case Name:	Subscribe/Un-subscribe to OR/SAMS
Use Case Description:	This use case describes the process of subscribing/un-subscribing to SAA usage and status updates via OGC Web Services deployed as part of the SAA SWIM Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, operational schedulers (MADE, CSE), ERAM, etc		
Pre-Conditions: - SAA SWIM Services are accessible		Post-Conditions: - User successfully subscribes/un-subscribes from SAA status and usage updates	
System Components - Event Service, - OR/SAMS and SR/NASR WFS Adapters, - OR/SAMS Event Service Adapter, - OR/SAMS SWIM Service, - Application Client			

Use Case Id:	SAA #5	Use Case Name:	Subscribe/Un-subscribe to OR/SAMS
Basic Course of Action			
1. User subscribes/un-subscribes to SAA status and usage updates a. Application Client formulates appropriate subscription/un-subscription request to the Event Service i. Subscription may contain criteria related to spatial, temporal or property parameters, and may be related to one or more SAAs, ii. Un-subscription may refer to a unique subscription id obtained upon subscription, 2. Event Service Adapter interfaces with OR/SAMS SWIM JMS Service and formulates/maps the equivalent subscription/un-subscription requests and parameters to the JMS Service, a. Event Service Adapter may also interface with the OR/SAMS and/or SR/NASR WFS Adapters to retrieve additional information to perform the mapping, 3. Event Service returns subscription/un-subscription status to Application Client Note this use case may be combined with Use Case # 2, whereby the Event Service can determine whether the subscription criteria is related to the SR/NASR or OR/SAMS databases			

Use Case Id:	SAA #6	Use Case Name:	Receive SAA Usage and Status Update Notifications
Use Case Description:	This use case describes the process of providing the user with the SAA update notifications based on their subscription criteria, using OGC Web Services deployed as part of the SAA SWIM Pilot		
Actors:	SAA User; SAA User could be a public user, military user, SAMS Operations Support, SAMS User, operational schedulers (MADE, CSE), ERAM, etc		
Pre-Conditions: - SAA SWIM Services are accessible - User successfully subscribed for notifications using spatial, temporal and/or property criteria		Post-Conditions: - User receives Event (encoded in AIXM 5.1) with relevant SAA usage and status update notifications	
System Components - Event Service, - OR/SAMS Event Service Adapter, - SR/NASR and OR/SAMS WFS Adapters, - SR/NASR SWIM Service, - Application Client			

Use Case Id:	SAA #6	Use Case Name:	Receive SAA Usage and Status Update Notifications
Basic Course of Action			
1. SAA update in the OR/SAMS triggers a JMS message, 2. Event Service Adapter maps JMS message into an AIXM Message, and forwards it to the Event Service, a. If needed, the Event Service Adapter may include additional information to enabling Event-User matching by the Event Service. This may include requests to the SR/NASR and OR/SAMS WFS Adapters for information about features affected by the original JMS message, 3. Event Service matches incoming Events with subscription criteria of subscribed users, 4. Event Service forwards Events to relevant users/application clients.			

3 Information Viewpoint

The Information Viewpoint describes the information models and encodings that will make up the content of the services and exchanges to be extended or developed to support the FAA SAA Dissemination Pilot in the following areas:

- Aeronautical and Event exchange models and encodings (AIXM, Digital NOTAM, GML),
- Information filtering (Filter Encoding),
- Information styling and sharing (SLD, OGC KML, GeoRSS).

This section also provides information about applicable SWIM Compliance standards.

3.1 Aeronautical Information Exchange Model (AIXM)

Relevant Specifications & Documents:

- AIXM 5.0 and AIXM 5.1 (<http://www.aixm.aero>)
- OWS-7 AIXM Assessment Report OGC 10-131
(http://portal.opengeospatial.org/files/?artifact_id=40502)

AIXM 5 takes advantage of existing and emerging information engineering standards and supports current and future aeronautical information system requirements. The major tenets are

- An exhaustive temporality model describing when features are valid and how feature properties change over time. The Temporality model also covers modeling the temporary information contained in NOTAMs (Notice to Airmen),
- Alignment with ISO standards for geospatial information (Figure 6), including the use of the Geography Markup Language (GML 3.2),
- Support for the latest ICAO and user requirements for aeronautical data including obstacles, terminal procedures and airport mapping databases,
- Modularity and extensibility to support current and future aeronautical information messaging requirements and additional data attributing requirements.

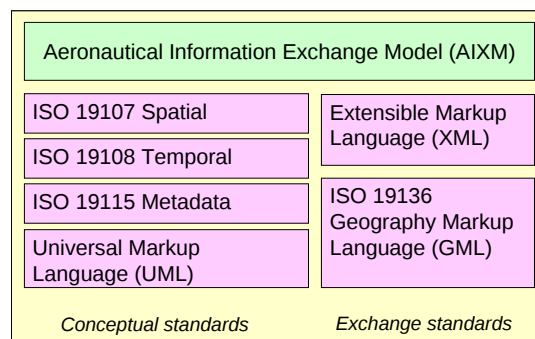


Figure 6 AIXM Based on International Standards

The SAA SWIM Services provide access to SAA information in AIXM 5.0 format. The SAA SWIM team at FAA is working on transitioning to AIXM 5.1. But in the meantime, and during the course of the FAA SAA Dissemination Pilot, AIXM 5.0 information shall be mapped to AIXM 5.1 when returned by the OGC WFS 2.0 adapter. AIXM will also be used to represent the Events generated as part of the pilot.

The SAA data structures and elements with their attributes are defined in an AIXM 5 schema extension for SAA, shown below in UML representation. The SAA extension extends the core AIXM model to include new elements on existing features, new relationships as well as new features. Appendix B “Interface Requirements Document ” includes more detailed information on the SAA, SUA and ATCAA schema extensions.

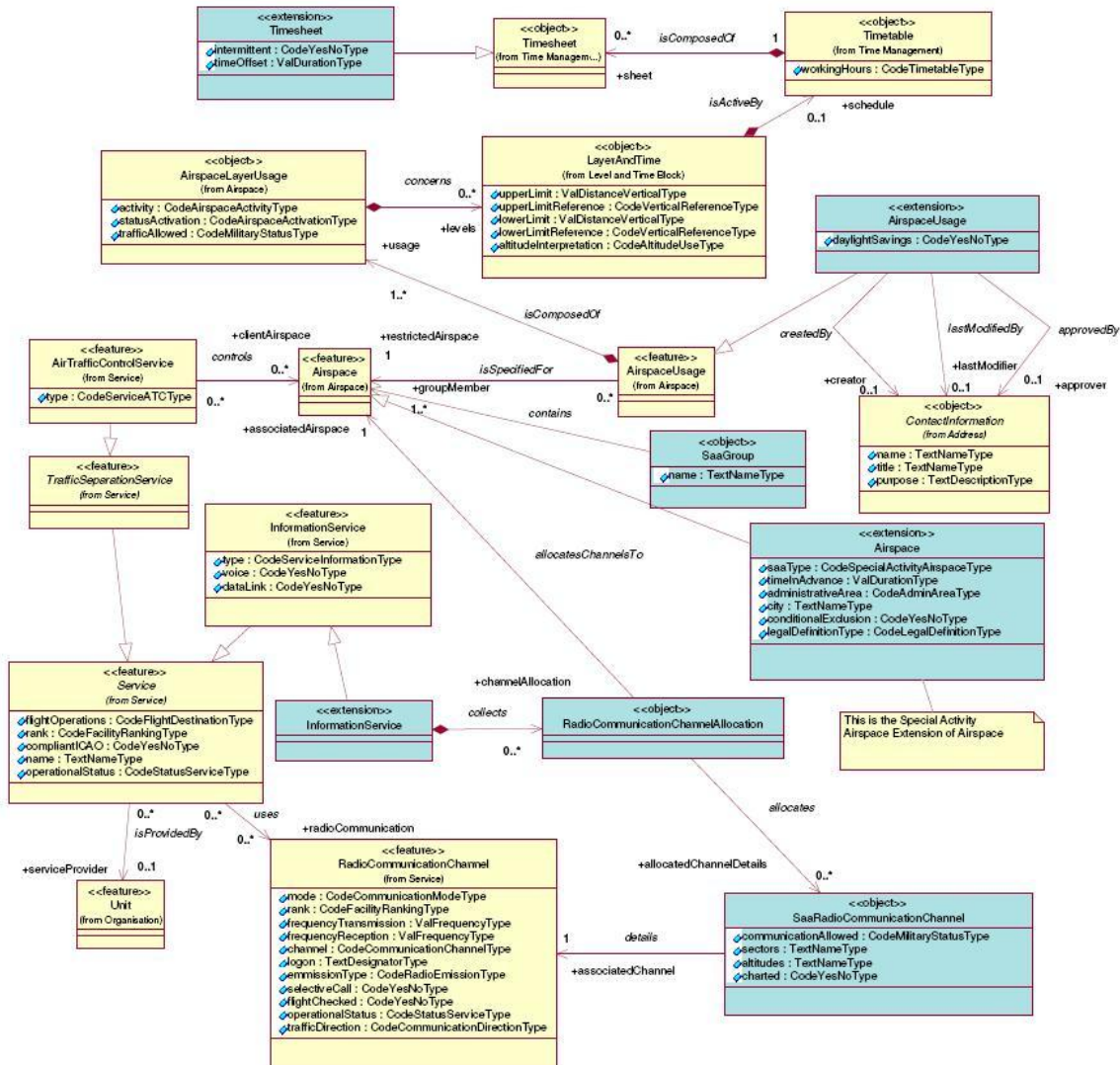


Figure 7 AIXM 5 Schema Extension for SAAs

3.2 Geography Markup Language (GML)

Relevant Specifications:

- OpenGIS® Geography Markup Language (GML) Encoding Specification 3.2.1 (OGC pending document #07-036) (http://portal.opengeospatial.org/files/?artifact_id=20509)

The Geography Markup Language (GML) is an XML encoding for the transport and storage of geographic information, including both the geometry and properties of geographic features. AIXM 5.0 and 5.1 are based on GML 3.2.1.

3.3 Filter Encoding (FE)

Relevant Specifications:

- OGC Filter Encoding Implementation Specification 2.0; ISO 19143 Geographic Information – Filter Encoding (<http://www.isotc211.org/protodoc/211n2633/>; final version submitted to ISO also available on OGC Pending Documents page at http://portal.opengeospatial.org/files/?artifact_id=39968&version=1)

The OGC Filter Encoding Implementation Specification describes an XML encoding of the OGC Common Catalog Query Language (CQL) as a system neutral representation of a query predicate. The filter encoding is a common component used by a number of OGC Web Services (e.g. WFS) requiring the ability to query objects from a web-accessible repository.

Filter Encoding 2.0 will be used in the FAA SAA Dissemination Pilot to support AIXM spatio-temporal and property queries for SAA information.

3.4 OGC Keyhole Markup Language (KML)

Relevant Specifications:

- OGC KML 2.2 (<http://www.opengeospatial.org/standards/kml/>)

OGC KML is an XML-based encoding schema for expressing geographic annotation and visualization on existing or future web-based online maps and Earth browsers (that includes not only the presentation of graphical data on the globe, but also the control of the user's navigation in the sense of where to go and where to look). KML may be used to meet the portrayal requirements of the use cases.

3.5 Styled Layer Descriptor (SLD)

Relevant Specifications & Documents:

- ISO 19117:2005 – Geographic Information- Portrayal
- OGC 10-127r1 – OWS-7 Aviation Portrayal Engineering Report (http://portal.opengeospatial.org/files/?artifact_id=40134)
- OGC 05-078r4 and 08-064 – SLD Profile of Web Map Service (WMS) (http://portal.opengeospatial.org/files/?artifact_id=22364), with CR (http://portal.opengeospatial.org/files/?artifact_id=28921&version=1)
- OGC 05-077r4 – Symbol Encoding (SE) (http://portal.opengeospatial.org/files/?artifact_id=16700)
- OGC 09-016 – OWS-6 Symbology Encoding (SE) Changes ER (http://portal.opengeospatial.org/files/?artifact_id=33515)
- OGC 05-012r1 – Symbology Management (http://portal.opengeospatial.org/files/?artifact_id=13285)

The FAA SAA Dissemination Pilot will leverage the capabilities of separating Portrayal Rules, Symbol Sets, and Portrayal specifications from the AIXM SAA feature data, and the possibility of applying different styles/symbols to the same feature data depending on the styling rules used (which can be influenced by the type of client – military vs. general public vs. airline partner).

The separation can be achieved by applying the OGC Styled Layer Descriptor (SLD) specifications (in conjunction with the Feature Portrayal Service (FPS) and the Catalog Service for the Web (CSW)) to demonstrate the potential of a scalable, flexible and interoperable architecture for producing customizable maps from source AIXM data by supporting different symbology (styles and symbols) and portrayal rules. Styles, encoded using OGC Symbology Encoding (SE), describe styling attributes that can be applied to particular features in the portrayal process. Symbols are generic graphical entities referenced in styles and used in the FPS in the styling process.

3.6 GeoRSS

Relevant Documents:

- Geographically Encoded Objects for RSS Feeds GeoRSS Webpage (<http://georss.org>)

GeoRSS describes a number of ways to encode location in RSS feeds. GeoRSS-Simple supports basic geometries (point, line, box, polygon) and covers the typical use cases when encoding locations. GeoRSS-GML is a formal GML Application Profile and supports a greater range of features, notably coordinate reference systems other than WGS-84. Both formats are designed for use with Atom 1.0, RSS 2.0 and RSS 1.0.

Depending on the final list of use cases and requirements, the Event Service in the FAA SAA Dissemination Pilot may leverage GeoRSS as one of the mechanisms for communicating relevant information about SAA updates and schedule change to subscribed clients.

3.7 Events & Notifications

Relevant Specifications & Documents:

- OGC 10-060r1 OWS-7 Event Architecture Engineering Report - http://portal.opengeospatial.org/files/?artifact_id=39509

The FAA SAA Dissemination Pilot will exercise existing and emerging standards in the encoding of Events representing information about SAA updates and schedule changes relayed to users who subscribed to receive such information based on some criteria. Such events may include notification of closure of airspaces of interest, update and modification of closed airspaces, etc. Both publish-subscribe interactions and notification-action interactions may be explored in the pilot.

The exact subset of Events and their structures shall be determined and agreed-upon during the Pilot Kickoff.

3.8 Applicable SWIM Compliance Standards

Within the Data Compliance category of SWIM (Figure 5), the established SWIM data standards and policies include:

- Data description (XML (1.0, 1.1, Binary Interchange), XSD (Parts 0, 1 and2)),
- Data transformation (XSLT),
- Document navigation (XPath 1.0, XQuery 1.0)

Additional information is available at

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/compliance/.

4 Computational Viewpoint

The computational viewpoint is concerned with the functional decomposition of the FAA SAA Dissemination Pilot architecture into a set of services that interact at interfaces. It reflects the components, interfaces, interactions and constraints of the Service Architecture without regard to their distribution.

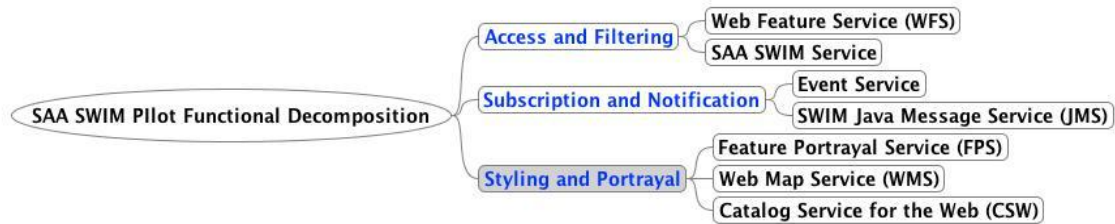


Figure 8 Functional Decomposition of FAA SAA Dissemination Pilot Architecture

As shown in Figure 8, the services used in the Pilot are:

- OGC Web Services
 - Web Feature Service (WFS) for access to SAA static and dynamic information,
 - Feature Portrayal Service (FPS)/Component Web Map Service (WMS) for portrayal of SAA static and dynamic information by applying SLD feature style descriptions,
 - Web Map Service (WMS) for easy access to static data or snapshot of data,
 - Event Service (based on OASIS Web Services Notification) for support of notification of updates and schedule changes,
 - Catalog Service for the Web (CSW) for managing publication, discovery and access to symbols and styles used by the FPS/Component WMS and the clients,
- SAA SWIM Services
 - Used to filter, access and update the SR/NASR and the OR/SAMS databases,
 - Java Messaging Services currently used in the SAA SWIM Management System to subscribe/un-subscribe to and receive messages related to changes in the SR/NASR and the OR/SAMS databases.

The following sections provide more information about those services and interfaces to be exercised in the FAA SAA Dissemination Pilot. Information about applicable SWIM Compliance standards is also presented here.

4.1 Web Feature Service (WFS)

Relevant Specifications:

- OGC Web Feature Service 2.0; ISO 19142 Geographic Information – Web Feature Service (<http://www.isotc211.org/protodoc/211n2632/>; final version submitted to ISO also available on OGC Pending Documents page at http://portal.opengeospatial.org/files/?artifact_id=39967&version=1)
- OGC 10-130 OWS-7 FUSE Integration Report http://portal.opengeospatial.org/files/?artifact_id=40114

The WFS Implementation Specification allows a client to retrieve and update geospatial data encoded in Geography Markup Language (GML) from multiple Web Feature Services. It defines interfaces for data access and manipulation operations on geographic features, using http as the distributed computing platform. A Transactional WFS (out of scope for the FAA SAA Dissemination Pilot) allows creation, deletion and updating of features in addition to querying and retrieval of features.

WFS 2.0 Adapters developed for the FAA SAA Dissemination Pilot shall support retrieval of static and dynamic SAA information in response to client queries by first mapping the WFS 2.0 client queries to the

corresponding SAA SWIM Service queries, and then by mapping the AIXM 5.0 SWIM Service responses to AIXM 5.1. Hence, the WFS Adapters are composited of a WFS Service and a SWIM Client. The WFS Adapters shall support spatial, temporal and property queries on SAA features.

4.2 Feature Portrayal Service (FPS)/Component Web Map Service (WMS)

Relevant Specifications & Documents:

- OGC 10-127r1 – OWS-7 Aviation Portrayal Engineering Report (http://portal.opengeospatial.org/files/?artifact_id=40134)
- OGC 05-078r4 and 08-064 – SLD Profile of Web Map Service (WMS) (http://portal.opengeospatial.org/files/?artifact_id=22364),
- OGC 05-012r1 – Symbology Management (http://portal.opengeospatial.org/files/?artifact_id=13285)

The Feature Portrayal Service (FPS) is a type of Component Web Map Service (WMS) that can symbolize feature data obtained from one or more remote WFSs. It allows for easy and straightforward binding of arbitrary GML data source and applicable styling rules. Typically, an FPS has the following characteristics:

- It has no pre-defined ‘named’ styles of layers (i.e. it acts as a portrayal engine rather than a data source).
- It only supports the WMS interface.
- It can symbolize feature data from any compliant WFS or GML data provided inline.
- It supports both user-defined styles and user-defined layers.

The styles and symbols can be stored in a Catalog Service for the Web (CSW) as shown in Figure 9.

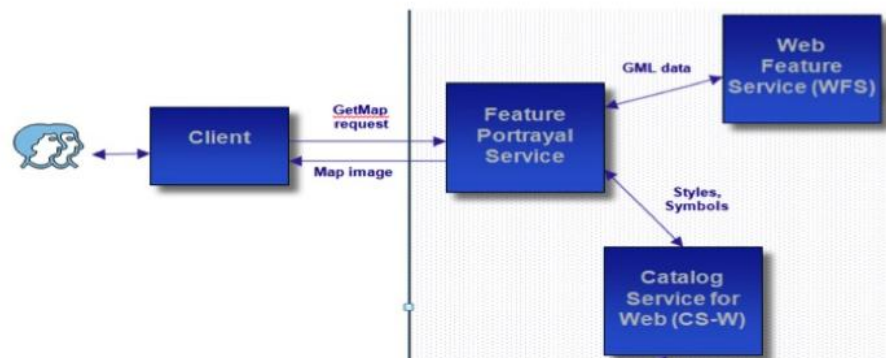


Figure 9 Feature Portrayal Service

The intent in the FAA SAA Dissemination Pilot is to lower the barrier for using SAA information by capitalizing on the separation of Portrayal Rules, Symbol Sets, and Portrayal specifications from the AIXM SAA feature data, and to leverage the ability of applying different styles/symbols to the same feature data depending on the styling rules used (which can be influenced by the type of Client or User Community). The separation can be achieved by using the FPS as a portrayal engine for AIXM SAA data to achieve the potential of a scalable, flexible and interoperable architecture for producing customizable maps from source SAA AIXM data by supporting different symbology (styles and symbols) and portrayal rules.

4.3 Event Service

Relevant Documents:

- OGC 10-069r2 OWS-7 GeoSynchronization Service - http://portal.opengeospatial.org/files/?artifact_id=39476
- OGC 10-060r1 OWS-7 Event Architecture Engineering Report - http://portal.opengeospatial.org/files/?artifact_id=39509

- OWS-6 AIM Event Service (http://portal.opengeospatial.org/files/?artifact_id=33208&version=1)
 - OGC 08-133 Sensor Event Service (http://portal.opengeospatial.org/files/?artifact_id=29576&version=2)
- Web Notification Service Best Practices Paper 0.0.9
(http://portal.opengeospatial.org/files/?artifact_id=18776)

In the last two OGC testbeds, an Event Notification Architecture has been developed to enable information producers to publish notifications/events (such as Digital NOTAMs) and to notify information consumers (Clients) of events that match their subscription criteria (Figure 10). The Event Notification Architecture was exercised within the Aviation Threads of both testbeds, and was based upon the WS-* standards from OASIS and W3C (including WSDL, SOAP and WS-Resource).

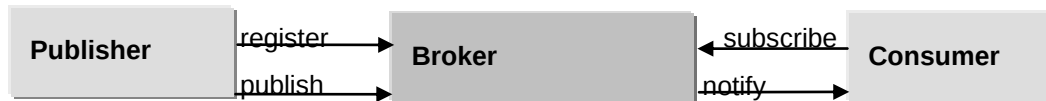


Figure 10 Event Notification System Overview

In addition to the Event Service, the FAA SAA Dissemination Pilot architecture involves the development of Event Service Adapters that can interface with the JMS services of the SR/NASR and OR/SAMS SWIM Services and create AIXM 5.1 Events based on JMS messages and information retrieved from the SR/NASR and/or OR/SAMS WFSs.

4.4 OASIS Web Services Notification

Relevant Specifications:

- OASIS WNS Base Notification 1.3
(http://www.oasis-open.org/committees/download.php/20625/wsn-ws_base_notification-1.3-spec-os.pdf)
- OASIS WNS Brokered Notification 1.3
(http://www.oasis-open.org/committees/download.php/20626/wsn-ws_brokered_notification-1.3-spec-os.pdf)

The purpose of the OASIS Web Services Notification is to define a set of specifications that standardize the way Web services interact using "Notifications" or "Events". They form the foundation for Event Driven Architectures built using Web services. These specifications provide a standardized way for a Web service, or other entity, to disseminate information to a set of other Web services, without having to have prior knowledge of these other Web Services. They can be thought of as defining "Publish/Subscribe for Web services".

The WS-Notification family of specifications defines a standard Web services approach to notification. This document is the base specification on which all the other specifications in the family depend. It defines the normative Web services interfaces for two of the important roles in the notification pattern, namely the NotificationProducer and NotificationConsumer roles. This specification includes standard message exchanges to be implemented by service providers that wish to act in these roles, along with operational requirements expected of them.

The OASIS WS-Notification family of specification is supported in the OGC Event Notification Architecture to enable the mechanism of notifying clients of data change or availability.

4.5 Catalog Service for the Web

Relevant Specifications:

- OGC 07-006r1 OGC Catalog Service Implementation Specification 2.0.2
(http://portal.opengeospatial.org/files/?artifact_id=20555)
- OGC 10-127r1 – OWS-7 Aviation Portrayal Engineering Report
(http://portal.opengeospatial.org/files/?artifact_id=40134)

The OGC Catalog Service supports the ability to publish and search collections of descriptive information (metadata) for data, services, and related information objects. Metadata in catalogs represent resource characteristics that can be queried and presented for evaluation and further processing by both humans and software. The Catalog Service supports the discovery and binding to these registered information resources within an information community. The Catalog Service for the Web (CSW) represents the HTTP protocol binding in version 2.0.2. In the FAA SAA Dissemination Pilot, the CSW may be used to register, manage, discover and access symbols, and styles in support of SAA information portrayal.

The FAA SAA Dissemination OGC Pilot shall build on the results of the OWS-7 Aviation Portrayal effort (see reference above for the OWS-7 Aviation Portrayal Engineering Report). The OWS-7 Portrayal effort successfully demonstrated integration of data services (both vector and gridded), portrayal services, Symbol/Style Registries and Clients to meet Aviation portrayal requirements. The OWS-7 effort required the design of a portrayal registry model, that was implemented as a set of ebRIM Classes, Associations and Classifications (within the ‘Type’ Classification Scheme) which were then loaded into a CSW-ebRIM registry.

4.6 SAA SWIM Services

SWIM will accomplish its goals by providing IT infrastructure capabilities to the NAS enterprise in the form of Core Services and enterprise governance. Core Services enable “business services” to be available throughout the enterprise while maintaining loose-coupling and maximizing reuse and consistent implementation. SWIM Core Services include the following:

Interface Management includes interface specification and interface discovery as well as support for managing the schemas that define data format and semantics for interface data elements.

Messaging covers how data are passed between applications. It also covers reliable delivery.

Security covers how both service consumers and providers authenticate themselves, assert privileges, and provide confidentiality for invoking and consuming services at both the application endpoint and security levels.

Enterprise Service Management includes managing the development, deployment, operation, and retirement phases of a service, and monitoring the operational system is monitored to ensure that Service Level Agreements are being met.

According to the SWIM Technical Overview document (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/documentation/media/architecture/SWIM%20Tech%20Overview%20V2_1%2028Mar2008.doc), SAA SWIM Services belong to a subset of SWIM services that are available to External User systems.

Refer to Appendix C “Web Service Description Document” for more information on how to use SAA SWIM Services. The WSDLs of the SAA Web Services will be posted on a public website soon after the release of the RFQ.

4.7 Applicable SWIM Compliance Standards

Within the SWIM Compliance policies and standards (Figure 5), the SWIM data standards and policies applicable in the Computational Viewpoint include:

- UDDI 3.0.2, WSDL 1.1 and WS-I 1.0 profiles in the SOA Service Interface Compliance category,
- HTTP 1.1, JMS 1.1, Active MQ, SOAP 1.2 Part 1 (and SOAP Message Transmission Optimization), WS-Notification, WS-Attachment Profile 1.0, WS-Addressing 1.0 (Core and SOAP binding) and MTOM in the Service Messaging and Transport Compliance category,
- and WS-security (1.2 OASIS standards, UsernameToken Profile 1.1, SOAP Message Security 1.1, SAML Token Profile OASIS standards), WS-I basic Security Profile 1.0, WS-Security profile 1.0, Federal standards for PKI, WS-Policy, and others in the SWIM Programmatic Compliance category.

Additional information can be found at

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/swim/compliance/

5 Engineering Viewpoint

The Engineering viewpoint identifies component types in order to support distributed interaction between the components of the system. Those components interact based upon the services identified and described in the Computational viewpoint.

Figure 11 depicts a preliminary architecture of how the above services interact with each other in the FAA SAA Dissemination Pilot. Comments on this architecture are expected in the RFQ responses, with an emphasis on how to enhance it to meet not only the Pilot objectives but also the long-term end-to-end automated information management objectives of SWIM and NextGen.

Note that components or connections depicted in **dotted lines are out of scope** for the FAA SAA Dissemination Pilot, but should be considered in the overall architecture and next steps. Those include but are not restricted to the use of WFS-T for updating the data and the use of the Geo-Synchronization Service as a mechanism to update, review, approve and publish activation requests.

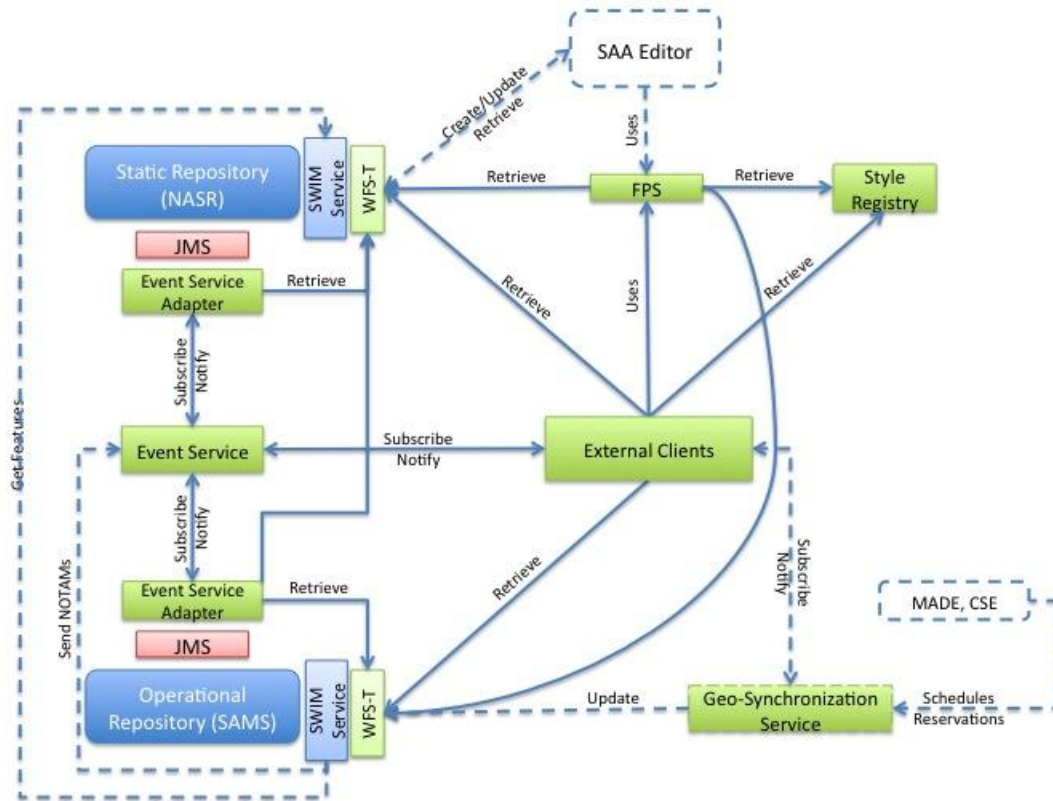


Figure 11 FAA SAA Dissemination OGC Pilot Engineering Viewpoint

Also note that this viewpoint is largely schematic and outline in nature. Further details will be filled in and refined for the purposes of the RFQ/CFP and then as the result of design, implementation, experimentation, and problem-solving during the course of the pilot.

6 Technology Viewpoint

The technology viewpoint is concerned with the underlying infrastructure of a system, describing the hardware and software components used. The specific details of this architectural view, with special attention to SWIM compliance (including security, authentication and access control), will continue to be filled out throughout the course of the pilot work, culminating in the completed pilot architecture at the end of the Pilot.

Software components developed by Pilot participants will be hosted at participants' sites and accessible on the Internet.

As for the FAA infrastructure, the FAA Telecommunications Infrastructure (FTI) Operational IP Network (OPS) is where mission essential operational systems sit. It is separated from the FTI Administrative network by the NAS Enterprise Security Gateway (NESG) firewall. Figure 12 depicts the SWIM logical network architecture, showing the OR SWIM services sitting on the internal side of the NESG, to facilitate communications with operational systems.

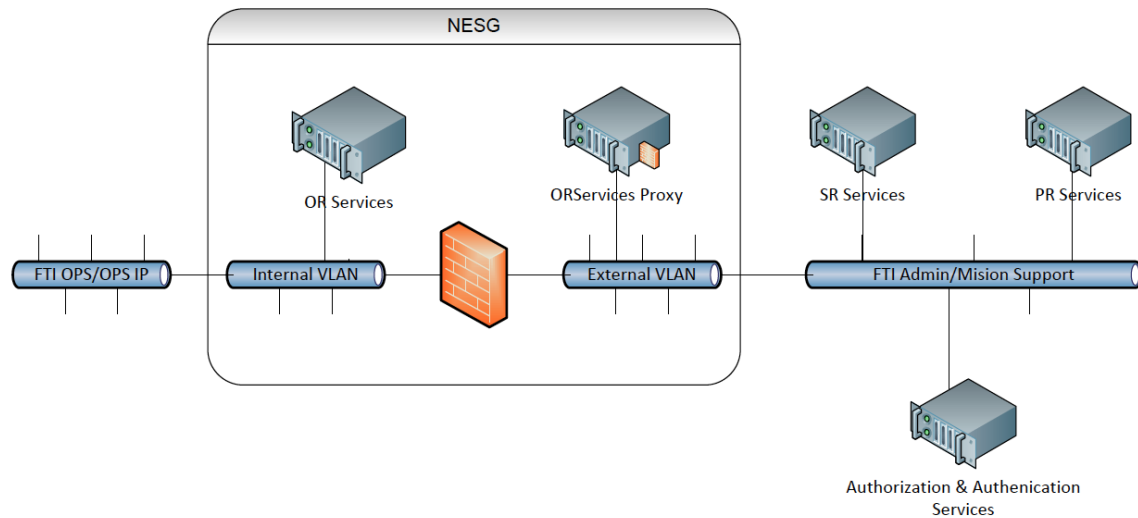


Figure 12 SWIM Logical Network Architecture

The SR, PR and SAA Editor sit on the Administrative network, as depicted in Figure 13. A proxy server sits on the external side of the NESG to allow communications between the OR and SR.

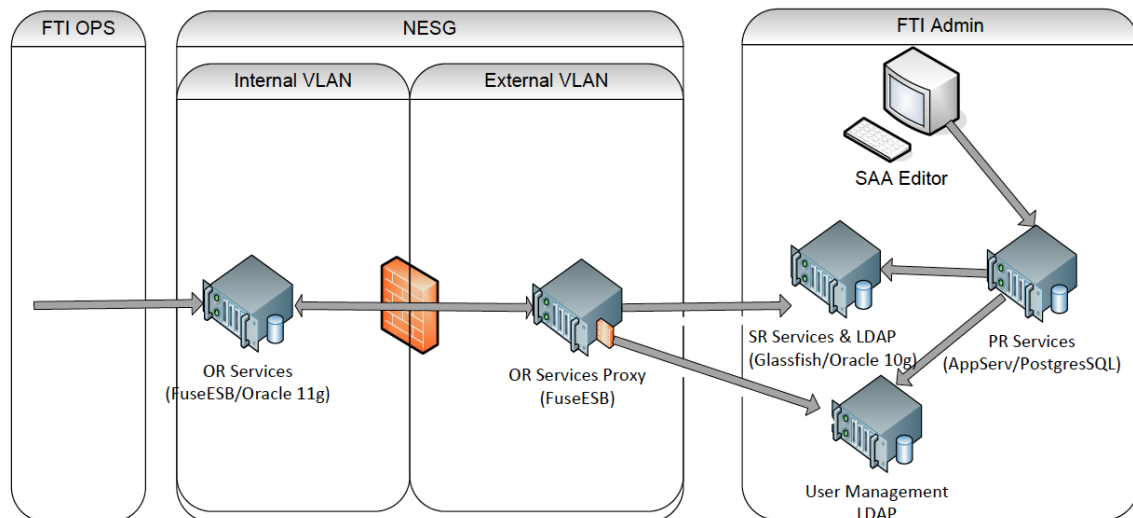


Figure 13 SWIM Logical Communication Architecture

Appendix A: Selected Excerpts of SAA Management Concept of Operation

Appendix B: SAA Interface Requirements Document – No Security

Appendix C: SAA SR WSSD Document – No Security