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

(FAA SAA DISSEMINATION PILOT)

Appendix A to Annex B – Selected Excerpts from SAA Management Concept of Operations

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Aeronautical Information Management Special Activity Airspace Management Concept of Operations

Selected Excerpts for reference in FAA SAA Dissemination OGC Pilot

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1. Overview

This document is focused on persons interested in the Special Activity Airspace (SAA) Management project including project managers, users of FAA Aeronautical Information Management (AIM) systems, and system architects.

1.1. System Overview

A Special Use Airspace (SUA) is a region of airspace designated, during certain times of the day, to be used by the military in the service of national defense and thus needs to ensure that no other air traffic is in the area during those times. An Air Traffic Control Assigned Airspace (ATCAA) is often the analogue of a SUA in Positive Control Airspace (PCA). These (along with other routes and airspaces that are not within the scope of this project yet) are collectively known as SAA.

AIM is one of several Federal Aviation Administration (FAA) organizations participating in the FAA System Wide Information Management (SWIM) program. SWIM is the FAA initiative to evolve towards a standards-based, Service-Oriented Architecture (SOA) for systems integration.

This document describes 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 includes an SAA Editor and Project Repository to manage the development and approval process for new SAA[1], a Static Repository subsystem to retain and manage airspace static reference data, and an Operational Repository subsystem to retain and manage the activity schedules for military use of the SAA.

2. Current (Legacy) System Situation

2.1. Background, Objectives, and Scope

A summary of the current SAA creation workflow is described here.

SUA development begins when the using agency (the military branch, civilian organization, or governmental agency that will use the airspace) opens a dialog with the controlling agency, usually an FAA Air Route Control Center (ARTCC). The design of the SUA is discussed and agreed upon. When the proposal is formalized it is forwarded to the FAA Service Area (SA). The proposal will be evaluated by the SA and by FAA headquarters. Depending on whether the SUA is rulemaking or non-rulemaking, notice of the SUA proposal may be documented in the Federal Register or in a circular to FAA Airspace and Rules for public comment. Once Headquarters receives the proposal

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[1] For the near term, the SAA Editor will only be used for entering approved SAA legal definitions. In the future, the SAA Editor will be used for SAA design and approval.

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package they will choose to approve or disapprove the creation of that SUA. This part of the SAA workflow will remain the same for the short term SWIM SAA system upgrades and will not be discussed further.

Upon approval, the new SUA definition will go out in the next 56-day charting cycle of the National Flight Data Digest (NFDD) for implementation. First, National Flight Data Center (NFDC) users will take the legal definition and digitize the points (e.g. mark the lat/lon of points along a river) and enter the SAA definition into the National Airspace System Resource (NASR) database. The National Aeronautical Charting Office (NACO) will also create a digitized version of the legal definition for their National Flight Database (NFD, aka ARINC file), and their charting files.

2.2.   Description of the Current (Legacy) System

The legacy components of the SAA Management system that are of interest to the AIM SWIM effort include the NFDC NASR system, and the Military Operations (MILOPS) SAMS system. NASR processing begins with the receipt of the SUA legal definition at the NFDC. Specialists enter information about the SUA, including the SUA type (see Table 2-1), controlling agency, using agency, expected times of use, altitudes, and a digitized boundary. The boundary is taken from the legal definition, with points added in place of geographic feature references (e.g. rivers, roads, airports). The coordinates of the geographic features are entered by hand. Notice of the change is published in the NFDD, and the full set of SUA definitions are disseminated with the NASR subscriber file.

Table 2-1: SAA Management Airspace Types

ID	Airspace Type	Category
A	Air Traffic Control Assigned Airspace	ATCAA
L	Alert Area	SUA
M	Military Operations Area (MOA)	SUA
P	Prohibited Area	SUA
R	Restricted Area	SUA
W	Warning Area	SUA

New SUA and ATCAA definitions are typically created by the military using agency, in coordination with the FAA controlling agency (typically an ARTCC) and the SA. Once finalized, ATCAAs are recorded as a Letter of Agreement (LOA) with the ARTCC, while SUAs are approved and recorded by FAA HQ.

SUA definitions are stored in, and disseminated to users by, NASR. NASR provides official government static data that defines and describes the infrastructure of the National Airspace System (NAS)[2]. In the context of SAA Management, static data refers

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[2]

https://employees.faa.gov/org/linebusiness/ato/operations/system_operations/aaim/services/responsibilities/index.cfm?printPage

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to airspace definitions and properties, including geospatial coordinates (shape and altitude data) and published Times of Use (TOU).

SAMS is used by the military to schedule SUAs and other tracked areas, including ATCAA and Military Training Routes (MTR). SAMS makes this information available to users through the Military Airspace Data Entry (MADE) and SAMS Web applications, and through public SUA and Temporary Flight Restriction (TFR) Web site displays and data product downloads.

SAMS downloads the latest SUA definitions from from an NFDC FTP site every 56 days, and receives a CD with geospatial shape files and additional airspace information from the National Geospatial-Intelligence Agency (NGA), which publishes the Digital Aeronautical Flight Information File (DAFIF), and a corresponding ArcView DAFIF (AVDAFIF) every 28 days. The SUA definitions are captured in the SAMS Loader subsystem, consolidated and validated, and used to update the CSAR (Consolidated Special Use Airspace Repository) database on the FAA MILOPS network, which is the backbone of SAMS.

Military users can then use the MADE web site to request the scheduled activation of a particular SUA for military operations, including the specification of altitude boundaries and begin/end times. The appropriate FAA controlling agency uses the SAMS web site to approve, disapprove, or modify the military SUA schedule requests. When the airspace definition requires an airspace activation event to include Notice to Airman (NOTAM) notifications, SAMS generates an appropriate text message and forwards it to the U.S. NOTAM System (USNS) for dissemination.

2.3.   SAA Management User Profiles

- NFDC specialist. Uses VFR sectional charts, topo charts, Google Earth, and other cartographic tools to generate coordinates for the geographic features referenced in the SUA legal definition. The specialist then types the legal definition into NASR.
- SAMS Operations Support. Updates SAMS with new SAA definitions from NASR and other sources. Maintains MILOPS help desk for user support.
- SAMS user. Reviews and approves military SUA schedule requests. Submits airspace reservations for air shows, laser light displays, and special operations. Generates reports of airspace utilization and other metrics.
- Military user. Submits MTR, Aerial Refueling (AR), and other aerial mission plan information to the FAA. Submits schedule requests for SUA reservations to the FAA controlling agency.
- Public user. Reviews current and future SUA/TFR reservation schedules for potential conflict with flight plans.

3. Concepts for the Proposed (SWIM) System

3.1.   Background, Objectives, and Scope

The long-term goal for SAA is to have an entirely electronic process for design, approval, storage, dissemination, scheduling, and tracking of SAAs. For the current SWIM work the electronic process will only focus on the storage, dissemination, and scheduling of SAAs. The other components will be phased in later.

Providing an entirely electronic process for SAAs will remove the labor intensive and error prone process of creating hand-drawn SAAs on paper charts and remove the vagaries and inconsistencies of human-created legal definitions. The use of AIXM and SOA will provide a consistent data exchange format in an architecture where it is easy to initiate and maintain a connection to a data source.

3.2.   Description of the Proposed System

3.2.1. Systems

3.2.1.1.   Editor and Project Repository

The Editor is a web-deployable application based on the Luciad COTS software. The Editor allows users to retrieve previous SAAs that were stored in the SR, edit SAAs, import aeronautical features from NASR, display reference charts, and submit an SAA to the SR.

The Project Repository (PR) is a database and server that allows Editor users to store projects. It is actually the PR that interacts with the SR, but this is invisible to Editor users.

3.2.1.2.   Static Repository

The Static Repository (SR) is an upgrade to the existing NASR database, which resides on the mission support network. The upgrade will include implementation of AIXM web services and a database upgrade.

NASR is the FAA system of record for providing SAA static definitions. Users currently get data through the NASR subscriber files which are disseminated through http://nfdc.faa.gov.

3.2.1.3.   Operational Repository

The Operational Repository (OR) is an upgrade to the existing SAMS system, which resides on the MILOPS NAS network. The upgrade will include implementation of AIXM web services and a database upgrade.

The OR stores airspace and time of use definitions. Military air traffic control specialists use the MADE web application to request SAA activation times. Those requests are reviewed and approved by FAA air traffic control specialists using the SAMS web

application. Public access to SAA activation schedules is provided by the SUA/TFR web site, which receives SUA schedule updates from SAMS.

3.2.2. Interfaces

This section describes the interfaces with the three SWIM SAA systems. A diagram is shown in Figure 5-1.
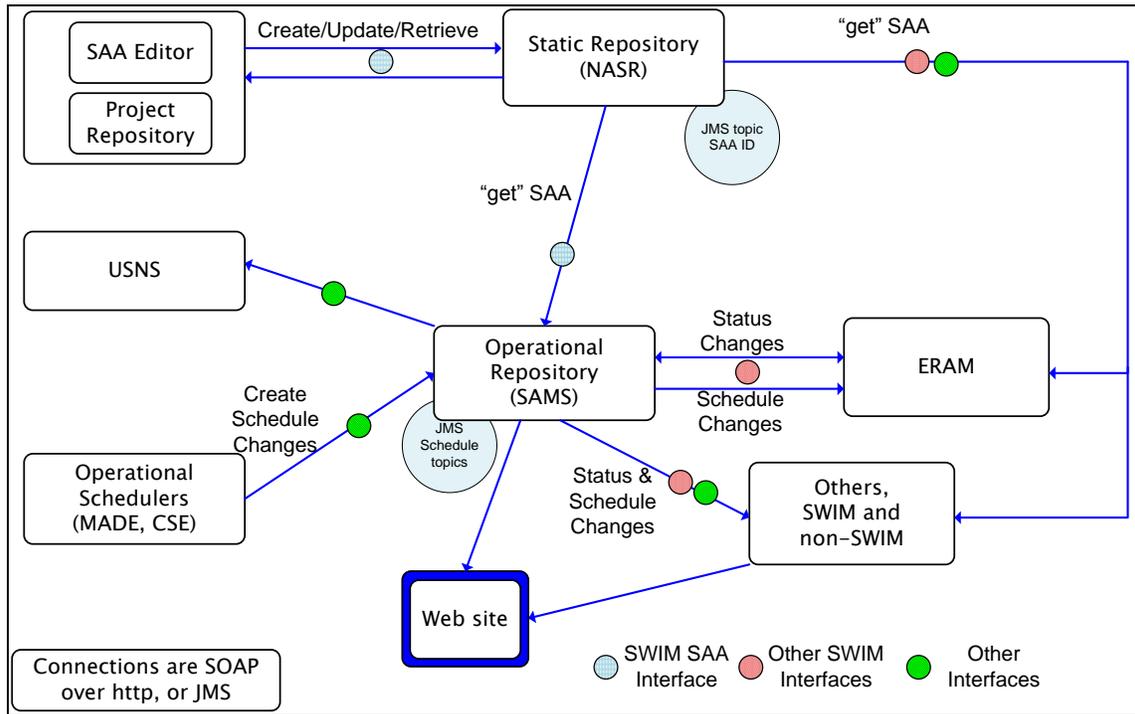

Figure 5-1. Diagram of SWIM SAA systems and interfaces.

Interfaces:
- SAA Editor and Project Repository
  - The SAA Editor is a web deployable application that will be used by users within and outside of the FAA. The PR is used to save/store a user's work and to provide data to the Editor.
- Project Repository – Static Repository
  - The PR will make calls to the SR to retrieve current SAA definitions and to submit new SAAs. These will be SOAP over HTTP web services.
- Static Repository
  - The SR hosts the SOAP and Java Messaging Service (JMS) web services that are accessed by the PR and OR, but it does not initiate any web service calls
- Static Repository – Operational Repository
  - The OR receives notification of airspace changes through the SR JMS topic. The OR then calls the SR SOAP web services to get the updated SAAs.
- Operational Repository

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- o The OR hosts a JMS topic to notify users of changes to schedules and status, and web services for users to update schedule and status of airspaces. Some of these services are called by users on both the mission support network and on the external internet, so the NESG must be used.

4. Operational Scenario

4.1. SWIM workflow

This scenario will describe how a revised SAA is submitted to the SR, and then how that airspace is scheduled through the OR.

The design and approval of the SAA is beyond the scope of the SWIM segment 1 work. The SWIM SAA activity begins when the SAA has been approved by the FAA's Airspace and Rules group. The approved SAA legal definition is given to NFDC. An NFDC specialist logs into the SAA Editor through a web site. The Editor application then runs within the browser on the specialists computer.

The specialist loads a copy of the existing SAA definition. This request is filled by the PR. The specialist makes changes according to the legal definition, saving the file (into the project repository, not on the local computer) as they go. The specialist imports a NAVAID (filled by the PR requesting this information from NASR) as a reference in creating the SAA boundary. They also overlay the SAA boundary on a VFR sectional chart, provided by the Airports GIS Web Map Service (WMS). Once finished with the edits, the specialist submits the revised SAA to the SR (with the PR using the appropriate SOAP web service to fulfill this request). In the process of SAA creation, the PR requests two Universally Unique IDentifiers (UUID) from the SR. These are unique numbers used to identify SAA Airspace features and SAA AirspaceUsage features[3].

The SR receives the updated SAA definition. As every SAA has UUIDs, the SR can update the correct SAA record with the new SAA definition. The SR posts the Airspace feature UUID to the JMS topic, so that all subscribers are notified of the change.

The OR receives the JMS topic update containing the Airspace feature UUID of the new SAA definition. It calls the SR web service to retrieve the new SAA definition. Even though it uses the Airspace feature UUID, the SR web service provides both the Airspace and AirspaceUsage features, which are cached in the OR Loader database for the next 28-day cycle update, at which point the new SAA definition is added to the CSAR production database, and posted to the SUA/TFR web site database.

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[3] In AIXM 5.0, the definition of the airspace (Airspace feature) is distinct from the scheduling or activation status of that airspace (AirspaceUsage feature). Therefore both of these features need a separate UUID. AIXM 5.1, when it is implemented, will treat these features as one feature so only one UUID will be required.

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4.2.   External SAA Scheduler

This section describes the operation of the system from the standpoint of an airspace scheduler.

When an SAA definition is changed (including a changed schedule) the UUID is posted to the SR JMS topic. The OR retrieves the updated SAA definition as described in section 4.1. The scheduler will be notified of changes to the SAA definition (both to the Airspace feature and to the AirspaceUsage feature) through the SR JMS topic. The scheduler then makes a web service call to the SR to retrieve the SAA definition and schedule.

When a military airspace scheduler wishes to schedule an SAA for use, they log into the MADE web site. They enter the times that the SAA will be used, along with additional mission data, and submit the schedule request to the OR. An FAA ARTCC specialist logs into the SAMS web site to review SAA schedule requests for the airspace that they control. They then approve, cap, or reject the schedule requests. Cap refers to FAA approval of a request with modifications to the scheduled activation times and/or altitudes.

When an action is taken upon a schedule request (approve, cap, reject) then notice of that action is posted on the Schedule Events JMS topic. Upon approval, if the scheduled time for the SAA requires a NOTAM, then a NOTAM message will be automatically sent to the USNS.

4.3.   SAA data user

This section describes how an external person is updated on changes to SAA definitions and schedule changes.

A user who is interested in receiving updates to SAA information will need to subscribe to as many as three JMS topics, described in the following sections.

4.3.1. Static Definition

As described in section 4.1, there is a JMS topic from the SR that provides notification of updates to the SAA definition and the SAA Times of Use. The user will need the UUID of any SAAs they are interested in (otherwise, they will get all updates). The user calls the Get SAA UUID Method from the SR to get the UUID for a given SAA name and type. The user adds the desired UUIDs to the SR JMS MessageSelector filter so that they will only be notified of changes to those SAAs. When they receive notification from the JMS topic, the user then requests the updated SAA definition using the Airspace feature UUID given in the JMS topic.

4.3.2. Schedule Changes

If the user wants to receive notifications when a schedule is approved, rejected, or capped, they will subscribe to the OR Schedule Events JMS topic, and set up a filter for the UUID. The user will then receive notice on the JMS topic when an SAA is scheduled.

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The user can then call the OR Get SAA Schedule and Status by UUID Method to get the updated schedule and status.

4.3.3. Active Schedules

If the user wants to receive notice of imminent SAA activation, they can subscribe to the OR Active Schedules JMS topic. With filtering by UUID and other criteria, they can be notified when an SAA will be activated within the next 72 hours, or within a time period shorter than 72 hours.

The user will use the same Get SAA Schedule and Status by UUID Method to retrieve the SAA schedule and status. The Active Schedules JMS topic does not provide "go hot" and "go cold" information, it just reports when an approved schedule is within a given time frame – something that could be tracked separately given the schedule approval information from the Schedule Events JMS topic.

4.3.4. Note on web service use

All of the web services for a data recipient require a number of steps:
1. Obtain the UUID or SAA name. The JMS topics can be subscribed to using the UUID, or sometimes the SAA name.
2. Subscribe to JMS topic. Set appropriate filters for notification.
3. Upon notification from JMS topic, request information from appropriate web service.
4. Repeat the process for all of the JMS topics that are of interest to the data recipient.

5. Glossary

Abbreviations and Acronyms	
AIM	Aeronautical Information Management
AIXM	Aeronautical Information Exchange Model
AR	Aerial Refueling Route (Refueling Anchor)
ARTCC	Air Route Traffic Control Center
ATCAA	Air Traffic Control Assigned Airspace
AVDAFIF	ArcView DAFIF
CSAR	Consolidated Special Use Airspace Repository
DAFIF	Digital Aeronautical Flight Information File
FAA	Federal Aviation Administration
GIS	Geographic Information System
JMS	Java Messaging Service
LOA	Letter of Agreement
MADE	Military Airspace Data Entry
MILOPS	Military Operations
MTR	Military Training Route
NACO	National Aeronautical Charting Office
NAS	National Airspace System
NASR	National Airspace System Resources

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Abbreviations and Acronyms	
NESG	NAS Enterprise Security Gateway
NFDC	National Flight Data Center
NFD	National Flight Database
NFDD	National Flight Data Digest
NGA	National Geospatial-Intelligence Agency
NOTAM	Notice To Airman
OR	Operational Repository
PCA	Positive Control Airspace
SA	FAA Service Area
SAA	Special Activity Airspace
SAMS	Special Use Airspace Management System
SOA	Service-Oriented Architecture
SUA	Special Use Airspace
SWIM	System Wide Information Management
TFR	Temporary Flight Restriction
TOU	Time of Use
USNS	US NOTAMS System
UUID	Universally Unique Identifier