
Federal Aviation Administration

# Airborne Position Reference Tool (APRT)

## *System Design Approval (SDA): An Overview*

*Version 1.0*

# Airborne Position Reference Tool
# System Design Approval (SDA) Process Summary

**Required Intake Submittals & Activities**

- A draft APRT Certificate of Compliance (C-of-C) form to certify that the applicant is compliant with all identified objectives (Signature not required for Intake)
- A completed Non-federal APRT Project Intake Form
- Compliance with FAA's minimal functional and performance requirements (See Appendix A) via a traceability matrix or equivalent
    - Identify any deviations/waivers to the requirements (Subject to approval)
- If requested, a virtual meeting to field initial questions and provide a demonstration of the system/service if feasible

**Required Assessment Submittals & Activities**

- The applicant will complete and sign the APRT C-of-C form
- The applicant will be responsible for delivering documentation describing and assessing any additional functionality and/or use cases that are beyond those described in Appendix B of this document
- The applicant will deliver to the FAA a final configuration baseline that establishes the configuration of the APRT system for which SDA will be granted
- The applicant will deliver a set of documentation to support field installation, operation, and maintenance as well as training material for users
- The applicant will support a virtual audit to present, on request, some or all of the following:
    - System level requirements and interface control document
    - Traceability to FAA system requirements
    - Verification of compliance with their system requirements
    - Documents and procedures for configuration management and change control
- The applicant supports an Operational Evaluation of the APRT. The intent is to demonstrate the proposed APRT compliance with the requirements and performance in a real or near real world situation. Operational Evaluation plans will be negotiated during Intake and may vary based on system/service details

# Table of Contents


**1. INTRODUCTION ..... 4**

1.1 APRT Definition ..... 4
*1.1.1 APRT Constraints ..... 5*
*1.1.2 APRT Operational Scenarios ..... 5*
1.2 System Overview ..... 6
1.3 Functional Description ..... 7
*1.3.1 Target Data Function ..... 7*
*1.3.2 Data Processing Function ..... 7*
*1.3.3 Display Function ..... 8*

**2. SYSTEM DESIGN APPROVAL PROCESS ..... 9**

2.1 Intake Phase ..... 9
2.2 Assessment Phase ..... 9
2.3 National Safety Risk Management (SRM) Panel ..... 10
2.4 Notice of Final Decision ..... 10
*2.4.1 System Modifications Require Approval ..... 11*

**APPENDIX A - MINIMUM TECHNICAL AND PERFORMANCE REQUIREMENTS ..... 12**

A.1 System Requirements ..... 12
A.2 Functional and Performance Requirements ..... 12
*A.2.1 Applicant Coverage Volume ..... 14*
A.3 Integration Requirements ..... 15
A.4 Human Factors Requirements ..... 16
A.5 Safety and Reliability, Maintainability, and Availability (RMA) Requirements ..... 16
A.6 Information Systems Security Requirements ..... 16

**APPENDIX B - FUNCTIONAL ASSESSMENT ..... 17**

**APPENDIX C - ACRONYMS ..... 18**

# 1. INTRODUCTION

This document provides information on how manufacturers (referred to as "applicant" throughout this document) can request Federal Aviation Administration (FAA) System Design Approval (SDA) of Airborne Position Reference Tools (APRT) intended to be available for sale to non-federal entities for supplemental non-federal use as a visual enhancement tool while operating in the National Airspace System (NAS). This approval process does not extend to procurement and/or use by the FAA or other Federal agencies. The FAA expects the applicant to follow the means described in this document in all applicable respects. Additional information is available in the latest edition of FAA Order 6700.20, *Approval, Operation, and Oversight of Non-federal Systems* (Order 6700.20).

The FAA retains absolute discretion as to whether to allow an applicant to participate in the APRT effort at all or to continue with the SDA process at any stage. Nothing in this document, process, or overall effort bestows upon an applicant any rights, including but not limited to a right to protest or otherwise pursue a legal cause of action against the FAA related to this APRT effort, that do not otherwise already exist under law.

Regardless of whether the applicant's APRT is approved to be on the approved system list (ASL), the applicant is not, nor shall it hold itself out to be, an agent, partner, or contractor of, or joint ventures with, the United States Government (including the FAA). Any document or communication issued by the FAA as part of this APRT effort must not be construed as an FAA Screening Information Request (SIR), solicitation, or any other type of invitation for a prospective contract award.

## 1.1 APRT Definition

The FAA conducted an Operational Needs Assessment (ONA) to consider the supplemental benefits of APRTs for Airport Traffic Control Towers (ATCT) not equipped with a Certified Tower Radar Display (CTRD). Findings from the assessment found that in ATCTs without a situational awareness display, controllers can have limitations to acquisition and/or correlating aircraft position by visual observation only. This results in potential efficiency shortfalls including:

- Lack of awareness of aircraft not in communication with the tower
- Decreased ability to assist distressed aircraft and direct emergency services in a timely manner
- Decreased ability to foresee/prevent wrong airport landings
- Decreased ability to visually locate aircraft or determine their spatial relationship to known geographical points in a timely manner

APRTs will provide Air Traffic Control Specialists (ATCS) managing airspace, typically defined as Class D, a means to visually acquire aircraft by correlating their position with geographical references. This capability can increase situational awareness by providing an independent supplemental system to confirm the controller's mental model. In addition, it can add to an increased awareness of previously unknown targets of interest.

### 1.1.1 APRT Constraints

The constraints for APRTs are known limitations or factors that will impact the effectiveness or completeness of the solution. Use of the APRTs will be limited to the most up-to-date guidance defined in FAA Order 7110.65 Air Traffic Control: 3−1−9a (to include any future versions of that Order). Use Of Tower Radar Displays. The following constraints set the boundaries for how the APRT is intended to be used:

- APRTs are limited to their input data sources, and users must understand that APRTs may not display all aircraft in the vicinity
    - For example, an ADS-B only APRT does not detect aircraft not equipped with or not broadcasting ADS-B
- Controllers must only use the APRT as an aid to assist in visually locating aircraft or in determining their spatial relationship to known geographical points (3-1-9a 7110.65 Use of Tower Radar Displays)
- Controllers must not provide radar services and traffic advisories using APRTs (3-1-9 7110.65 Use of Tower Radar Displays)
- When using an APRT, controllers must not utilize the services and phraseology set forth in FAA Order JO 7110.65, Air Traffic Control, Chapter 5, Radar, (10-5-3 7210.3 Facility Operation and Administration)
- No features or use cases that exceed situational awareness will be permitted (e.g., (but not limited to) safety logic associated, conflict detection/alerting)

### 1.1.2 APRT Operational Scenarios

The following operational scenarios are intended for applicants to understand the FAA defined scope of an APRT. Any use cases outside of the intended boundaries illustrated below must be discussed with and approved by the FAA during the Intake Phase before they can be considered within the scope of an APRT.

- Nominal Use Case
    - A pilot reports their position to an ATCS, who is able to visually verify the aircraft's position report;
    - The ATCS may use the APRT to support the visual observation of the aircraft and other traffic; and
    - The ATCS then uses the visual observations and pilot reports with the support of the APRT to determine and provide instructions and information to pilots.
- Wrong Airport Landings
    - The pilot provides an inbound position report to the ATCS. Unknown to the pilot and ATCS, the pilot is approaching the destination airport, but is on the wrong frequency;
    - The ATCS scans the airspace and does not observe the aircraft in the reported position;
    - The ATCS uses the APRT to support the visual scan. The aircraft's target is not displayed within the vicinity of the airport on the APRT; and
    - The ATCS solicits the pilot for additional information, and together identify and mitigate a potential wrong airport landing.

- Aircraft Not in Communication with the Tower
    - An aircraft not in radio communications (e.g., NORDO) enters the airspace;
    - The ATCS observes a target on the APRT that the ATCS has not received communication from. The ATCS uses the information from the APRT to support the visual observation of the traffic; and
    - The ATCS attempts to contact the aircraft and issues mitigating instructions and alerts to traffic impacted.
- Distressed Aircraft / Emergency Services
    - A pilot declares an emergency and must make an emergency landing before reaching the airfield;
    - The ATCS uses the APRT to observe the target; and
    - The ATCS is able to provide approximate aircraft location to expedite emergency & rescue services.

## 1.2 System Overview

The APRTs are intended to provide supplemental situational awareness for ATCS's in performing their current set of services. No additional services will be authorized by the installation of an APRT. Situational awareness is defined, per section 2-6-1 of JO 7210.3, Facility Operation and Administration as:

> *A continuous extraction of environmental information, integration of this information with previous knowledge to form a coherent mental picture, and the use of that picture in directing the further perception and anticipating future events. Simply put, situational awareness means knowing what is going on around you.*

Systems providing surveillance situational awareness can vary significantly in terms of form, complexity, and capabilities. The form for an APRT could range from a flight tracking service that feeds real time data to a laptop located in the tower to surveillance sensors that process and display local traffic data. There are no limits identified relative to surveillance sensors as they can consist of Automatic Dependent Surveillance - Broadcast (ADS-B), radar, multilateration or any combination of sensors; the applicant, however, must ensure the sensors used solely contribute to an accurate and useful display of the relevant airspace.

As with form, there is a broad range of complexity for potential APRTs. Use of flight tracking services may limit the local hardware to a laptop computer. Use of multiple local sensor technologies can greatly increase complexity as this would require data processing functions to fuse the individual sensor data prior to its display to avoid time variations and prevent duplicate targets.

The capabilities of the APRT can also vary greatly. A very simplistic fixed display of aircraft targets overlayed on a map of basic airport features (e.g., runways, taxiways) will meet this system overview. Systems of greater capabilities may include enhanced map features, range adjustability and incorporation of waypoints or traffic patterns. Applicants must ensure the APRTs do nothing to confuse or distract ATCSs from safely controlling traffic.

## 1.3 Functional Description

The APRT system is composed of the following list of functions: Target Data, Data Processing, and Display. The functional description is not intended to imply a particular architecture. The following subsections define the generic functions that each APRT system is expected to provide.


Figure 1-1 APRT Functional Block Diagram

The following functions have been identified as the functionality to be expected from an applicant's APRT system. Optional outputs identified in Appendix B were considered in preparation of these requirements, where minimum requirements have been identified for these outputs. If an applicant proposes the use of an APRT system that incorporates features or capabilities beyond those identified in this document, the FAA will require the applicant to provide a system-specific safety assessment to enable those capabilities. No features or use cases that exceed situational awareness will be permitted.

An applicant must not represent a system as being on the ASL unless it is precisely the same, unmodified system. This means, for example, that an applicant may not represent its base system with enhancements as being on the ASL when only the base system was approved by the FAA to be on the ASL. Similarly, an applicant may not represent its base system as being on the ASL when the FAA approved the base system with enhancements to be on the ASL.

### 1.3.1 Target Data Function

This function is the source of capturing target information. It consists of the source of target data, provided by either a sensor (e.g. Automatic Dependent Surveillance-Broadcast (ADS-B) receiver), or data received via the internet from a service provider. At a minimum, the lateral target position is a required output. Optionally, an applicant's design may provide target IDs or data tags as outputs from this function. The target ID serves as a unique identifier for the Data Processing function if multiple data sources are used. A data tag is a graphic overlay associated with a target that displays additional information such as aircraft type, speed, altitude, heading, tail number, call sign, and flight number.

### 1.3.2 Data Processing Function

This function processes target data and combines or formats the data as appropriate to ensure that the same target doesn't appear multiple times, which is particularly important when multiple data sources are being employed. Implementation will depend on the system configuration and may be divided between multiple processing platforms. At a

minimum, the lateral target position is a required output. Optionally, an applicant's design may provide data tags as an output from this function.

### 1.3.3 Display Function

This function is responsible for rendering the display for use by ATC personnel. The airborne targets must be accurately projected on a map of the airport environment. The airport environment map is resident within this function. Optionally, an applicant's design may provide data tags, map overlays, and/or aircraft tracks as outputs from this function. Map overlays are objects depicted on the map of the airport environment, such as local obstructions/elevations, landmarks/reporting points, approach overlays, range rings, and traffic patterns. Aircraft tracks provide historical and/or projected flight trajectories. The display function may optionally incorporate controls or configuration.

# 2. SYSTEM DESIGN APPROVAL PROCESS

SDA is the FAA's formal acceptance of a system intended for non-federal use in the NAS. In accordance with 49 USC Section 44505, the FAA requires applicants to have design approval for each uniquely identifiable configuration of a specific system type that satisfies a specific use case. This signifies the system's configuration (or subsequent modification) is compliant with applicable standards set or accepted by the FAA.

The FAA retains absolute discretion as to whether to allow an applicant to participate in the APRT effort at all or to continue with the SDA process at any stage. Nothing in this document, process, or overall effort bestows upon an applicant any rights, including but not limited to a right to protest or otherwise pursue a legal cause of action against the FAA related to this APRT effort, that do not otherwise already exist under law.

Regardless of whether the applicant's APRT is approved to be on the ASL, the applicant is not, nor shall it hold itself out to be, an agent, partner, or contractor of, or joint ventures with, the United States Government (including the FAA). Any document or communication issued by the FAA as part of this APRT effort must not be construed as an FAA SIR, solicitation, or any other type of invitation for a prospective contract award.

## 2.1 Intake Phase

The purpose of the Intake Phase is to ensure that the applicant's development process, general design, and functionality of the system is a suitable candidate for SDA. An FAA Intake Team made up of representatives from applicable stakeholder organizations will review the supplied artifacts and may request additional information to make a final intake decision. The Intake Phase begins when the FAA receives the applicant's Intake Form and supporting documentation listed in the Objective Summary above. Email the Advanced Systems Design Service (ASDS) Team at non-federal-program@faa.gov to submit an application and required documentation.

## 2.2 Assessment Phase

The FAA will review the submitted APRT C-of-C, requested artifacts identified in the Objective Summary above, and will participate in an FAA-led Operational Evaluation. The artifacts requested may vary depending on system type and use case. Artifacts may differ from documents identified in the C-of-C or this document; however, the applicant is responsible for mapping those differences in the submission to show compliance with the objectives. Documents previously delivered as part of the Intake Phase may require further updating throughout the review.

The intent of the Operational Evaluation is to demonstrate the proposed APRT compliance with the requirements and performance in a real or near real world situation. The system evaluation scope and evaluation site will be established during the SDA Intake Phase and is expected to vary depending on the proposed system. The objectives for the FAA Operational Evaluation are identified as follows:

- The applicant's processes associated with establishing a system are accurate, complete, and usable (e.g., system siting, system installation, establishment of site-specific parameters, site acceptance testing)

- The applicant's training material for operators is accurate and complete
- The applicant's system operates in a stable and consistent manner
- Operational usability of the APRT by ATCSs

## 2.3 National Safety Risk Management (SRM) Panel

The National Safety Risk Management (SRM) Panel is an FAA led process. The purpose for assembling a National SRM Panel is to identify the inherent residual risks for operation of the vendor's specific APRT within the NAS. This is beneficial in reducing the burden for individual installation sites (i.e., local SRM), relative to evaluation of residual risks. In accomplishing this, the SRM Document will be generated by the FAA with the following objectives:

- Identify explicit approved configuration(s) for the applicant's system
- Identify any restrictions in the following areas associated with safety risk mitigation:
    - Siting, installation, and configuration settings
    - System operational usage
    - System monitoring and maintenance
- Identify FAA acceptance of the residual risk

The National SRM Document is to be prepared in accordance with the FAA Air Traffic Organization (ATO) Safety Management System Manual.

## 2.4 Notice of Final Decision

The applicant will receive formal correspondence of the FAA's decision. An approval letter will document pertinent information with respect to the system assessed, including details (e.g., part number, version) that identify the approved configuration, along with any constraints or limitations. If approved within the FAA's sole discretion, the system will be added to the FAA's list of approved non-federal systems. Approvals only apply to the configuration(s) assessed by the FAA.

Upon receipt of the letter, applicants may market their approved system to non-federal sponsors as FAA Approved for Use in the National Airspace System in accordance with the approval and any documented restrictions developed during the assessment. Applicants cannot market the system as FAA-approved for use in the NAS unless and until an approval letter from the FAA is received.

The FAA reserves the absolute discretion to remove an approved system from the ASL at any time, for any reason or no reason at all. Such a decision is not appealable. Immediately upon receipt of notice from the FAA of the system's removal from the ASL, the applicant/vendor must cease all marketing/representations indicating its system is approved by the FAA and must delete or otherwise remove any existing such marketing/representations.

The FAA may issue a letter discontinuing the SDA review at any point in the process. If an applicant is permitted to resubmit a new proposal, such permission will be provided in the letter. Any resubmission will start over at the beginning of the process. Previous viability does not guarantee a resubmitted proposal will be viable.

As stated above, an applicant must not represent a system as being on the ASL unless it is precisely the same, unmodified system. This means, for example, that an applicant may not represent its base system with enhancements as being on the ASL when only the base system was approved by the FAA to be on the ASL. Similarly, an applicant may not represent its base system as being on the ASL when the FAA approved the base system with enhancements to be on the ASL.

### 2.4.1 System Modifications Require Approval

In accordance with 14 CFR Part 171 regulations, the FAA must approve any modifications to the approved configuration before installation and operation in the NAS, including, but not limited to the following: software updates, hardware updates, changes to the use case, and change of parts due to obsolescence. To officially complete the process and receive documented approval, you need to submit a formal modification request for processing following the Intake Process.

# APPENDIX A - MINIMUM TECHNICAL AND PERFORMANCE REQUIREMENTS

The requirements for APRT systems contained in this appendix utilize the following conventions:

a. **Must** – This is a mandatory requirement (e.g., The APRT system must display airborne targets only).
b. **Should** – This is a recommendation. The function "should" perform in this manner (e.g., The APRT map should include range rings).

All the requirements in this appendix are tagged with a unique requirement identifier as [Rxxx] or [Nxxx].

where "xxx" is a unique numerical value
"R" identifies minimum requirements (must) and
"N" identifies a recommendation (should)

## A.1 System Requirements

The APRT system must [R001] have two System States: ON and OFF. A System State of OFF means no system functionality is active. A System State of ON means at least some system functionality is active.

The APRT system should [N002] have the following system modes:

- Online: indicates that the system is fully functioning
- Degraded: indicates that the system is functional, but a fault has been detected
- Offline: indicates that the system is not available for operational use

The APRT system must [R003] provide an indication of the System State and System Mode (if applicable) to ATCS.

The APRT system must [R004] include a means to confirm proper configuration of hardware, software, and site-specific files.

## A.2 Functional and Performance Requirements

For additional information regarding required and optional functions, characteristics, and inputs and outputs, see Appendix B - Functional Assessment.

The APRT system must [R005] display airborne targets only.

The applicant must [R006] identify failure modes (if applicable) that could lead to duplicate targets and explain how they have been addressed.

The APRT system must [R007] detect and display individual targets (those the system is capable of tracking) within a minimum coverage volume of 5 nautical miles (NM) from the airport reference point and at least 3,500ft above ground level (AGL).[1,2]

- *Note: For example, an ADS-B only system is not required to detect aircraft not equipped with ADS-B.*

The applicant's coverage volume should [N008] be configurable.

- *Note: Applicants may choose to expand their coverage volume outside of the minimum coverage volume.*

The APRT system must [R009] only display targets that are within the applicant's coverage volume.

The APRT system must [R010] detect individual targets (those the system is capable of tracking) within the applicant's coverage volume with a probability greater than or equal to 95% per update.[2]

Targets within the applicant's coverage volume must [R011] be displayed with a lateral accuracy better than or equal to 0.5NM. The total lateral accuracy needs to consider sensor accuracy, update rate, latency, map display accuracy, and impact of fusion algorithms.

The APRT map should [N012] use the airport reference point as the center of the display.

The APRT map must [R013] include the runway(s) and heliport(s) as static (i.e., not removable) markers.

The APRT map overlays should [N014] include obstructions (e.g., radio towers), landmarks, and charted VFR reporting points.

The APRT system should [N015] allow users to add reference points to the APRT map.

The APRT map should [N016] include range rings.

The APRT overlays must [R017] be implemented in a manner that does not obscure targets and associated data tag(s).

The APRT map should [N018] allow static markers to be dimmable.

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[1] *See Appendix A.2.1 for additional information regarding coverage volume.*

[2] *For example, an ADS-B only system is not required to detect aircraft not equipped with ADS-B.*

The APRT system should [N019] allow the operator the capability of removing all optional outputs simultaneously.[3]

The APRT system must [R020] provide user controls for brightness.

The lateral positions of all required and optional outputs must [R021] be displayed with respect to a common coordinate frame and scale.

### A.2.1 Applicant Coverage Volume

The intent of Figure B-1 is to provide clarity between the terms:

- Minimum Coverage Volume
- Applicant's Coverage Volume
- Configurable Coverage Volume

The "minimum coverage volume" identified by the inner region of the figure is defined by requirement [R007]. All airborne targets (note that [R005] excludes ground targets) within the "minimum coverage volume" are required to be displayed.

An applicant is expected to define their "applicant coverage volume", which is required to encompass the "minimum coverage volume" and is represented by the outer region in the figure. Multiple requirements are imposed on the "applicant coverage volume" including display of all targets [R009], meet display probability of 95% [R010] and meeting 0.5NM accuracy [R011].

The applicant is recommended to have a "configurable service volume" [N008] as depicted by the dotted line region in the Figure. All "applicant coverage volume" requirements apply to the "configurable service volume" when the configured service volume is used.

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[3] *See Appendix B for more information regarding optional outputs.*

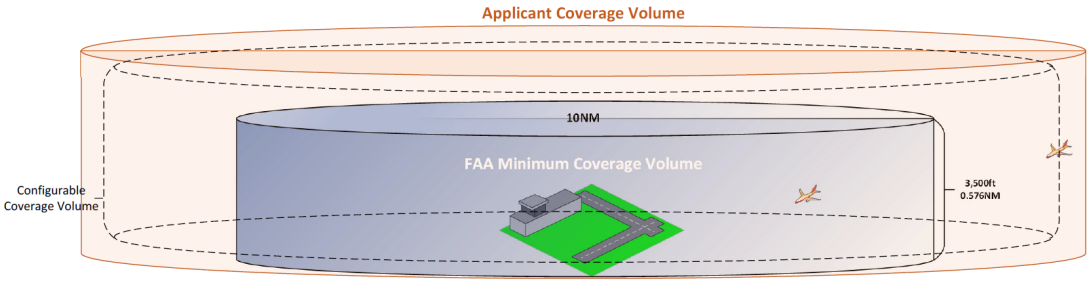


Figure B-1 Applicant Coverage Volume

## A.3 Integration Requirements

The APRT system must [R022] not connect to any FAA networks, with the exception of System Wide Information Management (SWIM) approved NAS Enterprise Security Gateway (NESG) or SWIM) Cloud Distribution Service (SCDS).

If connected to FAA SWIM via either the NESG or SCDS, the APRT system must [R023] not be allowed to receive unfiltered SWIM data containing Sensitive Unclassified Information (SUI)[4]. Filtered SWIM data, which does not contain SUI, is the only FAA SWIM data available to the APRT system.

The APRT system must [R024] not receive FAA data from an FAA contractor and/or vendor that is in possession of FAA flight data because of their contractual relationship with the FAA, unless that contractor and/or vendor has a provision in their FAA contract that specifically allows further distribution of filtered FAA flight data, with all SUI removed to third parties.

The APRT system must [R025] not receive any FAA radar surveillance data via either the NESG or a direct connection to the NAS. FAA radar surveillance data contains SUI, and it is not technically possible to filter the radar data to remove all SUI.

The APRT system must [R026] be designed to operate in the intended usage environment (e.g., indoor controlled and outdoor uncontrolled).

The APRT system earth grounding, AC power ground, bonding, shielding, and transient protection at the facility interface must [R027] meet the requirements specified by the NFPA 70®, National Electrical Code (NEC)® (Quincy: National Fire Protection Association).

[4] As defined in FAA Order 1375.1 Data and Information Management Policy

The APRT equipment must [R028] be compatible with facility power quality requirements specified by the NEC.

The APRT system equipment must [R029] meet the electromagnetic emissions requirements specified in 47 CFR Part 15 Radio Frequency Devices.

### A.4 Human Factors Requirements

The APRT display must [R030] have an identifier indicating that the tool is "Situational Awareness Use Only".

The design of the controls and displays should [N031] be consistent with FAA HF-STD-001 Human Factors Design Standard §§ 5.6, 5.7.

The design of the APRT system controls should [N032] provide consistent and predictable outcomes in relation to ATCS inputs. [FAA HF-STD-001 Human Factors Design Standard §§ 5.4.1.1.2.1, 5.2.10.17, 5.4.3.1.3, 5.4.3.1.4, 5.4.1.3.5, 5.4.3.1.6, 5.4.3.3.11].

### A.5 Safety and Reliability, Maintainability, and Availability (RMA) Requirements

The APRT system should [N033] have a minimum Mean Time Between Critical Failures (MTBCF) of 2,190 hours.

### A.6 Information Systems Security Requirements

The applicant must [R034] complete a Non-federal APRT System Information Document.

The applicant should [R035] submit a System Security Plan (SSP) to ensure compliance with best practices.

- *Note: The SSP is a recommendation for best practices for Non-federal APRTs. SSP controls were written in accordance with National Institute of Standards and Technology (NIST) Special Publication (SP) 800-18, Revision 1, Guide for Developing Security Plans for Information Technology Systems.*

# APPENDIX B - FUNCTIONAL ASSESSMENT

| FUNCTION | REQUIRED OUTPUT | OPTIONAL OUTPUT | KEY CHARACTERISTICS |
|---|---|---|---|
| Target Data | Lateral Target Position (Individual Aircraft) | Target ID[1]<br>Data Tag[2] | Accuracy<br>Latency<br>Completeness<br>Update Rate |
| Data Processing | Lateral Target Position (Fused) | Data Tag[2] | Accuracy<br>Latency<br>Completeness<br>Update Rate |
| Display | Map of the Airport Environment<br>Lateral Target Position | Data Tag[2,3]<br>Map Overlay[4]<br>Aircraft Track[5] | Accuracy<br>Latency<br>Completeness<br>Update Rate<br>Display Range[3] |

1. Target ID may be necessary if multiple data sources are used to avoid showing multiple targets for a single aircraft (i.e., unique identifier).
2. Data Tag may include any or all the following but are not limited to: Aircraft Type, Speed, Altitude, Heading, Tail Number, Call Sign, Flight Number, etc.
3. The display of these items may be adjustable via user controls.
4. Local obstructions/elevations, landmarks/reporting points, approach overlays, traffic pattern.
5. Aircraft track may include history as well as projected flight trajectories.

# APPENDIX C - ACRONYMS

## *A*

ADS-B
Automatic Dependent Surveillance - Broadcast 6
AGL
Above Ground Level 13
APRT
Airborne Position Reference Tool 4
ASDS
Advanced Systems Design Service 9
ASL
Approved System List 4
ATCS
Air Traffic Control Specialist 4
ATCT
Airport Traffic Control Tower 4
ATO
Air Traffic Organization 10

## *C*

CFR
Code of Federal Regulations 16
CTRD
Certified Tower Radar Display 4

## *F*

FAA
Federal Aviation Administration 4

## *J*

JO
Job Order 5

## *M*

MTBCF
Mean Time Between Critical Failures 16

## *N*

NAS
National Airspace System 4
NEC
National Electric Code 15
NESG
NAS Enterprise Security Gateway 15

NFPA
National Fire Protection Association 15
NIST
National Institute of Standards and Technology 16
NM
Nautical Mile 13

## *O*

ONA
Operational Needs Assessment 4

## *R*

RMA
Reliability, Maintainability, and Availability 16

## *S*

SCDS
SWIM Cloud Distribution Service 15
SDA
System Design Approval 4
SIR
Screening Information Request 4
SP
Special Publication 16
SRM
Safety Risk Management 10
SSP
System Security Plan 16
SUI
Sensitive Unclassified Information 15
SWIM
System Wide Information Management 15