EUROCONTROL Guidelines for Area Proximity Warning - Part I

Concept and Requirements

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EUROCONTROL Guidelines for Area Proximity Warning

Part I - Concept and Requirements

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Abstract

These Guidelines specify the minimum requirements and provide comprehensive guidance for the definition, implementation, optimisation and operation of Area Proximity Warning (APW).

Part I, **this document**, describes the APW concept of operations as well as the specific requirements on APW.

Part II contains overall guidance for the complete lifecycle of APW.

Part III specifies a generic example of an APW implementation as well as detailed technical guidance for optimisation of APW.

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EXECUTIVE SUMMARY

These Guidelines specify the minimum requirements and provide comprehensive guidance for the definition, implementation, optimisation and operation of Area Proximity Warning (APW).

Ground-based safety nets are functionalities within the ATM system with the sole purpose of monitoring the environment of operations in order to provide timely alerts of an increased risk to flight safety.

APW is a ground-based safety net that warns the controller about unauthorised penetration of an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement of the required spacing to that airspace volume.

The main objective of these Guidelines is to support ANSPs in the definition, implementation, optimisation and operation of APW by means of:

- Part I, **this document**, describing the APW concept of operations as well as the specific requirements on APW
- Part II containing overall guidance for the complete lifecycle of APW
- Part III specifying a generic example of an APW implementation and providing detailed guidance for optimisation and testing of APW

Together with similar Guidelines for Short Term Conflict Alert (STCA), Minimum Safe Altitude Warning (MSAW) and Approach Path Monitor (APM) these Guidelines provide “Level 3” documentation for evolutionary improvement of ground-based safety nets, i.e.:

- “Level 1” – documented in the EUROCONTROL Operational Requirement Document for EATCHIP Phase III ATM Added Functions (Volume 2), published in 1998 with emphasis on automation
- “Level 2” – documented in EUROCONTROL Specifications and Guidance Material for STCA, MSAW, APM and APW, published in 2007-2008 providing a broader context than automation alone, e.g. pointing out the importance of policy, organisational clarity and training
- “Level 3” – documented in EUROCONTROL Guidelines for STCA, MSAW, APM and APW, published in 2017 incorporating the results of SESAR I as well as lessons learned

1. Introduction

1.1 Objective of this document

These Guidelines are aimed at all Air Navigation Service Providers (ANSPs) in the EUROCONTROL Member States (41) and Comprehensive Agreement States (2). Part I (this document) specifies the minimum requirements for the development, configuration and use of Area Proximity Warning (APW). APW is a ground-based safety net intended to warn the controller about unauthorised penetration of an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement of the required spacing to that airspace volume.

The European Single Sky Implementation (ESSIP) contained an Objective (ATC02.5) for standardisation of APW in accordance with the EUROCONTROL Guidelines for APW (this document). This document specifies, in qualitative terms, the common performance characteristics of APW as well as the prerequisites for achieving these performance characteristics.

Note 1: ESSIP Objective ATC02.5 referred to “Level 2” APW whist this document refers to “Level 3” APW (see Executive Summary for explanation). However, the minimum requirements specified in this document are identical to those specified in “Level 2” documentation. The traceability between “Level 2” and “Level 3” documentation is contained in Table 1.

Note 2: Whilst the implementation of ESSIP Objective ATC02.5 has been completed, ANSPs are required to continue to operate and ensure the effectiveness of APW in the context of an evolving operational environment. Hence, the “Level 3” documentation provides support for evolutionary improvement of APW.

It should also be noted that Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation) contains, inter alia, the following essential requirements:

- *“Systems and operations of the EATMN shall achieve agreed high levels of safety. Agreed safety management and reporting methodologies shall be established to achieve this.”*
- *“In respect of appropriate ground-based systems, or parts thereof, these high levels of safety shall be enhanced by safety nets which shall be subject to agreed common performance characteristics.”*

In accordance with the Indicative roadmap with respect to standardisation and regulatory needs[1] EUROCONTROL has undertaken a standardisation activity to produce Guidelines for Area Proximity Warning.

These Guidelines have been developed in support of the deployment of ATM Functionality (AF) 3: “Flexible Airspace Management and Free Route”, sub-functionality “Free Route” as well as Operational Improvement (OI) Step AOM-0501 “Free Routing for Flights both in cruise and vertically evolving within low to medium complexity environments” from the ATM Master Plan.

These Guidelines facilitate harmonisation of the APW elements of the ground based safety nets and sets up the prerequisites for the refinement, in quantitative terms, of the common performance characteristics which might be developed in a further step in response to the requirements of the SES interoperability Regulation.

This document is targeted at stakeholders identified in ESSIP ATC02.5, and the requirements are placed on ANSPs.

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[1] REFERENCE AND SUPPORTING MATERIAL - (EC) NO 716/2014 - ARTICLE 4(B); Indicative roadmap with respect to standardisation and regulation needs

1.2 EUROCONTROL Guidelines

EUROCONTROL guidelines, as defined in EUROCONTROL Regulatory and Advisory Framework (ERAF), are advisory materials and contain:

"Any information or provisions for physical characteristic, configuration, material, performance, personnel or procedure, the use of which is recognised as contributing to the establishment and operation of safe and efficient systems and services related to ATM in the EUROCONTROL Member States."

Therefore, the application of EUROCONTROL guidelines document is not mandatory.

In addition, EUROCONTROL Regulatory and Advisory Framework specifies that:

"EUROCONTROL Guidelines may be used, inter alia, to support implementation and operation of ATM systems and services, and to:

- *complement EUROCONTROL Rules and Specifications;*
- *complement ICAO Recommended Practices and Procedures;*
- *complement EC legislation;*
- *indicate harmonisation targets for ATM Procedures;*
- *encourage the application of best practice;*
- *provide detailed procedural information."*

1.3 Structure of the document

Part I is structured as follows:

- Chapter 1 describes the purpose, scope and structure of the document.
- Chapter 2 describes the APW concept of operations. It provides the contextual information for interpretation of the requirements contained in Chapter 3.
- Chapter 3 specifies the minimum qualitative requirements that are regarded as necessary for effective APW. It does not prescribe implementation aspects. Only the *minimum* requirements that are considered essential for ensuring the effectiveness of APW in the area of EUROCONTROL Member States (41) and Comprehensive Agreement States (2) are specified. These requirements are necessarily of a qualitative nature considering the implications of local factors that need to be considered.
- Chapter 4 lists reference documents, explains terms and contains a list of abbreviations.

1.4 Use of this document

This document is intended to be read and used by all Air Navigation Service Providers (ANSPs) in the EUROCONTROL Member States (41) and Comprehensive Agreement States (2).

EUROCONTROL makes no warranty for the information contained in this document, nor does it assume any liability for its completeness or usefulness. Any decision taken on the basis of the information is at the sole responsibility of the user.

1.5 Conventions

The requirements in this chapter are normative in the sense that:

- ***"Shall"*** - requirements are mandatory to claim compliance with the Guidelines. Mandatory requirements are explicitly numbered with the prefix "APW-"
- ***"Should"*** - indicates a recommendation or best practice, which may or may not be applied
- ***"May"*** indicates an optional element
- ***"Will"*** denotes a statement of intent

Use of the word "shall" is avoided in Chapter 2 of Part I as well as in Part II and Part III of these Guidelines in order to emphasise the introductory and explanatory rather than normative nature of the information provided.

Some of the terms in section 4.2 and the requirements on procedures in section 3.2 are derived from paragraph 15.7.4 of ICAO Doc 4444. Any differences in formulation are intended to remove ambiguity and not to imply deviation from ICAO provisions.

2. APW concept of operations

2.1 Purpose of APW

As illustrated in Figure 1, today's ATS system is human centred; based on processing of a continuous stream of information, the controller issues clearances and instructions to prevent or resolve conflicts.

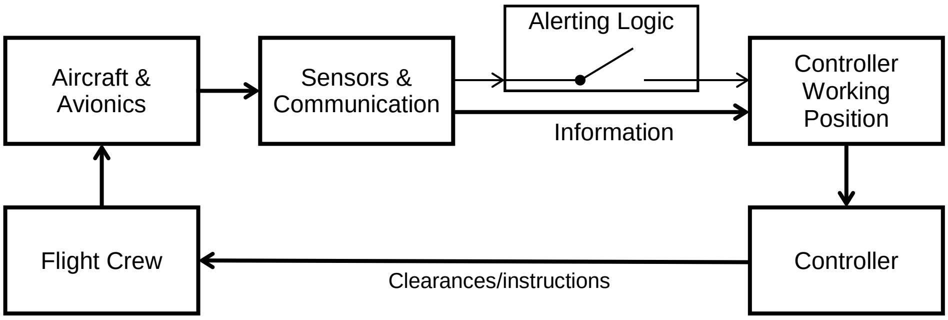

Figure 1: Simplified ATC control loop

However, the drive for consistency in cognitive information processing tasks leads to selective perception/exposure, selective attention and selective interpretation. As a result, actual or potential hazardous situations related to aircraft position can remain unnoticed.

APW adds independent alerting logic to the control loop in order to warn the controller about unauthorised penetration of an airspace volume by generating alerts of existing or pending situations, related to the position and speed of an aircraft relative to that airspace volume, which require attention/action. APW can have one or more roles, such as:

- Warn the controller about unauthorised penetration of controlled flights into restricted airspace
- Warn the controller about unauthorised penetration of uncontrolled flights into controlled airspace

APW is intended to function in the short term, if applicable providing warning times of up to 2 minutes.

2.2 Prerequisites for effective APW

2.2.1 Mature safety management system

APW is in widespread use during several decades. Effective implementation and operation of APW requires a number of attributes that are inherent to organisations that have adopted a mature Safety Management System. These attributes include:

- Management commitment, demonstrated by a formal policy for the use of APW and making available sufficient resources for a total life cycle approach
- Team effort, involving operational experts, technical experts, safety experts and air traffic controllers in ANSPs, working together with Industry and Regulators
- Sustained effort to optimise and improve APW, exploiting new technological developments and adapting for an increasingly complex operational environment

2.2.2 Adequate surveillance infrastructure

Conventional Mode 3A/C SSR infrastructure may still be sufficient for effective APW in less complex operational environments.

Mode S SSR infrastructure is an essential enabler for effective APW in more complex operational environments.

Complementary Multi-lateration infrastructure could be needed to obtain effective APW at lower altitudes with demanding terrain.

2.2.3 Sufficient transponder equipage

APW can only generate alerts for aircraft that are equipped with pressure altitude-reporting transponders. APW will be more effective for altitude-reporting in 25 ft increments rather than 100 ft increments, provided that the surveillance infrastructure can exploit the benefits of such reporting.

2.3 Operational context

When APW was first introduced, ATS surveillance services were in most cases provided using mixed (raw radar data supplemented with computer-generated synthetic data) situation displays. In the meantime, the norm for provision of ATS surveillance services has become full-synthetic situation displays. Decision support tools are gradually being introduced to enable the controller to handle more traffic in order to cope with the ever increasing demand. At the same time, automated support systems have become more robust and trustworthy but also more complex and interdependent. These changes imply a different operational context for APW.

Note: Ground-based safety nets and decision support tools are different. Ground-based safety nets are exclusively intended to increase safety and they do not change the way of working of the controller. Decision support tools are intended to increase the overall performance of the system (often by providing a combination of capacity, efficiency and safety benefits), and may change the way of working of the controller.

It is essential that individual ANSPs establish a clear APW policy for their particular operational context to avoid ambiguity about the role and use of APW using the following generic policy statements as a starting point:

APW IS A GROUND-BASED SAFETY NET; ITS SOLE PURPOSE IS TO ENHANCE SAFETY AND ITS PRESENCE IS IGNORED WHEN CALCULATING SECTOR CAPACITY.

APW IS DESIGNED, CONFIGURED AND USED TO MAKE A SIGNIFICANT POSITIVE CONTRIBUTION TO PREVENTION OF ACCIDENTS ARISING FROM UNAUTHORISED PENETRATION OF AN AIRSPACE VOLUME.

APW is only effective if the number of nuisance alerts remains below an acceptable threshold according to local requirements and if it provides sufficient warning time to resolve hazardous situations, governed by the inherent characteristics of the human centred system.

Figure 2 illustrates the nominal sequence of events to resolve a particular situation as two loosely coupled loops. Being a human centred system, the Ground loop reflects the states of the controller and the Air loop reflects the states of the flight crew. For each state transition to occur certain preconditions have to be met and actions performed, complicated by many fixed or variable delays and anomalous cases.

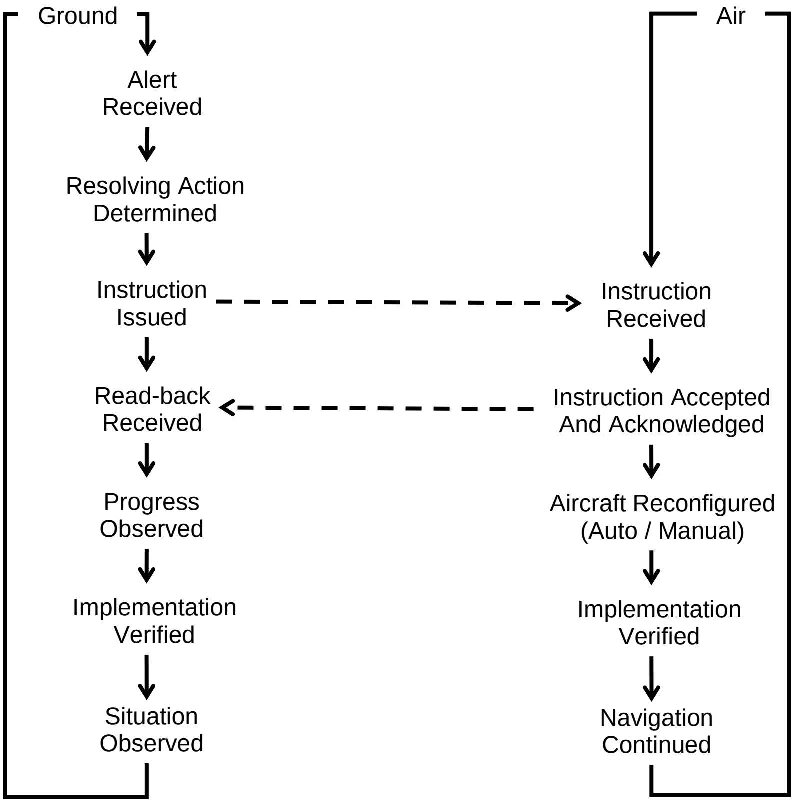

Figure 2: Expanded ATC control loop (triggered by APW)

2.4 Operational concept

2.4.1 Human performance considerations

In order to be able to process all available information, the controller must acquire situational awareness and build a mental model of the airspace and traffic pattern. To control the situation and make decisions, the controller has to establish strategies and tactics to handle the traffic flows and conflicts.

The use of APW will depend on the controller's trust. Trust is a result of many factors such as reliability and transparency. Neither mistrust nor complacency is desirable; training and experience is needed to develop trust at the appropriate level (see [EURO-HRS]).

For APW to be effective, the controller must have a positive attitude towards APW. This requires that the following aspects are addressed:

- **Appropriateness and timeliness**

  The rule set for generating alerts should be appropriate; dissonance with normal control practices should be avoided.

- **Effectiveness**

  The controller in charge may not notice or recognise the reason for an alert for the same reasons that left the potentially hazardous situation undetected. This should be addressed in HMI design.

- **Comprehensibility and performance monitoring**

  The increasing complexity of APW and the environment in which it is used should be addressed through appropriate training and competency assessment. Practices and controller perception of the effectiveness of APW should be evaluated periodically and following changes to APW. Lessons from particular situations or incidents in which APW was involved should be shared through appropriate mechanisms.

2.4.2 Design considerations

APW should perform in concert with the airspace design and classification, variety of airspace users, Flexible Use of Airspace (FUA) and the applicable procedures for air navigation services. In order to accommodate FUA through real-time updates of airspace booking data (airspace volumes and booking times), consideration should be given to interface APW with airspace booking tools.

Special consideration should be given to making all ground-based safety nets and controller tools perform in concert.

Dependent on the diversity of these aspects, APW should be capable of using different parameters for generation of alerts. Different parameters may be applied in the case of system degradation (e.g. unavailability of one or more radar stations).

Local instructions concerning the use of APW should be established to ensure that APW is used in a safe and effective manner. Pertinent data should be regularly analysed in order to monitor and optimise the performance of APW.

2.4.3 Technical aspects

APW is suitable for use in any airspace covered by adequate surveillance.

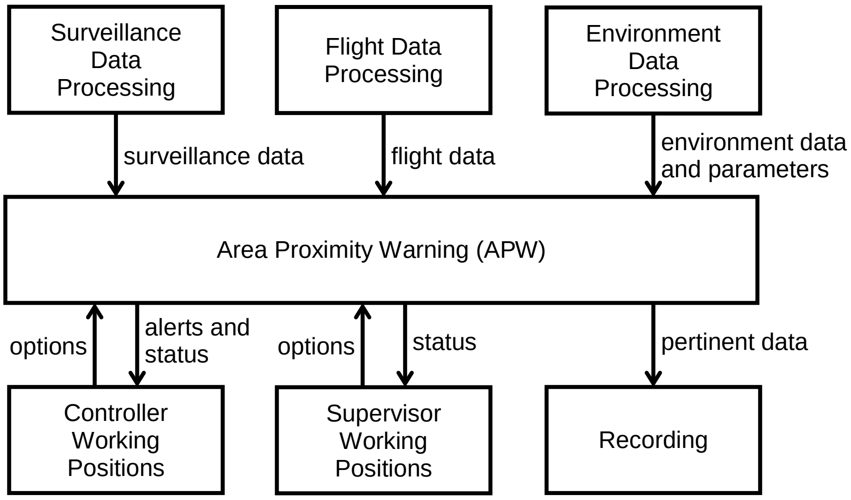
Surveillance Data Processing
Flight Data Processing
Environment Data Processing
surveillance data
flight data
environment data and parameters
Area Proximity Warning (APW)
options
alerts and status
options
status
pertinent data
Controller Working Positions
Supervisor Working Positions
Recording

Figure 3: APW context diagram

As illustrated in Figure 3, APW should obtain information from Surveillance Data Processing, from Environment Data Processing and possibly from Flight Data Processing in order to generate alerts:

- Surveillance data
  - State vector and tracked pressure altitude information: to predict or detect hazardous situations
  - Selected Vertical Intent: to increase relevance of conflict prediction

    Note: Although Selected Vertical Intent downlinked from the aircraft will sometimes be QNH corrected it is commonly referred to as the Selected Flight Level (SFL), which is the term used in these Guidelines.

- Flight data should be used as follows:
  - Type/category of flight/flight rules: to determine the eligibility for alert generation and possibly also the parameters applied
  - Concerned sector(s): to address alerts
  - Cleared/Block Flight Levels: to increase the relevance of alert generation
  - Manually entered Flight Levels: to compensate for missing pressure altitude information
  - RVSM status of aircraft to determine appropriate spacing from the volume of airspace
- Environment data and parameters should include:
  - Airspace volumes
  - Alerting parameters
  - Airspace booking data (airspace volumes and booking times, updated in real-time by airspace booking tools)

Alerts should be generated at least at a Controller Working Position of the control sector responsible for the infringing aircraft and/or for the airspace subject to unauthorised penetration. Status information regarding the technical availability of APW is to be provided to all Working Positions. Selectable options of APW related to eligibility, configuration and technical availability may be available at Controller and Supervisor Working Positions.

All pertinent APW data should be recorded for offline analysis.

2.5 Safety aspects

It is assumed that EUROCONTROL Safety Regulatory Requirements are effectively implemented. It is recommended to put emphasis on [SRC-ESARR4] and its guidance material for the implementation of, and changes to, APW applications.

2.6 Future directions and need for change

APW will have to meet future demands imposed by, amongst other things, further traffic increase, changing traffic patterns, changing aircraft characteristics, further automation in the air and on the ground and, potentially, the introduction of new concepts.

The compatibility of APW and other ground-based and airborne safety nets needs to be maximised.

This could, amongst others, lead to changes in the following aspects of APW:

- Correlation of ATC constraints with aircraft intent in order to further reduce the number of nuisance alerts
- Increased look ahead time and multi-level or different types of alerts
- Correlation of alerts from multiple sources (on the ground and in the air) to generate combined alerts

3. Specific requirements

3.1 Policy, organisational clarity and training requirements

3.1.1 Policy

APW-01 The ANSP ***shall*** have a formal policy on the use of APW consistent with the operational concept and safety management system applied to avoid ambiguity about the role and purpose of APW.

The policy ***should*** be consistent with the generic policy statements in section 2.3 of these Guidelines but ***may*** contain more detail or additional aspects called for by local factors.

The policy ***should*** be communicated to all relevant staff in order to ensure consistency of all design, configuration, operational use and monitoring activities in compliance with the intended use of APW.

3.1.2 Responsibility for management of APW

APW-02 The ANSP ***shall*** assign to one or more staff, as appropriate, the responsibility for overall management of APW.

It ***should*** be possible for other staff in the organisation to identify the assigned staff. The assigned staff ***should*** seek advice from the APW manufacturer, as appropriate.

3.1.3 Training and competence

APW-03 The ANSP ***shall*** ensure that all controllers concerned are given specific APW training and are assessed as competent for the use of the relevant APW system.

Note: The primary goal of the training is to develop and maintain an appropriate level of trust in APW, i.e. to make controllers aware of the likely situations where APW will be effective and, more importantly, situations in which APW will not be so effective (e.g. sudden, unexpected manoeuvres).

3.2 Requirements on procedures

3.2.1 Local instructions

APW-04 Local instructions concerning use of APW ***shall*** specify, *inter alia*:

a) The types of flight (GAT/OAT, IFR/VFR, etc.) which are eligible for generation of alerts

b) The volumes of airspace within which APW is implemented

c) The method of displaying the APW to the controller

d) In general terms, the parameters for generation of alerts as well as alert warning time

e) Procedures for and methods of defining and activating/deactivating volumes of airspace

f) The volumes of airspace within which APW can be selectively inhibited and the conditions under which this will be permitted

g) Conditions under which specific alerts may be inhibited for individual flights

h) Procedures applicable in respect of volumes of airspace or flights for which APW or specific alerts have been inhibited

3.2.2 Controller actions

APW-05 In the event an alert is generated in respect of a controlled flight, the controller ***shall*** without delay assess the situation and if necessary take action to ensure that the required spacing to that airspace volume will not be infringed or will be restored. If that is not possible the controller ***shall*** take action to mitigate the consequences of the unauthorised penetration.

3.2.3 APW performance analyses

APW-06 APW performance ***shall*** be analysed regularly to identify possible shortcomings related to APW.

3.2.4 Statistical Analyses

The appropriate ATS authority ***should*** retain electronic records of all alerts generated. The data and circumstances pertaining to each alert ***should*** be analysed to determine whether an alert was justified or not. Non-justified alerts ***should*** be used to further optimise APW in order to minimise the number of nuisance alerts. A statistical analysis ***should*** be made of justified alerts in order to identify possible shortcomings in airspace design and ATC procedures as well as to monitor overall safety levels.

3.3 Requirements on APW capabilities

3.3.1 Alerting performance

APW-07 APW ***shall*** detect and alert operationally relevant situations for eligible aircraft.

APW-08 APW ***shall*** provide alerts for operationally relevant situations.

Note 1: Situations are operationally relevant when covered by the adopted rule set and optimisation strategy. The rule set and optimisation strategy should be determined taking into account the relevant local factors.

Note 2: Optimisation aims to maximise the number of operationally relevant situations which are alerted with adequate warning time and minimise the number of nuisance alerts. As a balance must be struck, APW should not be expected to alert all operationally relevant situations with adequate warning time.

APW-09 APW alerts ***shall*** attract the controller's attention and identify the aircraft involved in the situation; APW alerts ***shall*** be at least visual.

An airspace volume identification element ***may*** be included to improve the controller's ability to assess the situation.

An audible element ***may*** be included to improve the system's ability to draw the controller's attention to the alert. If a continuous audible element is included, an acknowledgement mechanism ***may*** be provided to silence an alert.

APW-10 The number of nuisance alerts produced by APW ***shall*** be kept to an effective minimum.

Note: Human factors and local circumstances determine what constitutes an effective minimum.

APW-11 The number of false alerts produced by APW ***shall*** be kept to an effective minimum.

Note: Local circumstances determine what constitutes an effective minimum.

3.3.2 Warning time

APW-12 When the geometry of the situation permits, the warning time ***shall*** be sufficient for all necessary steps to be taken from the controller recognising the alert to the concerned aircraft successfully executing an appropriate manoeuvre.

Note: Warning time may be insufficient in cases of sudden, unexpected manoeuvres.

APW-13 APW ***shall*** continue to provide alert(s) as long as the alert conditions exist.

3.3.3 Alert inhibition

APW-14 APW ***shall*** provide the possibility to inhibit alerts for predefined volumes of airspace and for individual flights.

Note: It may be necessary to inhibit alerts for predefined volumes of airspace to suppress unnecessary alerts. It may be necessary to inhibit alerts for specific flights to suppress unnecessary alerts.

APW-15 Alert inhibitions ***shall*** be made known to all controllers concerned.

3.3.4 Status information

APW-16 Status information ***shall*** be presented to supervisor and controller working positions in case APW is not available.

3.3.5 Adaptability

APW ***should*** be adaptable for the procedures in use in all distinct volumes of airspace.

Where appropriate, APW ***should*** accommodate real-time updates of airspace booking data (airspace volumes and booking times).

APW ***may*** need to take into account the type of flight as well as the specific volume of airspace in which the aircraft is flying, in order to apply appropriate parameters or trajectory estimation. Different parameters ***may*** be applied in the case of system degradation (e.g. unavailability of one or more radar stations).

Where appropriate, APW ***should*** be adaptable to alert situations as, for example:

- Uncontrolled flights penetrating controlled airspace without ATC clearance; and
- Military flights leaving exercise areas.

3.3.6 Data recording

APW-17 All pertinent APW data shall be made available for off-line analysis.

Note: Off-line analysis may need access to other data sources as well (surveillance data and voice recordings) for complete analysis.

4. Conventions regarding terms

4.1 Reference documents

[EURO-HRS]	Guidelines for Trust in Future ATM Systems: Principles, HRS/HSP-005-GUI-03, Edition 1.0, May 2003
[SRC-ESARR4]	ESARR 4: Risk Assessment and Mitigation in ATM, Edition 1.0, 05-04-2001

4.2 Definitions

alert	Indication of an actual or potential hazardous situation that requires particular attention or action.
approach path monitor	A ground-based safety net intended to warn the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of an unsafe aircraft flight path during final approach.
area proximity warning	A ground-based safety net intended to warn the controller about unauthorised penetration of an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement of the required spacing to that airspace volume.
ATS surveillance service	Term used to indicate a service provided directly by means of an ATS surveillance system.
false alert	Alert which does not correspond to a situation requiring particular attention or action (e.g. caused by split tracks and radar reflections).
ground-based safety net	A ground-based safety net is functionality within the ATM system that is assigned by the ANSP with the sole purpose of monitoring the environment of operations in order to provide timely alerts of an increased risk to flight safety which may include resolution advice.
human performance	Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.
nuisance alert	Alert which is correctly generated according to the rule set but is considered operationally inappropriate.
minimum safe altitude warning	A ground-based safety net intended to warn the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles.
short term conflict alert	A ground-based safety net intended to assist the controller in preventing collision between aircraft by generating, in a timely manner, an alert of a potential or actual infringement of separation minima.
warning time	The amount of time between the first indication of an alert to the controller and the predicted hazardous situation. Note 1: The achieved warning time depends on the geometry of the

situation.

Note 2: The maximum warning time may be constrained in order to keep the number of nuisance alerts below an acceptable threshold.

4.3 Abbreviations and acronyms

ADS	Automatic Dependent Surveillance
AGDL	Air-Ground Data Link
ANSP	Air Navigation Service Provider
APM	Approach Path Monitor
APW	Area Proximity Warning
ASM	Airspace Management
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATM	Air Traffic Management
ATS	Air Traffic Service
EATCHIP	European ATC Harmonisation and Integration Programme
EATMN	European Air Traffic Management Network
EC	European Commission
ESARR	EUROCONTROL Safety Regulatory Requirement
ESSIP	European Single Sky Implementation
FUA	Flexible Use of Airspace
GAT	General Air Traffic
HMI	Human Machine Interface
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
MSAW	Minimum Safe Altitude Warning
OAT	Operational Air Traffic
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
RVSM	Reduced Vertical Separation Minima
SES	Single European Sky
SESAR	Single European Sky ATM Research
SFL	Selected Flight Level
SRC	Safety Regulation Commission
STCA	Short Time Conflict Alert
VFR	Visual Flight Rules

ANNEX A

Table 1: Traceability between “Level 2” and “Level 3” documentation for APW

“Level 2” documentation	**“Level 3” documentation**
EUROCONTROL Specification for APW, i.e. the APW concept of operation as well as the specific requirements on APW	EUROCONTROL Guidelines for APW Part I: Concept and Requirements, i.e. as “Level 2” with the following evolutions: • New section 2.2 identifying the prerequisites for effective APW. • Note added explaining the difference between ground-based safety nets and decision support tools (section 2.3). • Guidance for accommodating FUA added (sections 2.4.2, 2.4.3, 3.3.5). • Guidance for use of SFL added (section 2.4.3).
EUROCONTROL Guidance Material for APW, i.e. a general description of the full APW lifecycle, aimed at staff with responsibility for overall management of APW	EUROCONTROL Guidelines for APW Part II: Lifecycle Description, i.e. as “Level 2” with the same evolutions as in Part I.
Appendix A: Reference APW System, i.e. a detailed technical explanation of typical implementation details of APW with emphasis on parameterisation and performance optimisation; optimisation concepts are also covered in detail.	EUROCONTROL Guidelines for APW Part III: Implementation and Optimisation Examples, i.e. as “Level 2” with the same evolutions as in Part I.
Appendix B: Safety Assurance, i.e. a set of three documents that can be used as starting point for APW safety assurance work in a particular local context.	As “Level 3” APW is an evolution of “Level 2” APW, the “Level 2” safety assurance work should be reusable. If required, the “Level 2” guidance remains a valid starting point for safety assurance work and consequently no “Level 3” equivalent has been developed.
Appendix B-1: Initial Safety Argument for APW System, i.e. ANSPs may find it convenient to present the safety argument as a stand-alone document initially, as is the case with this document. However, the argument will ultimately become part of the safety case document and the stand-alone version will then become defunct.	

Appendix B-2: Generic Safety Plan for APW Implementation, i.e. a description of what safety assurance activities should be considered at each lifecycle phase, who should do them, and what the criteria for success are.	
Appendix B-3: Outline Safety Case for APW System, i.e. addressing in detail the assurance and evidence from the System Definition stage and outlining the likely assurance and evidence for the later stages.	
Appendix C: Cost Framework for the Standardisation of APW, i.e. assistance in identifying potential financial implications of standardisation of APW in compliance with the EUROCONTROL Specification for APW.	As “Level 3” APW is an evolution of “Level 2” APW, the “Level 2” financial planning work should be reusable. If required, the “Level 2” guidance remains a valid starting point for financial planning work and consequently no “Level 3” equivalent has been developed.
Appendix D: Optimisation of APW for ATCC Semmerzake, i.e. a description of the (partial) application of the guidance material in a demanding environment.	As “Level 3” APW is an evolution of “Level 2” APW, no “Level 3” equivalent has been developed.
Appendix D-1: Enhancement of APW for ATCC Semmerzake, i.e. identification of potential solutions for a number of issues.	

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