

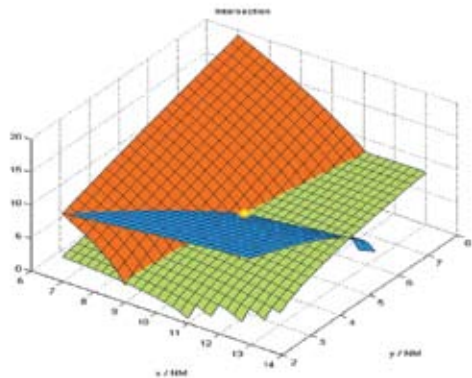
## Purpose

The purpose of this pamphlet is to introduce the approvals guidance documents for Wide Area Multilateration.

It summarises the documents that have been written to support Air Navigation Service Providers (ANSPs) and National Supervisory Authorities (NSAs) and introduces the six key steps to be performed.

## What is WAM?

Wide Area Multilateration (WAM) is a ground-based Independent Cooperative ATM system (like SSR or Mode S). It works by accurately computing the time difference of arrival of a 1090 MHz transponder signal transmitted from an aircraft at a number of distributed ground-based receivers and uses this to calculate the position of origin of the signal (i.e. the position of the aircraft). Conventional SSR, Mode S and ADS-B data that is broadcast from the aircraft can also be 'captured' and made available to the ATC system.



## The approvals process for WAM

WAM is the first distributed surveillance technique for use in civil aviation. It is modular and allows system requirements to be designed against precise operational performance requirements (for example, the service volume).

As WAM performance and coverage is specific to the local environment, and its failure modes differ from other surveillance techniques, the approvals process has been specifically tailored. The on-site process is critical and special care must be taken in validating performance through the operational flight trials.

Guidance notes have been written to help ANSPs and NSAs through the entire WAM implementation lifecycle, including lessons learned from past system deployments. Coverage planning, changes in operations, integration of WAM data into the ATC system and safety, are some of the topics covered.

## Further Information

For more information and to download the approvals process guidance papers, please go to the EUROCONTROL Surveillance Website at:

[www.eurocontrol.int/surveillance](http://www.eurocontrol.int/surveillance)

### Two papers on WAM approvals guidance are available:

Volume 1 – Approvals Process Description

Volume 2 – Guidance Notes

### Other supporting papers are also available including:

Introduction to WAM

WAM Generic Safety Assessment

EUROCONTROL WAM Workshop 2007 presentations



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## Wide Area Multilateration

Guidelines for achieving operational approval of a WAM System



## STEP 1

Define operational requirements

The deployment and approvals process of any surveillance system starts with a clear business justification. At this early stage, it will not be clear which surveillance system should be deployed.

The Air Navigation Service Provider must firstly establish the operational requirements for the system. From these, further detailed requirements will be derived. These will include the Air Traffic Services that the surveillance system is expected to support and whether it will do so in isolation or in combination with existing surveillance infrastructure integration elements.

The service volume within which performance requirements are set is agreed at this stage.

At the end of this stage, the ANSP should have a clear understanding of what the new surveillance system is required to do.

## STEP 2

Analyse design options and system requirements

The ANSP needs to select the most appropriate technological solution – considering WAM, ADS-B and Mode S. This step should include cost benefit studies and feasibility analyses for the different options.

Once a suitable technology is selected, further technical requirements will be captured. The required system performance and interoperability will also be defined (for WAM an initial estimate of the number and location of ground stations and other constituents will be necessary). A preliminary System Safety Assessment is conducted to ensure that the application of the designed system is acceptably safe and any additional safety requirements or mitigations are identified.

Early contact with the National Supervisory Authority (NSA) and potential WAM suppliers will help facilitate a successful approvals process, develop an understanding of the outline safety arguments and ensure a well structured system design process.

## STEP 3

Define local environment considerations

Specific local environment issues will be assessed in detail at this stage. Detailed coverage planning will finalise the requirements and refine procurement requests, in cooperation with potential suppliers.

A clear Failure Mode analysis is to be conducted to ensure the necessary technical and operational mitigations which can be established, e.g. component redundancy or reversion to procedural control. The Transition Plan to full operational service should also be outlined at this stage, to identify the mitigation or risks during the transition phase.

During the requirements developments process, traceability should be maintained between operational and system requirements to aid the validation process.

The outcome of this step will be an invitation to Tender for manufacturers (i.e. a Functional and Technical Specification). This will also include conditions for maintenance, spares, training, etc. as necessary. The preparation and release of the Invitation To Tender forms the final task in this step.

## STEP 4

Delivery, integration and validation

Following tender evaluation and contract award, the technical approval of system constituents can be achieved via:

1. The manufacturer may have already demonstrated compliance against a recognised standard.
2. A conformity assessment being conducted through an EC Declaration of Conformity (in coordination with the NSA).

Once the system is installed on site, the WAM system is tuned and Site Acceptance Tests are conducted.

Flight tests, specific to the WAM system, will be necessary to validate the system performance under normal and failure mode conditions to the satisfaction of the service provider and regulator.

Finally, a Declaration of Verification is issued, showing that the WAM System as deployed is approved for use in the local environment.

## STEP 5

Establish operational service

The operational approval is finalised by the ANSP and the Safety Case updated, taking account of the locally installed solution (i.e. System Safety Assessment is completed). Procedures and practices are fully defined.

All data and supporting evidence for operational approval is collated, including the formal Transition Plan (drafted in Step 3) describing procedures, maintenance and operational training.

The details are presented to the NSA and operational approval is awarded.

## STEP 6

Deliver operational service

Once the system is in operational service, ongoing monitoring and calibration will be required to ensure that the required performance continues to be met. Through life support and decommissioning issues are also considered.

### The checklist approach

The approvals documentation can be found on our website:  
[www.eurocontrol.int/surveillance](http://www.eurocontrol.int/surveillance).

It describes each of the steps outlined in this pamphlet in detail and sets out guidance for each task.

Checklists are also provided that the ANSP or NSA can use to verify that each potential action has been considered.