

Release 4 SESAR Solution #05
Extended Arrival Manager Horizon

Contextual note – SESAR Solution description form for deployment planning

Purpose:

This contextual note introduces a SESAR Solution (for which maturity has been assessed as sufficient to support a decision for industrialization) with a summary of the results stemming from R&D activities contributing to deliver it. It provides to any interested reader (external and internal to the SESAR programme) an introduction to the SESAR Solution in terms of scope, main operational and performance benefits, relevant system impacts as well as additional activities to be conducted during the industrialization phase or as part of deployment. This contextual note complements the technical data pack comprising the SESAR deliverables required for further industrialization/deployment.

Improvement in Air Traffic Management (ATM)

The SESAR's Extended Arrival Management Horizon (E-AMAN) Solution increases the current AMAN horizon for preparing the landing sequence on a congested airport up to 180 - 200NM in continental airspace instead of the 100 NM average for AMAN currently in operation.

The solution applies for a single E-AMAN feeding a single airport. Extending the horizon provides more time for queue management to act on the traffic and provides greater benefits in terms of flight efficiency, environmental impact and punctuality.

To keep a high runway throughput, relieve congestion and minimize arrival queuing time a smooth and optimal arrival flow is computed. The Solution relies upon a delays sharing strategy such that the ATC system integrates information from arrival management systems operating out to an extended distance to provide an enhanced and more consistent arrival sequence. Handling of the traffic is performed in En-Route phase which allows a more efficient management of delays and reduces waiting times in TMA holding patterns (fuel reduction). The "newly" impacted En Route sectors contribute to the sequencing towards a single TMA.

Upstream ACC Controllers provide instructions to pilots to make adjustment of speed to meet Time To Lose/ Time To Gain need (TTL/TTG), before initiating descent towards the destination airport. Different techniques can be applied for apportioning the delay to be implemented for a flight across the flown sectors. The apportionnement is applied taking into account the potential delay that can be absorbed by the different sectors considering several aspects. Within these the most relevant are the sector organization (i.e. En-route, Approach, ..), the sectors position with regards to the trajectory and the sector dimension. The solution is operable cross-borders, based on agreement between ANSPs on the delay sharing strategy.

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Operational Improvement Steps (OIs) & Enablers

TS-0305-A Arrival Management Extended to En Route Airspace - single TMA (DS14):

- APP ATC 111 “Enhance AMAN to extend arrival management to en-route airspace - single TMA”;
- ER ATC 163 “Support to En-route delay absorption for cross-border implementation of arrival sequence”;
- PRO-245 “ATC Procedures for use of cross border extended Arrival Management”;
- SWIM-APS-12a “Provision and Consumption of general traffic management information sharing for Step 1”;
- SWIM-INFR-01a: High Criticality SWIM Services infrastructure Support and Connectivity.

Background and validation process

The SESAR Solution has been validated both in high density/high complexity En-Route airspace for the benefit of a complex TMA through live trials (e.g Reims and MUAC En Route Sectors for London LATCC APP).

Real-time simulations have also been conducted to secure the concept in a large type of TMA (e.g. AMSTERDAM, LONDON) and the integration with other concepts like CTA (Controlled Time of Arrival) and ASAS (Airborne Separation Assistance System) has been evaluated in medium density/medium complexity environments such as Rome and Stockholm.

Results and performance achievements

The Extended Arrival Management Horizon (E-AMAN) Solution demonstrated benefits in terms of:

- Increased airspace (TMA) capacity and predictability;
- Reduction of the time spent in holding stacks and therefore saving Kg of fuel and CO₂ per flight;
- Reduced noise beneath the air holdings;
- The en-route controller workload remains within acceptable levels while TMA/APP ATCO productivity may be increased.

Recommendations and Additional activities

No further validation of the concept is necessary. This single E-AMAN solution can be deployed as is.

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However, where several E-AMAN will be in use in a European environment, more validation is still needed (e.g to solve the 'overlapping horizon' issue).

Actors impacted by the SESAR Solution

Actors are APP and ACC, both TMA and En-Route ATSU's Controllers and pilots.

Impact on Aircraft System

None for the solution itself.

Impact on Ground Systems

Accurate and extended trajectory prediction is needed to generate a fine tuned AMAN sequence. In addition, in case multi-ANSP partners are involved within the extended horizon, it is needed to exchange the AMAN Time To Lose/Time To gain information through a SWIM Service documented in the ISRM and transferred over the SWIM infrastructure.

For cross border operations, letters of agreement between ANSPs need to be set up in order to determine the delay sharing strategy (impact on ANSP performance).

Regulatory Framework Considerations

No specific new regulation is necessary.

Standardization Framework Considerations

There is no specific topic in the field of Standardization to be considered in deployment, beyond the applicable existing one.

Considerations of Regulatory Oversight and Certification Activities

There is no specific topic in the field of the Regulatory Oversight and Certification Activities to be considered in deployment, beyond the applicable existing ones.

Solution Data pack

The Data pack for this Solution includes the following documents:

- Regulatory overview;
- OSED - P05.06.07-D15 Edition 00.01.01 from 30/09/2015 (provides contextual information, but in terms of requirements for solution #05, the SPR-INTEROP is the only reference);
- SPR, INTEROP - P05.06.07-D16 Edition 00.01.01 from 15/12/2015;

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- TS - P10.09.02-D55 Edition 00.05.00 04/11/2015;
- 08.03.10 D61 European ATM Service Description for the Arrival Management Information Service Edition 00.02.00 from 30/05/2014;
- TS-14.01.04-D41-005 SWIM-TI Yellow Profile Technical Specification Edition 00.02.00 from 01/02/2014.

Intellectual Property Rights (foreground)

The foreground is owned by the SJU.