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.

Improvements in Air Traffic Management (ATM)

While there are AMAN solutions available for a foresighted, cross-sectorial arrival planning, the current capabilities of these AMAN systems are not sufficient for the complexity of traffic and airspace structure of this extended TMA with converging inbound streams. The main issue of such a multi-airport TMA is the small size of the TMA sectors and their adjacent en-route sectors which does not allow the controllers to implement sufficient TTL without both a drastic increase in workload and decrease of flight efficiency. Thus, to meet the special conditions of the airspace structure of a complex E-TMA an extension of the existing functionalities of AMAN is necessary.

Despite proper network flow management measures based on average traffic count within 20min intervals of a predefined traffic volume, bunching can occur. If this happens simultaneously and traffic streams converge, spontaneous overload situations can be the consequence. To prevent this from happening, capacity buffers must be kept and thus the available airspace capacity is not fully utilized. This in turn can lead to situations where the E-TMA sector becomes the bottleneck of the multi-airport TMA and thus runway capacity is not fully utilized, too.

Therefore, an additional arrival planning component "Center Manager" (CMAN) which accompanies the AMANs of the airports was developed. The system generates a combined planning for several arrival streams into different airports by calculating the sequence of aircraft flying towards an area where their routes intersect. By imposing an adequate spacing of the aircraft in that area ("sector flow"), a TTL for the appropriate upstream ACC sector is calculated to meet this constraint. The controller in the upstream sector will be presented with the superimposed TTL from the AMAN and the CMAN, i.e. the highest amount of necessary TTL of either AMAN or CMAN will be shown. In the en-route sectors adjacent to the TMAs which do not serve both airports, TTL based on runway capacity is presented to the controllers. The extended AMAN horizon has been identified as an important means to support this concept.

It is expected that the results of this Solution will have relevance for many other areas of Europe that have complex E-TMAs and/or several airports within close proximity (e.g.

Madrid, Paris, London), and that it could also support flow control measures in regions with complex traffic interactions (e.g. French – German Border and Switzerland).

Operational Improvement Steps (OIs) & Enablers

TS-0303 - Arrival Management into Multiple Airports is fully covered by SSol #08:

- ER APP ATC 109 Support for Metering Of Interacting Arrival Flows to Multiple Airports Upstream of the TMAs
- PRO-125 ATC Procedures (En-route and TMA) to accommodate mixed traffic streams into multiple aerodromes

Applicable Integrated Roadmap Dataset is DS15.

Background and validation process

The SESAR Solution has been validated through a series of Real Time Simulations, focusing on a range of objectives from the benefits on controller workload and ATC sector capacity to the AMAN delay management and its stability. A high level summary of each validation is presented hereafter:
- Real Time Simulations:
  Validate the system prototype in terms of
  - Controller workload
  - Impact on traffic flows/throughput
  - Impact on safety
  - Flight efficiency
The Real Time Simulations have been run in Cologne and Dusseldorf arrivals.

Results and performance achievements

- Solution #08 introduces all AMAN benefits to a complex multi-airport environment.
- While keeping the en-route controllers workload at an acceptable level, the TMA controllers benefited by receiving a better sequence from the upstream sectors.

Recommendations and Additional activities

- SESAR Solution #05 Extended AMAN is a pre-requisite to SESAR Solution #08.
- Non-nominal situation shall be studied in the local environment of implementation.

Actors impacted by the SESAR Solution

TMA and En-Route Controllers.

Impact on Aircraft System

No impact on aircraft system.

Impact on Ground Systems

The AMANs of the individual Airports need to exchange AMAN information with the new planning component (CMAN).

Regulatory Framework Considerations

No specific new regulation is necessary.

Standardization Framework Considerations

There is no specific topic in the field of the Standardisation to be considered in deployment, beyond the existing ones.

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:

- SPR & INTEROP – 05.04.02-D05 Edition 00.01.03 (28.06.2016). The document contains the safety and performance requirements for the CMAN procedures;
- TS: 10.09.02-D64 Edition 00.07.00 (22.07.2016). This document provides technical specification on tools used for CMAN operations;

Intellectual Property Rights (foreground)

The foreground is owned by the SJU.