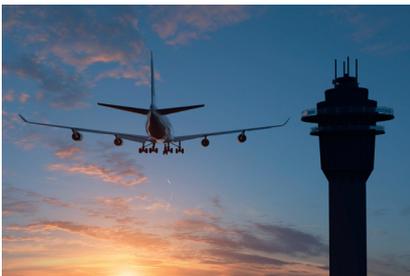


# E-AMAN

## Improved delay prediction, reduced need for stack holding



### Benefits

- Increased efficiency in highly complex TMAs due to early and small speed adjustments during the en-route flight phase
- Associated early delay reductions minimise the required time in fuel-intensive holding stacks
- Improved environmental sustainability as a result of massive fuel savings and reduced emissions
- Better predictability and sequence stability due to decreased uncertainties in the terminal demand prediction
- Increased capacity enabled by longer-term optimised streaming and sequencing of arrival flights
- Upgraded TMA planning and management by extending the AMAN planning horizon to the en-route environment
- EUROCAE ED-254 SWIM service standard supporting interoperability with open web-based service-oriented architecture

### Enhancing AMAN operations

In 2013, the operational Arrival Manager (AMAN) was enhanced at NATS to support extended arrival management, in line with the ICAO Aviation System Block Upgrades (ASBU) and the SESAR ATM concept of operations.

The Extended Arrival Manager (E-AMAN) allows air traffic controllers to meter traffic into a busy terminal maneuvering area (TMA) from far out in the en-route airspace and thereby improve delay prediction. It offers an effective solution for reducing congestion compared to the conventional AMAN horizon, which provides a limited window of opportunity to optimise the traffic flow to an airport. E-AMAN allows controllers in the neighbouring sectors (or even neighbouring ANSPs) to adjust trajectories before the aircraft begin their descent towards their destination, reducing the need for stacking and holding over the destination airport – an effective means of reducing fuel costs and lowering emissions for airlines.

### Award-winning and record-breaking solution

The NATS E-AMAN is the world's first SESAR-based E-AMAN system – operational since 2014. It spans multiple national borders and uses a SWIM-based, web-centric service-oriented architecture.

NATS, Snowflake software, and Orthogon each won a SESAR SWIM Master Class 2013 award for demonstrating an AMAN web service and a SWIM-enabled AMAN user interface.

In early 2015, Orthogon together with NATS, Snowflake software, EUROCONTROL (Maastricht), and the French and Irish ANSPs DSNA and IAA, won the IHS Jane's ATC Award 2015 for the groundbreaking "Heathrow Cross-Border Arrival Management (XMAN)" project.



“Between the start of the operational trial in April 2014 and the start of permanent procedures in late 2015, NATS recorded a reduction of holdingstack times by up to a minute for LHR inbound flights subject to XMAN activity. This saves airlines annually around 4,700t in fuel or 15,000t of CO<sub>2</sub> and reduces noise for communities underneath the stacks.”

NATS press office  
(February 2016).

## The concept

The SESAR extended arrival management concept is made feasible by expanding the AMAN’s operational horizon from the airspace close to the airport to a horizon further upstream, into adjacent en-route airspace. Typically, an E-AMAN solution is implemented using a SWIM-compliant information exchange infrastructure that delivers AMAN output information to controllers upstream.

With an E-AMAN implemented, en-route controllers can inform aircraft pilots to adjust their speed before their top-of-descent, thus reducing the amount of time the aircraft spends in the TMA. This leads to a reduction of time spent in the holding stacks in the destination TMA.

Extended AMAN furthermore allows implementing Cross-Border Arrival Management (XMAN) operations, where the AMAN horizon is extended across multiple ANSP borders. With XMAN, the advisory horizon for arriving aircraft was extended to 350 NM. It became operational at NATS for London Heathrow in April 2014 (initially as an operational trial) and entered full operations in November 2015. At this point, it became the world’s first Cross-Border Arrival Management solution.

E-AMAN is a SESAR solution that has been selected by the European Commission to be part of the common project 1 (CP1), mandating deployment at 18 European airports by 2024.

Extended AMAN is also featured in the International Civil Aviation Organization (ICAO) Aviation System Block Upgrades (ASBU).

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