



# SESAR SOLUTION 18.02c

## CONTEXTUAL NOTE TRL6

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# 18.02c

## EFPL DISTRIBUTION TO ATC

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### Abstract

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This TRL6 Contextual note provides SESAR Solution description for industrialisation consideration.

The scope encompasses technical enablers supporting the distribution of eFPL information to ATC systems.



## Table of Contents

<b>Abstract</b> .....	<b>4</b>
<b>1 Purpose</b> .....	<b>6</b>
<b>2 Improvements in Air Traffic Management (ATM)</b> .....	<b>7</b>
<b>3 Operational Improvement Steps (OIs) &amp; Enablers</b> .....	<b>8</b>
<b>4 Background and validation process</b> .....	<b>9</b>
<b>5 Results and performance achievements</b> .....	<b>10</b>
5.1 Conclusions on SESAR Solution maturity .....	10
5.2 Conclusions on technical feasibility .....	10
5.3 Conclusions on performance assessment .....	10
<b>6 Recommendations and Additional activities</b> .....	<b>11</b>
<b>7 Actors impacted by the SESAR Solution</b> .....	<b>12</b>
<b>8 Impact on Aircraft System</b> .....	<b>13</b>
<b>9 Impact on Ground Systems</b> .....	<b>14</b>
<b>10 Regulatory Framework Considerations</b> .....	<b>16</b>
<b>11 Standardization Framework Considerations</b> .....	<b>17</b>
<b>12 Solution Data pack</b> .....	<b>18</b>

## List of Tables

Table 1: Enabler List .....	8
Table 2: Change request in progress .....	8
Table 3: Conclusions on SESAR Solution Maturity .....	10
Table 4: Conclusions on performance assessment .....	<b>Error! Bookmark not defined.</b>
Table 5: Stakeholder involvement.....	12
Table 6: Capability Configuration .....	14
Table 6: Impacted Capability Configuration.....	15



# 1 Purpose

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This contextual note introduces the SESAR Solution “eFPL Distribution to ATC Solutions” (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.

## 2 Improvements in Air Traffic Management (ATM)

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The SESAR Solution "eFPL Distribution to ATC Solutions" looks at the technical enablers supporting the distribution of eFPL information to ATC systems. This technological evolution has been developed considering the following assumptions:

- Need to improve to ATC prediction with additional information to better assess the expected sector load and to reduce the number of false conflict detections.
- Need to provide the ATCO with better knowledge of airline intentions thanks to a more accurate profile and additional elements such as ToC or ToD.

### 3 Operational Improvement Steps (OIs) & Enablers

The technological solution covers two technical enablers and one standardisation enabler supporting the eFPL distribution to ATC.

Enabler Identifier	Enabler Definition
NIMS-21b	Flight Planning extended with eFPL Distribution service
SWIM-APS-18	eFPL service consumption in ATC
STD-XXX	Update FF-ICE 1 or create a European extension for including aircraft weight on each trajectory point in the 4D trajectory definition. Standardisation enabler – number unavailable at time of publication

Table 1: Enabler List

Applicable Integrated Roadmap dataset is DS20, in which Title and content of the solution shall be properly reflected through the following Change request in progress.

Change request number	Purpose
CR 03950	Change title and content of the solution; The title is “eFPL Distribution to ATC Solutions”
CR 03931	Change Request for creation of POI-xxx eFPL distribution to ATC (replacing AUO-0226)
CR 03934	Create STD-xxx
CR 03932	NIMS-21b : Update the enabler validation status and remove link to PCP

Table 2: Change request in progress



## 4 Background and validation process

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SESAR 1 Solution 67 showed the benefits of the Flight Operations Centre sharing enhanced flight planning data elements like the Take-Off weight and speed information in the trajectory and Flight Specific performance data via eFPL to ATC. This led to improvements in ATC trajectory prediction in support to conflict detection and resolution, in particular during the climbing phase.

SESAR 1 Solution 37 further showed the benefits of including eFPL to improve NM trajectory prediction (see Sol 37 Contextual Note). However, Solution 37 as outcome of their validation activities highlighted that this same enhanced trajectory picture was not shared commonly between the FOC, NM and ATC. It was therefore proposed but not validated by Solution 37 that the research gap could be closed by having the NM distribute FOC provided eFPL to ATC.

To reach the TRL6 maturity, the following validation activities have been performed decomposed into two phases:

- One technical phase, aiming at validating the transfer of the eFPL data from NM to ATC via the B2B services and the use of the Agreed Reference Business Trajectory (RBT);
- A Real Time simulation run in the SWISS airspace covering Geneva and Zurich ACCs with Flight Plans distribution in shadow mode between NMVP platform (NM simulator) and Skyguide simulation platform.

## 5 Results and performance achievements

### 5.1 Conclusions on SESAR Solution maturity

Topic	TRL 6 maturity status	Justification
eFPL information distribution to ATC	TRL 6 achieved for the following enablers: <ul style="list-style-type: none"> <li>- NIMS-21b</li> <li>- SWIM-APS-18</li> </ul>	The technical objectives related to eFPL data distribution by NM and the integration of the information in ATC system have been achieved.

Table 3: Conclusions on SESAR Solution Maturity

### 5.2 Conclusions on technical feasibility

The technical validation has demonstrated the technical capability of the distribution of eFPLs from NM to ATC using the B2B services and the ability of ATC Flight Data Processing systems to treat Flight Plan data in eFPL format (i.e. FXIM).

### 5.3 Conclusions on performance assessment

It must be highlighted that this solution ‘eFPL Distribution to ATC’ (Sol 18-02c) will not directly impact any KPAs.

Nevertheless it has the potential to enable other solutions (e.g. directly ATM Solution 67, or contribution to Technological Solutions as for instance defined in Sol 18-06a ‘Air Traffic Control (ATC) Planned Trajectory Performance Improvement’ and 18-06b ‘Tactical and Network Manager (NM) Trajectory performance Improvement’) to produce benefits.

## 6 Recommendations and Additional activities

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The following additional activities are recommended related to eFPL distribution and use in ATC:

- To further study the impact on subsequent use by ATC support tools such as Conflict detection tools, monitoring aids;
- To perform a study on ATCO situation awareness improvement (thanks to some eFPL new data about the AU expectation (e.g. Top of Climb, Top of Descent, speed profile...) to measure the benefit of such information available on display.

These activities should be conducted as part of V3 SESAR ATM Solution validation activities.

## 7 Actors impacted by the SESAR Solution

The table below lists the main operational stakeholders<sup>1</sup> identified for Solution 18.02c with their specific involvement and expectations related to the eFPL distribution and use in ATC.

Stakeholder	Involvement	Why it matters to stakeholder (related KPA)
<b>Network Manager</b>	<i>Direct involvement</i> through the provision of the eFPL distribution service	When conflicts are detected earlier they can be solved with smaller trajectory modifications. As a result, the aircraft will stay closer to the original planned trajectory which should improve DCB traffic prediction.
<b>Civil ATS service provider</b>	<i>Direct involvement</i> through the integration and use of the information in the ATC systems	<p>eFPLN data could improve ATC predictions which will allow to better assessing the expected sector load.</p> <p>eFPLN data could improve ATC predictions which will allow to detect fewer false conflicts which will reduce the number of unnecessary trajectory changes made by the controller and will improve its confidence in support tools (Trajectory Management, Conflict Detection, and Monitoring Aids). This will reduce controller workload which has a direct impact on Human Performance, <b>Cost Efficiency</b> (controller productivity), <b>Capacity</b> and <b>Safety</b>.</p>
<b>Ground industry(ATC)</b>		Clear and consistent set of operational and functional requirements for the system development Possibility to have a Standard.

Table 4: Stakeholder involvement

<sup>1</sup> Airspace users are not mentioned in the table since there is no involvement in this solution. Their involvement is in solution #37 for the provision of EFPL/eFPL



## 8 Impact on Aircraft System

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N/A.

## 9 Impact on Ground Systems

The following capability configurations are required for the SESAR Solution.

Capability Configuration	Capability	Node	Stakeholder
<b>APP ACC</b>	Collaborative Trajectory Planning; Demand and Capacity Balancing (airspace); SWIM-based Information Dissemination;	Air Traffic Flow and Capacity Management; Airspace Management; Airspace Organisation; En-Route/Approach ATS;	Civil ATS Approach Service Provider; Military ATS Approach Service Provider;
<b>ER ACC</b>	Collaborative Trajectory Planning; Demand and Capacity Balancing (airspace); SWIM-based Information Dissemination;	Air Traffic Flow and Capacity Management; Airspace Management; Airspace Organisation; En-Route/Approach ATS;	Civil ATS En-Route Service Provider;
<b>Regional ATFCM</b>	Air Traffic Demand Provision (Airspace); Air Traffic Flow Management; Airspace Capacity Information Provision (incl. Capacity Changes); Collaborative Network Management; Collaborative Trajectory Planning; SWIM-based Information Dissemination;	Air Traffic Flow and Capacity Management;	Network Manager;

Table 5: Capability Configuration



The impacted capability configuration with its impacted system, per enabler, is as follows.

Enabler Identifier	Enabler Definition	Impacted Capability Configuration	Impacted System
NIMS-21b	Flight Planning extended with eFPL Distribution service	Regional ATFCM	ATFCM
SWIM-APS-18	eFPL service consumption in ATC	APP ACC ER ACC	ATFCM, ATC

Table 6: Impacted Capability Configuration



# 10 Regulatory Framework Considerations

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N/A





# 11 Standardization Framework Considerations

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The solution 'eFPL Distribution to ATC' (**PJ-18-02c**) has shown the feasibility for ATC – in particular for traffic departing outside ECAC - to use the eFPLN information; in addition interest in aircraft mass at each point of the trajectory has been captured as a potential to provide benefits. Ideally, this information should be included in the eFPL – as optional information – defined by ICAO in the context of FF-ICE increment 1 and part of core FIXM data in the future releases.

Alternatively, this information should be defined in FIXM as part of a European extension to be considered in yellow profile eFPL submission and distribution services.

A standardisation enabler (change request in progress for DS20) has been created to cover these aspects.

## 12 Solution Data pack

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The solution data pack includes two core documents:

- SESAR Technological Solution ‘eFPL Distribution to ATC’ (Sol 18.02c) – SESAR 2020 D3.4.080 Final TS/IRS - 18-02c, Edition 00.01.01. This document provides the technical architecture, service definitions, functional and non-functional requirements for the solution.

Two additional documents are attached to the TS/IRS:

- The SESAR solution 18.02c INTEROP as annex of the TS document,
- The Safety Assessment Report (SAR) as informal supporting documentation.



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