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# PJ.02-W2-14.3 TS IRS

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## Authoring & Approval

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| None | |

### Approved for submission to the S3JU By - Representatives of all beneficiaries involved in the project

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# AART

AIRPORT AIRSIDE AND RUNWAY THROUGHPUT

This Technical Specification is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 874477 under European Union's Horizon 2020 research and innovation programme.

## Abstract

This Technical Specification provides the requirements for ground based ATC systems and aircraft systems supporting the solution PJ.02-W2-14.3:

- AO – 0320 - Enhanced Arrival procedures using Increased Second Glide Slope (ISGS)

Those requirements were consolidated and refined during the validation exercises.



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# 1 Executive summary

This TS/IRS document provides the architecture and the requirements for SESAR 2020 solution PJ.02-W2-14.3 . It will focus on the following change to current capabilities:

- The capability to operate two active glide slopes to the same threshold, permanently published, one standard (typically 3deg) and one steeper (ISGS).

Enhanced Arrival Procedures concepts were already investigated within SESAR1 Program in PJ06.08.08 and P06.08.05, and within SESAR 2020 W1 in PJ02-02, but they did not achieve full V3 maturity. Solution PJ.02-W2-14.3 aims then at completing the validation activities on SRAP concept, so that they can be moved to next phases of validation cycle.

| Code | Concept Name | Description | Maturity at PJ02-02 start | Maturity target at PJ02-02 end |
|---|---|---|---|---|
| AO-0320 | Increased Second Glide Slope (ISGS) | A glide path with a glide slope angle value that can be set between the conventional approach angle (3°, as defined by ICAO PANS OPS Doc 8168) and the beginning of the "steep approach" domain (4.5°, as defined by FAA AC-25-7C | V2 | V3 |

**Table 1: Initial and targeted maturity level of ISGS concept**

This document provides requirements for ground based ATC systems and aircraft systems supporting Enhanced Arrival Procedures. Those requirements are based on the use cases defined in SPR-INTEROP/OSED (reference [37]):

- [NOV-5][EAP-01] IGS Published Approach



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# 2 Introduction

## 2.1 Purpose of the document

This TS/IRS document is used to capture and consolidate the set of Technical Requirements related to SESAR 2020 W2 solution PJ.02-W2-14.3

The requirements included in this TS/IRS satisfy requirements captured at SPR-INTEROP/OSED and are associated with Functions, Functional blocks and Roles available in EATMA applicable version.

TS/IRS aims to provide sufficient information so as to allow the functional block (or parts of it in which the project is working) to be designed and implemented either as separate functional block or as part of an integrated system, depending upon the design choice, for V&V activity within the programme and ultimately for industrialization, standardization and deployment.

## 2.2 Scope

Solution PJ.02-W2-14.3 aims at improving airport performances on the Environmental Sustainability and Capacity Key Performance Areas by introducing a second steeper glide slope approach procedure in addition to the standard one.

ISGS procedures/operations allow reducing the environmental impact (e.g. noise, fuel) by having part of the traffic flying on a higher glide slope.

The OI is considered to have reached V3 ongoing maturity level at the end of SESAR 2020 PJ02 W1 and the aim of PJ.02-W2-14.3 is to bring them to V3.The following table provides the scope of SESAR solution PJ.02-W2-14.3 and the related OI. The description of the procedures associated to the concept is detailed in SPR-INTEROP/OSED document [38].

| OI Step code | OI Step title | OI Step coverage |
|---|---|---|
| AO-0320 | Enhanced Arrival Procedures using Increased Glide Slope (ISGS) | Full |
| Enhanced arrival procedures using Increased Glide Slope (ISGS) will allow inbound aircraft to reduce noise footprint (environmental benefit). ISGS procedures are published approaches which feature a glide slope between the published one (commonly 3 degrees) and 4.49 degrees (limit above which steep approach concept applies), in order to provide a significant reduction in ground noise level (order of magnitude: -3 dBA in approach between 15 NM and 4 NM from runway threshold). | | |

**Table 2: SESAR Solution PJ.02-W2-14.3 Scope and related OI**

This document contains requirements for ground based ATC systems and aircraft systems supporting Enhanced Arrival Procedures. Requirements are based on the five use cases defined in SPR-INTEROP/OSED (reference [37]):

- [NOV-5][EAP-01] IGS Published Approach

## 2.3 Intended readership



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The intended audience of this document is initially the partners of Solution PJ.02-W2-14.3 to support suitable validation exercises.

Airborne and ground industries are also a primary audience as the TS/IRS allows them to assess the impact on airborne systems and ground-based ATC systems of implementing ISGS Procedures. Finally this document will support Airspace Users, ANSPs, Airport Operators and Safety Regulators willing to develop ISGS procedures.

## 2.4 Background

PJ.02-W2-14.3 complements studies carried out in the frame of SESAR1 in projects P06.08.08 and P06.08.05, and in SESAR 2020 PJ02-02 W1.

The picture below shows the validation activities performed in P06.08.08 and in PJ02 W1 on ISGS. Details on the outputs of activities performed in SESAR W1 PJ02-02 can be found in [38].

It has to be noticed that the procedure was called IGS (Increased Glide Slope) and has been renamed in SESAR 2020 W2.

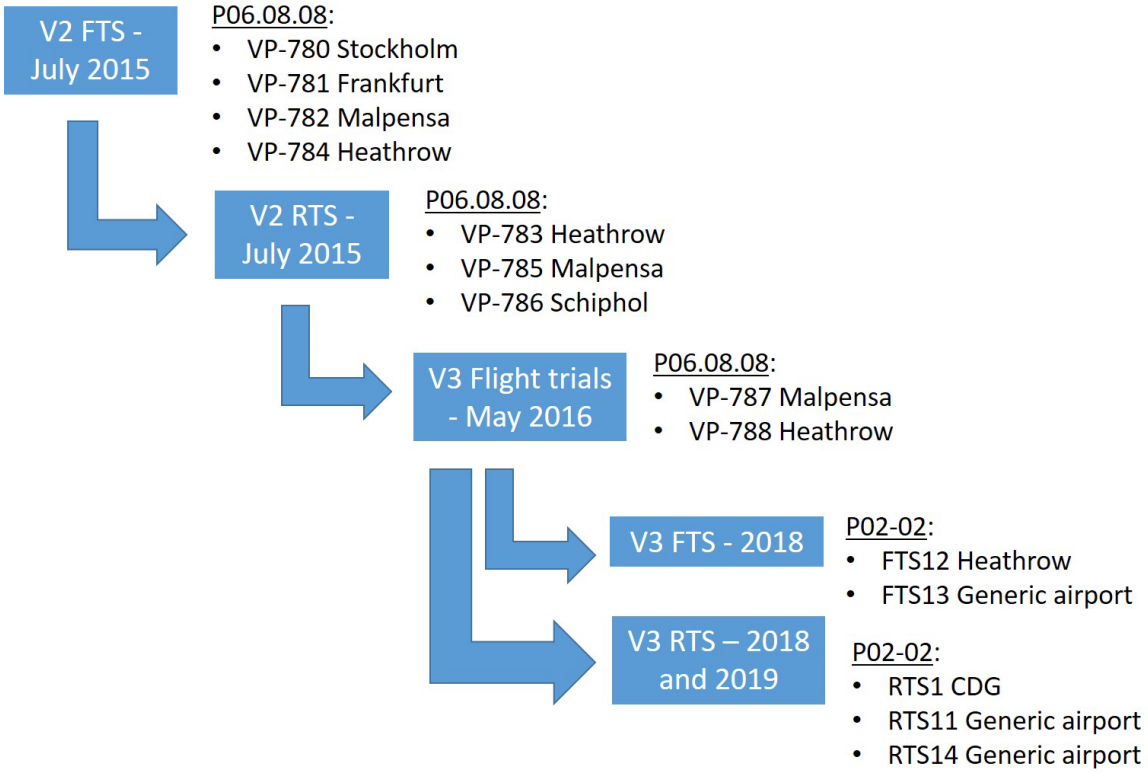


**Figure 1: Validations activities performed on ISGS in SESAR1 P06.08.08 and in SESAR 2020 W1 PJ02-02**

The major recommendations from PJ02-02 were:

- the need to consider the non-nominal situations, and in particular the loss of the ATC tool supporting the controllers in ensuring the needed separations between the aircraft approaching on standard and SRAP procedures
- the need to consider go-arounds/missed approaches
- the need to have a controller alert when an aircraft is not flying the expected glide
- the need to propose and evaluate PAPI solutions.

## 2.5 Structure of the document

The structure of the document is as follows:

- Chapter 1: This section introduces the document.
- Chapter 2: This section provides the document introduction, its scope, purpose, intended audience, background information as well as the glossary of terms and acronyms.
- Chapter 3: This section gives a description overview of the SESAR Solution developed in this TS document.
- Chapter 4: This section provides the Technical Specifications (TS) that have been validated during validation activities at V3 level.
- Chapter 5: This section describes the options that can be chosen when implementing the solution.
- Chapter 6: This section describes any assumptions made that have an impact on the technical specifications described in section 5.
- Chapter 7: This section lists the references and applicable documents used in producing this TS document.
- Chapter 8: This appendix presents the Service Description Document (SDD).
- Chapter 9: This appendix presents the Service Technical Design Document (STDD).

## 2.6 Glossary of terms

| Term | Definition | Source of the definition |
|---|---|---|
| Enhanced arrival procedures / operations | Generic term referring in a general manner to all PJ02-02 operational concepts: IGS, A-IGS, SRAP, IGS-to-SRAP, CSPR-ST | ICAO Annex |
| Obstacle Clearance Altitude/Height (OCA/H) | In a precision approach procedure, the OCA/H is defined as the lowest altitude/height at which a missed approach must be initiated to ensure compliance with the appropriate obstacle clearance design criteria | ICAO Doc 8168 PANS OPS |
| Autopilot / Flight Director | AP/FD means that both the Autopilot and the Flight Director are used by the flight crew. They are both driven by the guidance targets coming either from the FMS (FPLN follow up) or the flight crew itself (target selected on Auto Flight system Control Panel). The pilot does not touch the aircraft stick command. FD only means that the Flight Director is displayed and followed manually (using the stick command) by the flight crew on the Primary Flight Display. Without AP/FD means that the flight crew flies a pure manual final approach with the unique aid of lateral and vertical deviations displayed | Project proposed definition |



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| | | |
|---|---|---|
| | on the Primary Flight Display. | |
| Ground Based Augmentation System (GBAS) | Civil-aviation safety-critical system that supports local augmentation of the primary GNSS constellation(s) by providing enhanced levels of service that support all phases of approach (precision and non-precision), landing, departure, surface operations and it may support additional operations: en route and terminal operations. While the main goal of GBAS is to provide integrity assurance, it also increases the accuracy. The technology can be based on GPS L1 providing Cat I, GPS L1 providing up to Cat III, and Multi-Constellation / Multi-Frequency GBAS providing up to Cat III with improved integrity and availability compared to GBAS based on GPS L1 only. | *EATMA* |
| Space Based Augmentation System (SBAS) | Civil aviation safety-critical systems that support wide-area or regional augmentation though a monitoring and reference stations network and geostationary (GEO) satellites (35.786 km altitude) which broadcast GNSS augmentation information (correction & integrity). | *EATMA* |

207 **Table 3: Glossary**

208 ## 2.7 Acronyms and Terminology

| Acronym | Definition |
|---|---|
| AAL | Above Aerodrome Level |
| ACC | Area Control Center |
| ADD | Architecture Definition Document |
| AFCS | Automatic Flight Control System |
| AFS | Automatic Flight System |
| AGL | Above Ground Level |
| A-IGS | Adaptive Increased Glide Slope |
| AMAN | Arrival Manager |
| ANP AR | Required Navigation Performance Authorization Required |
| AO | Aerodrome Operations |
| AODB | Airport Operational Data Base |
| AOM | Airspace Organisation and Management |
| AOP | Airport Operational Plan |
| AP | Auto Pilot |
| APOC | Airport Operations Center |
| ASAS | Airborne Separation Assistance System |
| A-SMGCS | Advanced Surface Movement Guidance and Control System |
| ATC | Air Traffic Control |
| ATCO | Air Traffic Controller Operator |
| ATFCM | Air Traffic Flow and Capacity Management |
| ATIS | Automatic Terminal Information Service |
| ATM | Air Traffic Management |
| CDI | Course Deviation Indicator |



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|---|---|
| CDM | Collaborative Decision Making |
| CDO | Continuous Descent Operations |
| CONOPS | Concept of Operations |
| CP | Control Panel |
| CSPR-ST | Closely Space Parallel Runway - Staggered Thresholds |
| CWP | Controller Working Position |
| DA(H) | Decision Altitude/Height |
| DCB | Demand and Capacity Balancing |
| DMAN | Departure Manager |
| DOD | Detailed Operational Description |
| DS | Double Slope |
| DT | Displaced Threshold |
| E-ATMS | European Air Traffic Management System |
| FAF | Final Approach Fix |
| FAP | Final Approach Point |
| FAS | Final Approach Segment |
| FCOM | Flight Crew Operating Manual |
| FD | Flight Director |
| FMS | Flight Management System |
| FPL | Flight Plan |
| FRAP | Further Runway Aiming Point |
| G/S | Glide Slope |
| GAST | GBAS Approach Service Type |
| GBAS | Ground-Based Augmentation System |
| GLS | GBAS Landing System |
| GNSS | Global Navigation Satellite System |
| GPA | Glide Path Angle |
| HMI | Human Machine Interface |
| IFR | Instrument Flight Rules |
| IGE | In Ground Effect |
| IGS | Increased Glide Slope |
| IGS-to-SRAP | Increased Glide Slope to Second Runway Aiming Point |
| INTEROP | Interoperability Requirements |
| IRS | Interface Requirements Specification |
| ISGS | Increased Second Glide Slope |
| KPI | Key Performance Indicator |
| LNAV | Lateral Navigation |
| LOC | Localizer |
| LPV | Localizer Performance with Vertical Guidance |
| LTS | Lower Than Standard |
| LVTO | Low Visibility Take-Off |
| MAPt | Missed Approach Point |
| NavDB | Navigation Database |
| NM | Nautical Mile |
| OAT | Outside Air Temperature |
| OCA/H | Obstacle Clearance Altitude/Height |
| OCD | Operational Concept Description |



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|---|---|
| OFA | Operational Focus Areas |
| OGE | Out-of-Ground Effect |
| OI | Operational Improvement |
| OSED | Operational Service and Environment Definition |
| OTS | Other Than Standard |
| PAN | Precision Approach Navigator |
| PANS | Procedures for Air Navigation Service |
| PBN | Performance Based Navigation |
| QNH | Barometric pressure adjusted to sea level |
| RAVC | Reduced Aerodrome Visibility Conditions |
| RAVP | Reduced Aerodrome Visibility Procedures |
| RET | Rapid Exit Taxiway |
| RF | Radius to Fix |
| RMP | Radio Management Panel |
| RNP | Required Navigation Performance |
| RPID | Reference Path IDentifier |
| SESAR | Single European Sky ATM Research Programme |
| SESAR Programme | The programme which defines the Research and Development activities and Projects for the SJU. |
| SID | Standard Instrument Departure |
| SIS | Signal-in-space |
| SJU | SESAR Joint Undertaking (Agency of the European Commission) |
| SJU Work Programme | The programme which addresses all activities of the SESAR Joint Undertaking Agency. |
| SOP | Standard Operating Procedure |
| SPR | Safety and Performance Requirements |
| SRAP | Second Runway Aiming Point |
| STAR | Standard Terminal Arrival Route |
| TAD | Technical Architecture Description |
| TBD | To Be Defined |
| TBS | Time Based Separations |
| TCH | Threshold Crossing Height |
| TIBT | Target In-Block Time |
| TLDT | Target Landing Time |
| TMA | Terminal Manoeuvring Area |
| ToD | Top Of Descent |
| TS | Technical Specification |
| TTOT | Target Take Off Time |
| Vapp | Approach Speed |
| VDB | VHF Data Broadcast |
| VHF | Very High Frequency |
| VIS | Visibility |
| VNAV | Vertical Navigation |
| VPA | Vertical Path Angle |
| WTC | Wake Turbulence Category |
| WVE | Wake Vortex Encounter |

**Table 4: Acronyms and terminology**

# 3 SESAR Solution Impacts on Architecture

## 3.1 Target Solution Architecture

### 3.1.1 SESAR Solution(s) Overview

PJ.02-W2-14.3: Increased second glide slope (ISGS)

This solution introduces an increased second glide slope (ISGS) as a new concept of enhanced approach operations. ISGS helps reduce the environmental impact by the use of two glide slopes active simultaneously.
By doing so, the environmental impact should be reduced as aircraft flying on the higher slope should generate less noise.

| OI Step | | OI description | Open CR |
|---|---|---|---|
| AO-0320 | | Enhanced approach operations using an increased second glide slope (ISGS) | CR 06475 Update AO-0320 (unlink Institutional EN) |
| | EN code | EN description | Open CR |
| | A/C-86 | On-board assistance to aircraft energy management | |
| | A/C-87 | On-board assistance to flare | |
| | AERODROME-ATC-102 | Aerodrome ATC system to support final approach operations (distinguish approach procedures) | |
| | AERODROME-ATC-71 | Aerodrome ATC System to support ISGS operations (separation delivery) | |
| | AIRPORT-53 | PAPI for ISGS approach procedures | |
| | APP ATC 114 | Approach ATC System to support ISGS operations (separation delivery) | |
| | APP ATC 170 | Approach ATC system upgraded to support approach procedure assignment | |
| | HUM-022 | Flight Crew new role for handling ISGS approach | |
| | HUM-032 | ATC new role for handling ISGS approach | |


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| | | | |
| | REG-0530 | Regulatory provisions for increased second glide slope operations (ISGS) | |
| | STD-113 | Update of EASA and ICAO regulatory frameworks for new visual ground aids (ISGS) | |

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| Type | Element | EN Code | EN/CR Title | Coverage |
|---|---|---|---|---|
| | | A/C-86 | On-board assistance to aircraft energy management | |
| | | A/C-87 | On-board assistance to flare | |
| | | AERODROME-ATC-71 | Aerodrome ATC System to support ISGS operations (separation delivery) | |
| | | AIRPORT-53 | PAPI for ISGS approach procedures | |
| | | APP ATC 114 | Approach ATC System to support ISGS operations (separation delivery) | |
| | | HUM-022 | Flight Crew new role for handling ISGS approach | |
| | | HUM-032 | ATC new role for handling ISGS approach | |
| Role | ATC Executive Controller (PJ.02-W2-14.3) | | | considered |
| Role | Tower Runway Controller (PJ.02-W2-14.3) | | | considered |
| | | REG-0530 | Regulatory provisions for increased second glide slope operations (ISGS) | |
| | | STD-113 | Update of EASA and ICAO regulatory frameworks for new visual ground aids (ISGS) | |

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222 ### 3.1.1.2 Deviations with respect to the SESAR Solution(s) definition

| Enabler | Opt/Req | Deviation |
|---|---|---|
| A/C-86_On-board assistance to aircraft energy management | Optional | |
| A/C-87_On-board assistance to flare | Optional | |
| AERODROME-ATC-102_Aerodrome ATC system to support final approach operations (distinguish approach procedures) | Required | |
| AERODROME-ATC-71_Aerodrome ATC System to support ISGS operations (separation delivery) | Optional | |
| AIRPORT-53_PAPI for ISGS approach procedures | Required | |



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|---|---|---|
| APP ATC 114_Approach ATC System to support ISGS operations (separation delivery) | Optional | |
| APP ATC 170_Approach ATC system upgraded to support approach procedure assignment | Required | |
| HUM-022_Flight Crew new role for handling ISGS approach | Required | |
| HUM-032_ATC new role for handling ISGS approach | Required | |
| REG-0530_Regulatory provisions for increased second glide slope operations (ISGS) | Required | |
| STD-113_Update of EASA and ICAO regulatory frameworks for new visual ground aids (ISGS) | Required | |

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224 ### 3.1.1.3 Relevant Use Cases

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| Operational Use Case | Description |
|---|---|
| [NOV-5][EAO-01] ISGS Published Approach | The use case takes place in the execution phase. It describes how one flight performing a published Enhanced Approach Operation (EAO) as an Increased Second Glide Slope (ISGS) approach is integrated in a flow of traffic.<br><br>The use case starts when the flight enters the approach control area (taking into account that the Flight Deck has performed a "Prepare & Brief Approach" at the end of cruise), and is initiated following a request from Approach Executive Control and ends when the aircraft has landed.<br><br>Pre-conditions:<br>? The ANSP shall inform Airspace Users (e.g. via AIC) about the availability of ISGS procedure with their differences from the local conventional approaches (including applicable separation minima, location of the second aiming point, landing distance available etc.)<br>? The need for displaying to the Controllers the interception points respective for each procedure shall be evaluated as part of the local deployment, such that the visual references are operationally relevant and unambiguously presented without e.g. cluttering on the controller air surveillance display.<br>? ANSPs shall reinforce through a request to Aircraft Operators the need for Flight Plans to be complete and correctly filled with aircraft navigation capabilities.<br>? A single ISGS procedure type may be supported by different navigation guidance systems and the same ISGS procedure type with different guidance means may be active at the same time.<br>? The ISGS approach chart shall be specific to one final approach path (i.e. angle) and supporting navigation guidance |

| | |
|---|---|
| | mean, and shall highlight the glide path angle in case it is significantly increased (e.g. more than 3.5°). The position and color of the associated PAPI shall be indicated on the chart.<br>? Flight Crew shall be informed about discrepancies from visual aid references when not specifically adapted to increased glideslope procedures.<br>? ISGS shall be published approach procedures flown based on ILS or GLS or RNP APCH with vertical guidance.<br>? The design of the GLS or RNAV (LPV, LNAV-VNAV) procedures supporting ISGS shall be compliant with ICAO Doc 8168 and shall be validated in accordance with the Instrument Flight Procedure process specified in ICAO Doc 9906<br>? Procedure design for ISGS operation shall use a glide path angle limited to 4.49°.<br>? Contingency procedures shall be revised as appropriate to accommodate non-nominal modes or degraded modes of operations like the navigation guidance supporting an active procedure is no longer serviceable or the ATC separation support function is no longer serviceable (e.g. loss of separation distance indicator).<br>? Approach Supervision shall decide when a published IGS becomes active/inactive for operations, considering the conditions for application are and remain met:<br>1. No operational ATC & weather limitations<br>2. Necessary navigation guidance means are serviceable.<br>? Approach / Tower Supervision shall inform the Approach / Tower Controllers about the list of active approach procedures.<br>? Information about a published ISGS being active to a given runway QFU shall be available to the Flight Deck in order to prepare expected approach briefing (e.g. via ATIS).<br>? ISGS Approach separation minima shall be specified for each combination of published approach procedure with different glideslopes, taking into account the associated navigation means and corresponding vertical accuracy around the published profile, for<br>? Leader and follower on same glideslope<br>? Leader upper glide - folower lower glide<br>? Leader lower glide - follower upper glide |
| [NOV-5][ISGS-Non-Nominal-02] Procedure for Glide Alert Management | This Use Case describes a non-nomial scenario in which glide alert is activated during ISGS approach. |
| [NOV-5][ISGS-Non-Nominal-03] Loss of TBS-ORD separation indicators | This Use Case describes a non-nomial scenario for the loss of TBS/ORD separation indicators during ISGS approach. |

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| System Process | Description |
|---|---|
| [NSV-4][EAO-01a] ISGS Published Approach (Airborne) | This is the technical Use Case for the ISGS procedure from an airborne point of view. |
| [NSV-4][EAO-01b] ISGS Published Approach (Ground) | This is the technical Use Case for the ISGS procedure from an ATC point of view. |
| [NSV-4][ISGS-Non-Nominal-02] Procedure for Glide Alert Management | This is a technical realisation of a non-nomial Use Case for glide alert management during ISGS approach. |
| [NSV-4][ISGS-Non-Nominal-03] Loss of TBS-ORD separation indicators | This is a technical realisation of a non-nomial Use Case for loss of TBS/ORD separation indicators during ISGS approach. |

#### 3.1.1.4 Applicable standards and regulations

The current existing regulations are applicable and may need evolution to cover ISGS:

- For the visual aids including PAPI:
  - AMC/GM to Aerodrome regulation EU 139/2014
  - ICAO Annex 14
  - AMC/GM to Common Requirements regulation EU 2020/469 Part-ATS.
- For the ISGS procedure and phraseology, the current regulatory framework.

### 3.1.2 Capability Configurations required for the SESAR Solution

| Enhanced Arrival Operations | | Airport | | |
|---|---|---|---|---|
| **CC** | **Op Env** | **Capability** | **Node** | **Stakeholder** |
| APP ACC | Terminal Airspace; | Airspace Reservation Management; Arrival Sequencing; Arrival Traffic Merging; Arrival/Departure Routes Management; Clearance/Instruction Management; Coordination and Transfer; CTA/CTO Management; Integrated Arrival/Departure Sequencing; Mid-Air Collision Avoidance; Minimum Pair Separation Provision; RNP based Operations Execution; Separation Service Provision (airspace); Spacing Technique Management; Trajectory Information Synchronisation; Wake Turbulence Separation Provision; Weather-Dependent Separation | Airspace Organisation; En-Route/Approach ATS; | Civil ATS Approach Service Provider; Military ATS Approach Service Provider; |



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| | | Provision; | | |
| Civil Aircraft | Airport; En-Route; Terminal Airspace; | Arrival Sequencing; Clearance/Instruction Management; CTA/CTO Management; Optimised Climb Execution; Optimised Descent Execution; Optimised Take-Off / Landing Execution; RNP based Operations Execution; | Flight Deck; | Civil Business Aviation-Fixed Wing; Civil Business Aviation-Rotorcraft; Civil Scheduled Aviation; |
| Communication Infrastructure | Airport; En-Route; NET-Network; Terminal Airspace; | Network connectivity provision for aeronautical communications on the airport surface; | | Civil CNS Service Provider; Military CNS Service Provider; |
| Civil Aircraft | Airport; En-Route; Terminal Airspace; | Optimised Descent Execution; Optimised Take-Off / Landing Execution; PinS Operations Execution; RNP based Operations Execution; | Flight Deck; | Civil Business Aviation-Fixed Wing; Civil Business Aviation-Rotorcraft; Civil Scheduled Aviation; |
| Navigation Infrastructure Ground Based | Airport; Terminal Airspace; | | En-Route/Approach ATS; | Civil CNS Service Provider; Military CNS Service Provider; |
| Navigation Infrastructure Satellite Based | | Positioning/Navigation/Timing of Mobiles (airspace) independent of Ground Navaids; | | |
| TWR | Airport; | Airspace Reservation Management; Arrival Sequencing; | Aerodrome ATS; | Civil ATS Aerodrome |



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| | | | | |
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| | | Clearance/Instruction Management;<br>Coordination and Transfer;<br>Departure Sequencing;<br>Dynamic Runway Allocation;<br>Integrated Arrival/Departure Sequencing;<br>Minimum Pair Separation Provision;<br>Remote Tower Operations Provision;<br>Spacing Technique Management;<br>Wake Turbulence Separation Provision;<br>Weather-Dependent Separation Provision; | | Service Provider;<br>Military ATS Aerodrome Service Provider; |

## 3.2 Changes imposed by the SESAR Solution on the baseline Architecture

| Enabler | Element type | Element name | Impact | Change |
|---|---|---|---|---|
| HUM-032 | ATC new role for handling ISGS approach | | | |
| | Role | ATC Executive Controller (PJ.02-W2-14.3) | Update | |
| | Role | Tower Runway Controller (PJ.02-W2-14.3) | Update | |



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# 4 Technical Specifications

## 4.1 Functional architecture overview

### 4.1.1 Resource Connectivity View

This view describes the resource connectivity for Solution PJ02-W2-14.3.
It covers the realization of the following Technical UCs:

- IGS Published Approach (Airborne)
- IGS Published Approach (Ground)



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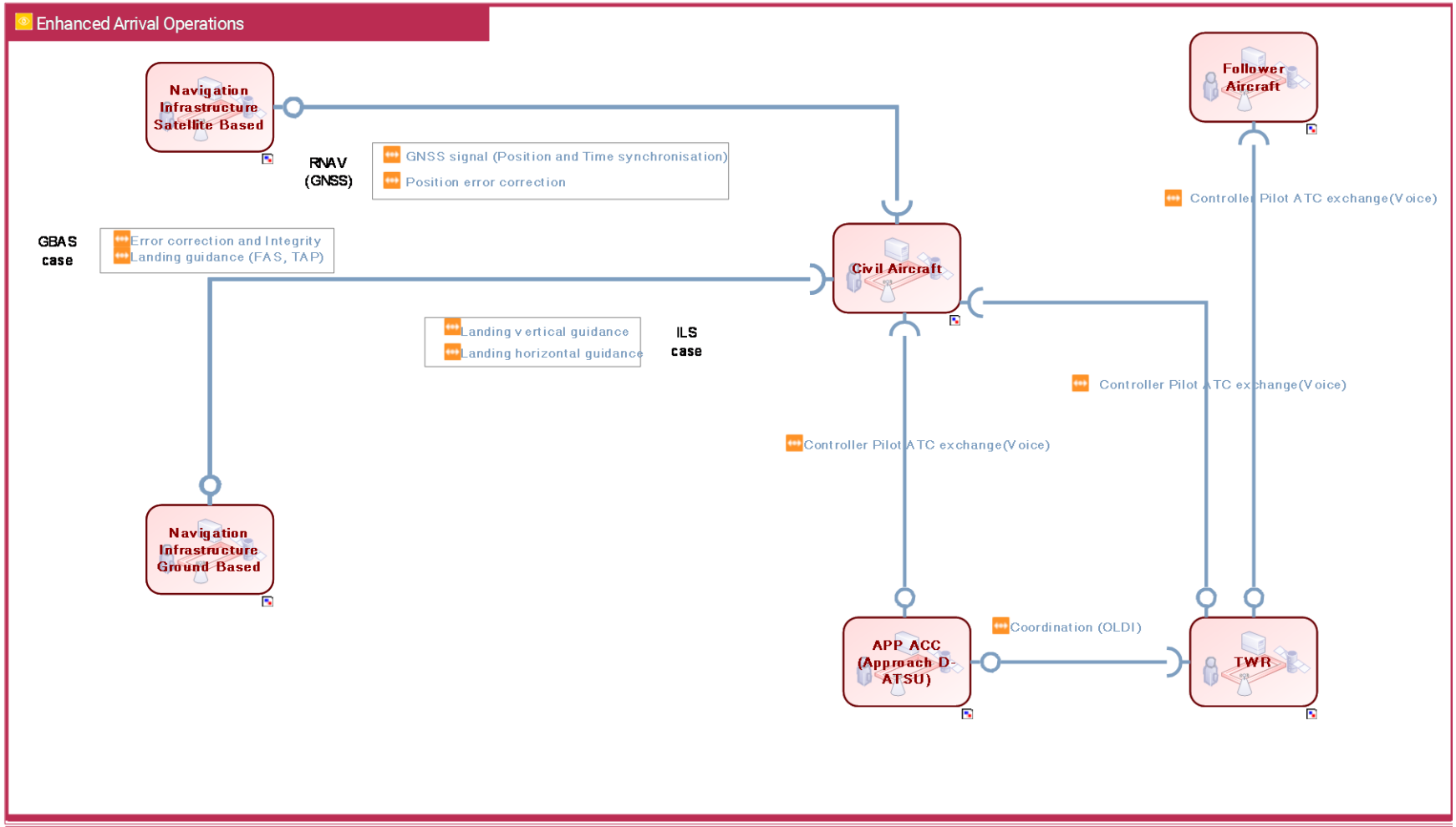


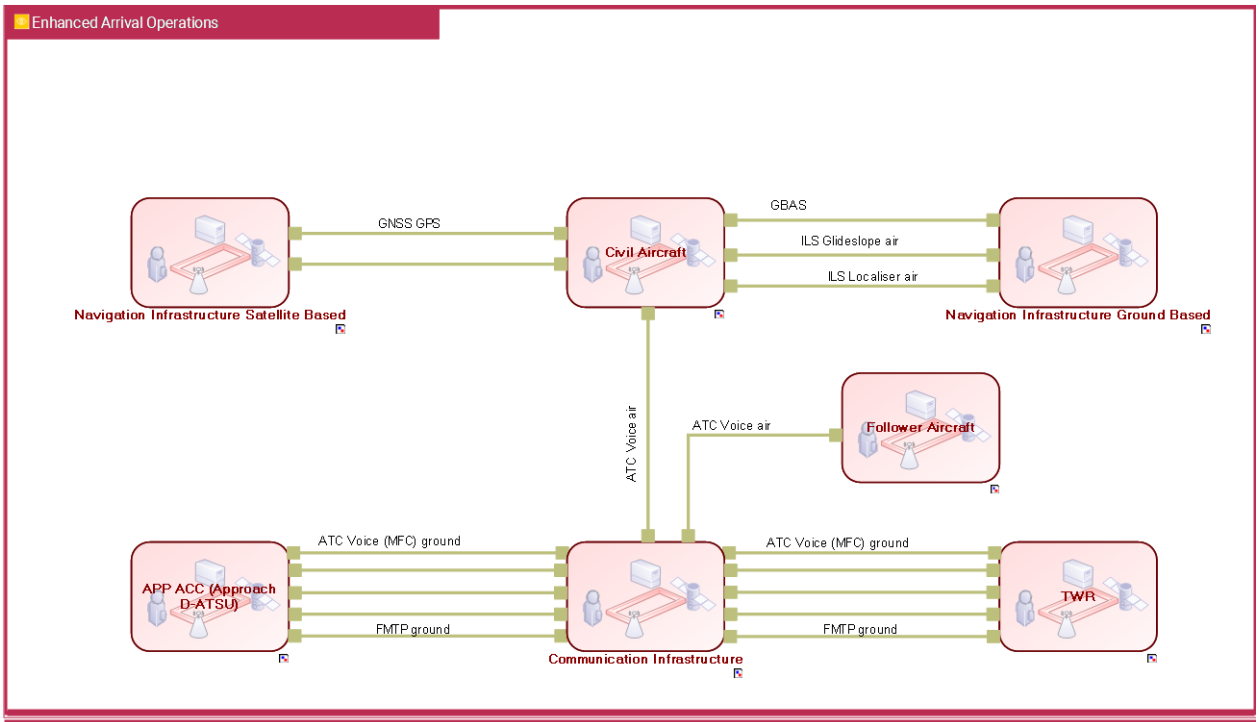

[NSV-4][EAO-01a] ISGS Published Approach (Airborne) [Airborne Predictions, APP ACC (Approach D-ATSU), Displays and Controls, Flight Crew, Flight Plan Management, GBAS Ground station, GPS (External), ILS, Lateral and Vertical Guidance, Lateral Positioning, Maneuvering Area Infrastructure, SBAS, Sensors and Antennas, TWR, Vertical Positioning, Voice]

[NSV-4][EAO-01b] ISGS Published Approach (Ground) [A/G Voice Communication (APP ACC), A/G Voice Communication (TWR), Aerodrome Safety Nets, Approach Traffic Separation, Arrival Traffic Separation, Civil Aircraft, Controller Human Machine Interaction Management Aerodrome ATC, Controller Human Machine Interaction Management ER/APP, Coordination and Transfer, Executive Controller (also called Tactical Controller), Flight Planning - Lifecycle Management - Data Distribution, G/G Communication Aerodrome ATC, Legacy G/G Datalink Communications, Safety Nets, Tower Runway Controller]

[NSV-4][ISGS-Non-Nominal-02] Procedure for Glide Alert Management [A/G Voice Communication, Approach Traffic Separation, ATC Executive Controller (PJ.02-W2-14.3), Civil Aircraft, Controller Human Machine Interaction Management ER/APP, Safety Nets]

[NSV-4][ISGS-Non-Nominal-03] Loss of TBS-ORD separation indicators [A/G Voice Communication, ATC Executive Controller (PJ.02-W2-14.3), Civil Aircraft, Follower Aircraft]

#### 4.1.1.1 Resource Infrastructure View




#### 4.1.1.2 Resource Orchestration View

##### 4.1.1.2.1 [NSV-4][EAO-01a] ISGS Published Approach (Airborne)

This is the technical Use Case for the ISGS procedure from an airborne point of view.



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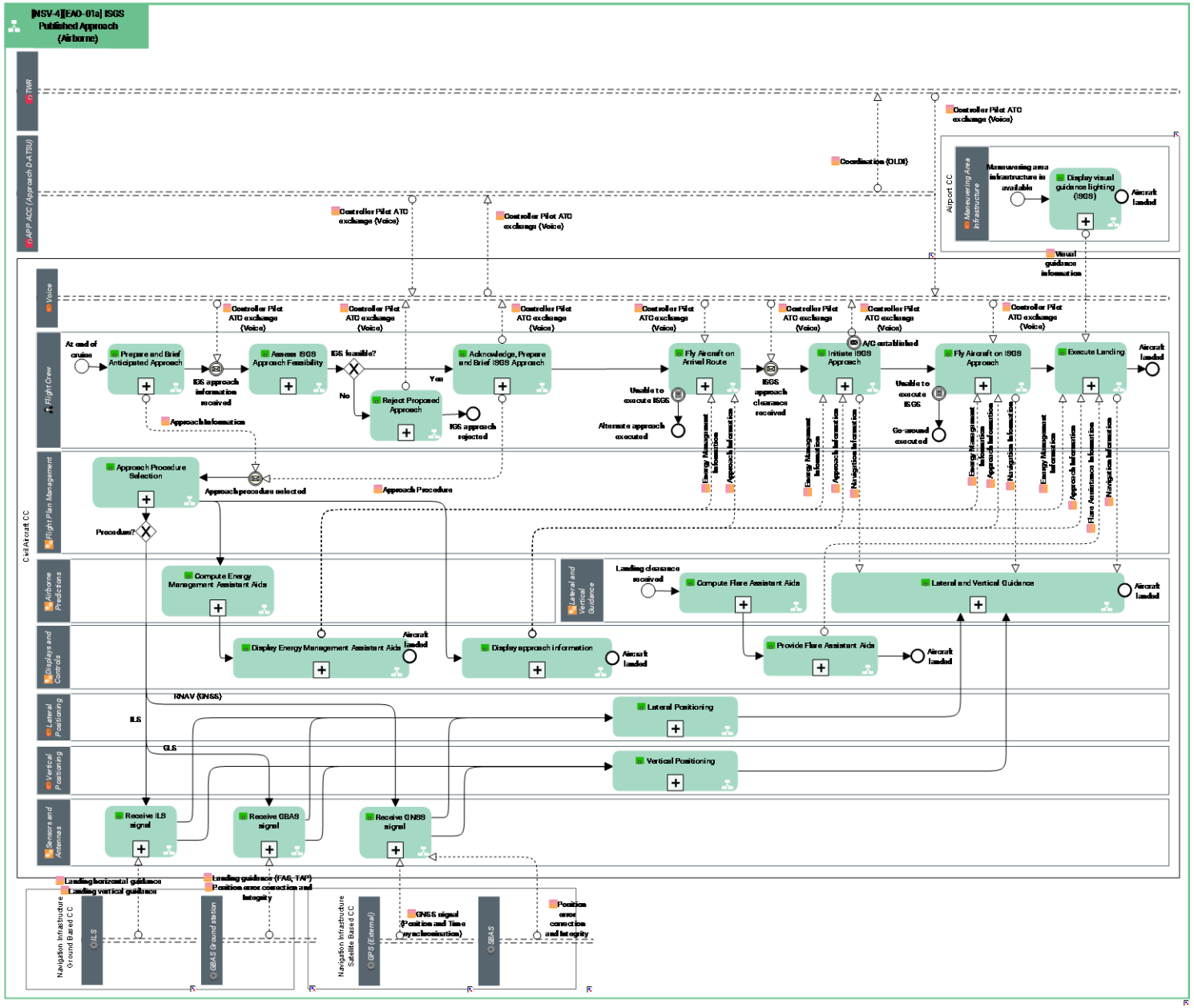




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| Role | Functional Block | Function |
|---|---|---|
| | Airborne Predictions | Compute Energy Management Assistant Aids; |
| | Displays and Controls | Approach Procedure Selection;<br>Display approach information;<br>Display Energy Management Assistant Aids;<br>Provide Flare Assistant Aids; |
| Flight Crew | | Acknowledge, Prepare and Brief ISGS Approach;<br>Assess ISGS Approach Feasibility;<br>Execute Landing;<br>Fly Aircraft on Arrival Route;<br>Fly Aircraft on ISGS Approach;<br>Initiate ISGS Approach;<br>Prepare and Brief Anticipated Approach;<br>Reject Proposed Approach; |
| | Flight Plan Management | Approach Procedure Selection; |
| | Lateral and Vertical Guidance | Compute Flare Assistant Aids;<br>Lateral and Vertical Guidance; |
| | Lateral Positioning | Lateral Positioning; |
| | Maneuvering Area Infrastructure | Display visual guidance lighting (ISGS); |
| | Sensors and Antennas | Receive GBAS signal;<br>Receive GNSS signal;<br>Receive ILS signal; |
| | Vertical Positioning | Vertical Positioning; |

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| Function | Description |
|---|---|
| Acknowledge, Prepare and Brief ISGS Approach | Upon proposal of an ISGS procedure by Approach Executive Control, the Flight Deck acknowledges it and immediately initiates the corresponding briefing to prepare the aircraft to fly the ISGS approach procedure, if not anticipated during approach preparation and briefing at the end of cruise. |
| Approach Procedure Selection | The aircraft system allows the flight crew to select the approach procedure as performed today for any approach. |
| Assess ISGS Approach Feasibility | The Flight Deck assesses the feasibility of the ISGS proposed by ATC, i.e.:<br>1. Aircraft equipment that is necessary for this procedure is available,<br>2. The proposed published procedure is already available on board,<br>3. The Flight Deck is able to fly such approach<br>4. Meteorological conditions do not prevent the execution of such a procedure<br>The feasibility assessment is considered when receiving the expected approach information and then until the final approach is being flown. |
| Compute Energy Management Assistant Aids | The Energy Management assistant computes an aid considering the state of the aircraft (e.g.weight and landing configuration chosen by flight crew), destination airport information (e.g. final glide slope) and the external environment i.e. destination airfield weather (wind, temperature, pressure). |
| Compute Flare Assistant Aids | The Flare assistant computes an aid considering the state of the aircraft (e.g.weight and landing configuration chosen by flight crew), destination airport information (e.g. final glide slope) and the external environment i.e. destination airfield weather (wind, temperature, pressure). |



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| | |
|---|---|
| Display approach information | Approach information are displayed as for any other approach.<br><br>In case of ISGS function features (e.g. ISGS slope value) are displayed in addition the approach information for standard slopes. |
| Display Energy Management Assistant Aids | Energy management assistant features are displayed in addition the approach information for standard slopes. |
| Display visual guidance lighting (ISGS) | This function relates to the PAPI for the increased glide slope. |
| Execute Landing | The Flight Deck flies the visual segment after DH (if any) and safely executes landing on the runway. |
| Fly Aircraft on Arrival Route | The Flight Deck follows arrival procedure or ATC instructions towards the final approach. |
| Fly Aircraft on ISGS Approach | The Flight Deck flies and monitors the lateral and vertical approach trajectory until reaching the decision height (DH). If distance/altitude information is provided on the chart, it can be used to perform distance/altitude checks.<br><br>The Flight Deck continues managing aircraft energy and configuration following SOP to prepare aircraft for landing, while respecting potential ATC speed instructions as long as they are compatible with stabilization criteria.<br><br>Meanwhile, the Flight Deck contacts Tower Runway Control when instructed to do so in order to receive landing clearance. When visual contact is established with the runway (at or before DH), the Flight Deck needs to properly identify visual references. |
| Initiate ISGS Approach | Once the ISGS approach clearance has been received, the Flight Deck manages aircraft navigation as appropriate to capture the final approach lateral and vertical path.<br><br>The Flight Deck also manages aircraft energy and configuration following SOP, while respecting procedure altitude and speed constraints, or ATC speed instructions if any. |



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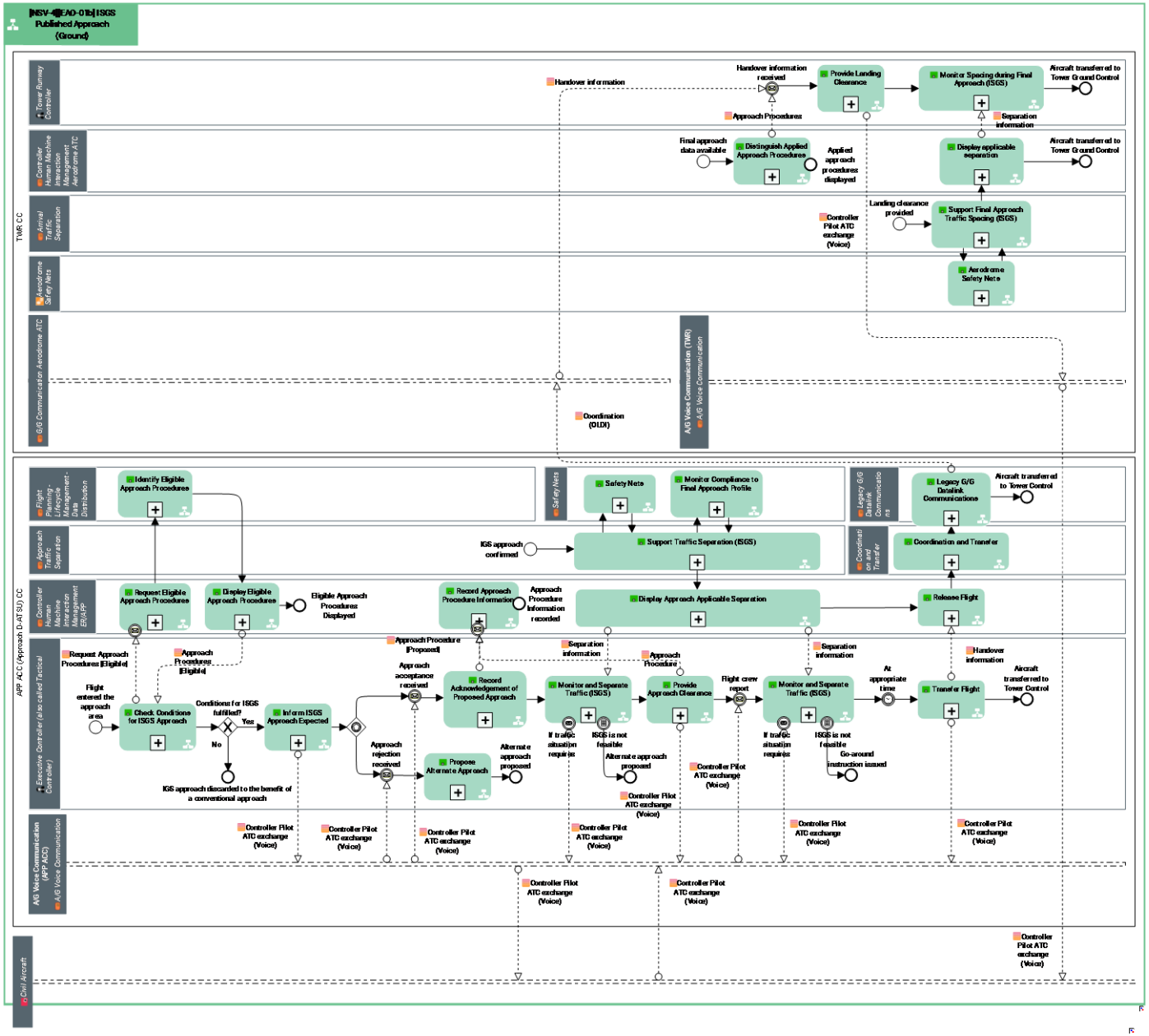
| | |
|---|---|
| | Once the aircraft is established on the final approach lateral and vertical path, the Flight Deck reports to ATC. |
| Lateral and Vertical Guidance | Flight Control i.e. the control of the aircraft on its lateral and vertical axis (e.g. Autopilot, Flight Director, Head up display) |
| Lateral Positioning | Elaboration of A/C latitude and longitude based on external means (GNSS, Radio Navigation, TACAN for Mil A/C) or autonomous means (Inertial Reference System). |
| Prepare and Brief Anticipated Approach | The Flight Deck performs the following sub-tasks:<br>1. obtain weather and landing information for destination and alternate airports<br>2. check current aircraft approach and landing capabilities against available airport means and weather conditions<br>3. insert expected arrival and approach procedures into the flight plan and check them against published charts<br>4. insert relevant performance parameters for approach<br>5. insert landing minimum<br>6. check/edit relevant performance parameters for go-around<br>7. check/perform tuning of relevant NAVAIDs<br>8. perform approach briefing<br>If the airport operates an Enhanced Arrival Procedure (EAP) approach, the Flight Deck also briefs the most likely EAP procedure. |
| Provide Flare Assistant Aids | The Flare assistant features are provided to the crew (e.g. audio cue for Flare anticipation and initiation). |
| Receive GBAS signal | (self-explanatory) |
| Receive GNSS signal | (self-explanatory) |

| | |
|---|---|
| Receive ILS signal | (self-explanatory) |
| Reject Proposed Approach | Once the proposed approach has been assessed as "not feasible", the Flight Deck rejects it (possibly providing the reason why). |
| Vertical Positioning | Elaboration of A/C vertical position (altitude, height) based on external means (GNSS) or autonomous means (Baro-Altitude, Radio-Altitude measurements) |

#### 4.1.1.2.2 [NSV-4][EAO-01b] ISGS Published Approach (Ground)

This is the technical Use Case for the ISGS procedure from an ATC point of view.



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271

| Role | Functional Block | Function |
|---|---|---|
| | Aerodrome Safety Nets | Aerodrome Safety Nets; |
| | Approach Traffic Separation | Support Traffic Separation (ISGS); |
| | Arrival Traffic Separation | Support Final Approach Traffic Spacing (ISGS); |
| | Controller Human Machine Interaction Management Aerodrome ATC | Display applicable separation; Distinguish Applied Approach Procedures; |
| | Controller Human Machine Interaction Management ER/APP | Display Approach Applicable Separation; Display Eligible Approach Procedures; Record Approach Procedure Information; Release Flight; Request Eligible Approach Procedures; |
| | Coordination and Transfer | Coordination and Transfer; |
| Executive Controller (also called Tactical Controller) | | Check Conditions for ISGS Approach; Inform ISGS Approach Expected; Monitor and Separate Traffic (ISGS); Propose Alternate Approach; Provide Approach Clearance; Record Acknowledgement of Proposed Approach; Transfer Flight; |
| | Flight Planning - Lifecycle Management - Data Distribution | Identify Eligible Approach Procedures; |
| | Legacy G/G Datalink Communications | Legacy G/G Datalink Communications; |





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| | | |
|---|---|---|
| | Safety Nets | Monitor Compliance to Final Approach Profile; Safety Nets; |
| Tower Runway Controller | | Monitor Spacing during Final Approach (ISGS); Provide Landing Clearance; |

272

| Function | Description |
|---|---|
| Aerodrome Safety Nets | This functional block detects potential conflicts between two objects (i.e. aircraft or vehicles), or between an object and a restricted area, by processing the actual traffic situation, and triggers alerts within manoeuvring areas (runway/s and taxiways).<br><br>It is also extended on final approach and take-off path. The potential safety hazards situations on the airport movement area: runway incursion, intrusion in protected areas, aircraft/aircraft and aircraft/vehicle collisions. |
| Check Conditions for ISGS Approach | Approach Executive Control determines whether a flight can be given an active ISGS published procedure based on:<br><br>? aircraft declared navigation capabilities (assuming flight crew ability),<br><br>? relevance of such a procedure for this flight in current traffic context (density, spacing management, etc.) |
| Coordination and Transfer | The Coordination & Transfer functional block comprises the management of coordination and transfer of flights between "internal" sectors and with external ATSUs, civil/military coordination, pre-departure clearance coordination, and the processing of oceanic clearances.<br><br>The type of connection with the coordination partner (e.g. internal sector, OLDI ATSU, Flight Object ATSU) is largely transparent to the Coordination and Transfer functional block as the coordination and transfer process is common to all.<br><br>C&T addresses the following aspects:<br><br>? Identification of the sectors/units that are interested in the flight (i.e. that will either control the flight or for which part or all of the flight needs to be coordinated or informed) based on the airspace intersections, as provided by TP&M, together with other data such as flight category (GAT/OAT), rules (IFV/VFR), ADEP/ADES, distance |

| | |
|---|---|
| | flown in the sector, etc<br><br>? Synchronization of the transfer of frequency with ACM when needed<br><br>? Synchronisation of the SSR code with the upstream centre (in conjunction with GGDC)<br><br>? Identification of LOAs to be used<br><br>? Check that coordinated entry/exit conditions are achievable (e.g. from planned trajectory) and generate consequent warnings<br><br>? Identification of the executive data at the transfer time (i.e. CFL, Assigned ROCD, Assigned Heading?) |
| Display applicable separation | That function displays the separation delivery indicators linked to each pair of aircraft to help the controller respect the necessary separations between aircraft and optimize the distance between 2 aircraft. |
| Display Approach Applicable Separation | That function displays the separation delivery indicators linked to each pair of aircraft to help the controller respect the necessary separations between aircraft and optimize the distance between 2 aircraft. |
| Display Eligible Approach Procedures | That function displays to Executive Controller, on his/her request, the list of active published procedures an aircraft can fly, according to its known capabilities (from flight plan). |
| Distinguish Applied Approach Procedures | That function displays, on Runway Tower Controller interface, the list of arriving aircraft in such a way that the controller can easily identify which procedure an aircraft is flying. According to the case, that enables the controller to discriminate aircraft going to one threshold or the other (for SRAP and IGS-to-SRAP), flying one slope or the other (IGS, A-IGS) , going to one runway or the other (CSPR-ST). |
| Identify Eligible Approach Procedures | That function calculates the list of active procedures an aircraft can fly, according to its known capabilities (from flight plan). |
| | Approach Executive Control initiates the ISGS procedure informing |

| | |
|---|---|
| Inform ISGS Approach Expected | the Flight Deck of the expected enhanced arrival approach. |
| Legacy G/G Datalink Communications | The Legacy Ground-Ground Datalink Communications functional block provides the functionality processing to exchange flight and environment data with the CFMU (IFPS and ETFMS), aircraft operators, other civil and military ATS Units, Air Defence units and Aerodrome system (Departure Management). The functional block translates data between internal interfaces and the standard protocols in use with the external systems (e.g. ICAO, ADEXP, OLDI). |
| Monitor and Separate Traffic (ISGS) | Approach Executive Control sequences and merges the arrival traffic while respecting all separation and spacing criteria for ISGS procedure using speed and vectoring (altitude and heading) instructions whenever needed. |
| Monitor Compliance to Final Approach Profile | This Function monitors compliance to the final approach profile, i.e. interception of the right glide path and adherence to the correct glide path. |
| Monitor Spacing during Final Approach (ISGS) | Tower Runway Control monitors the final approach, especially:<br>1. the spacing with aircraft ahead, and<br>2. the adherence to the final approach altitude scheme.<br>A go-around procedure may be initiated if the conditions for a safe landing are not fulfilled.<br>Once the aircraft has landed and vacated the runway, Tower Runway Control transfers the flight to Tower Ground Control. |
| Propose Alternate Approach | After the Flight Deck has rejected the proposed active EAP, Approach Executive Control takes this refusal into account and clears the arrival flight for another active approach. |
| Provide Approach Clearance | Approach Executive Control issues, at the appropriate time, and records the approach clearance corresponding to the published chart. |
| | At the appropriate time, the tower controller provides the landing clearance as well as the wind information while ensuring that the |



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|---|---|
| Provide Landing Clearance | runway is clear of traffic. |
| Record Acknowledgement of Proposed Approach | Once the Flight Deck has accepted the proposed approach, Approach Executive Control records the corresponding arrival approach for this particular flight. |
| Record Approach Procedure Information | This function enables the controller to input and record the approach procedure information. |
| Release Flight | This function allows the controller to trigger the procedure to release the flight and transfer it to another ATS unit. |
| Request Eligible Approach Procedures | That function allows the Executive Controller to request to the system the list of active procedures an aircraft can fly. |
| Safety Nets | The Safety Nets functional block alerts the ATC controllers in case of short-term danger for an aircraft to infringe separation criteria with other aircraft or danger areas or in case the aircraft deviates from the nominal approach path.<br><br>The safety nets functional block encompass the following sub-functions:<br><br>? Short Term Conflict Alert (STCA) detecting and alerting in case of infringement of separation minima between aircraft.<br><br>? Minimum Safe Altitude Warning (MSAW) detecting and alerting in case of infringement the minimum safe altitude form the ground or from an obstacle.<br><br>? Airspace Proximity Warning (APW) detecting and alerting in case an aircraft is going to infringe restricted airspace.<br><br>? Approach Path Monitoring (APM) detecting and alerting in case an aircraft deviates from the glide path. |
| Support Final Approach Traffic Spacing (ISGS) | This function will support the controller in the delivery of the separation (on final approach) to apply between each pair of aircraft (one of them following an ISGS procedure). |
| Support Traffic Separation (ISGS) | This function will support the controller in the visualization of the separation to apply between each pair of aircraft (one of them following an ISGS procedure). |

| | |
|---|---|
| Transfer Flight | At the appropriate time, Approach Executive Control:<br><br>1. hands over and transfers the control of the flight to Tower Runway Control, mentioning the followed published approach chart, and<br><br>2. instructs the Flight Deck to contact Tower Runway Control. |

#### 4.1.1.2.3 [NSV-4][ISGS-Non-Nominal-02] Procedure for Glide Alert Management

This is a technical realisation of a non-nomial Use Case for glide alert management during ISGS approach.



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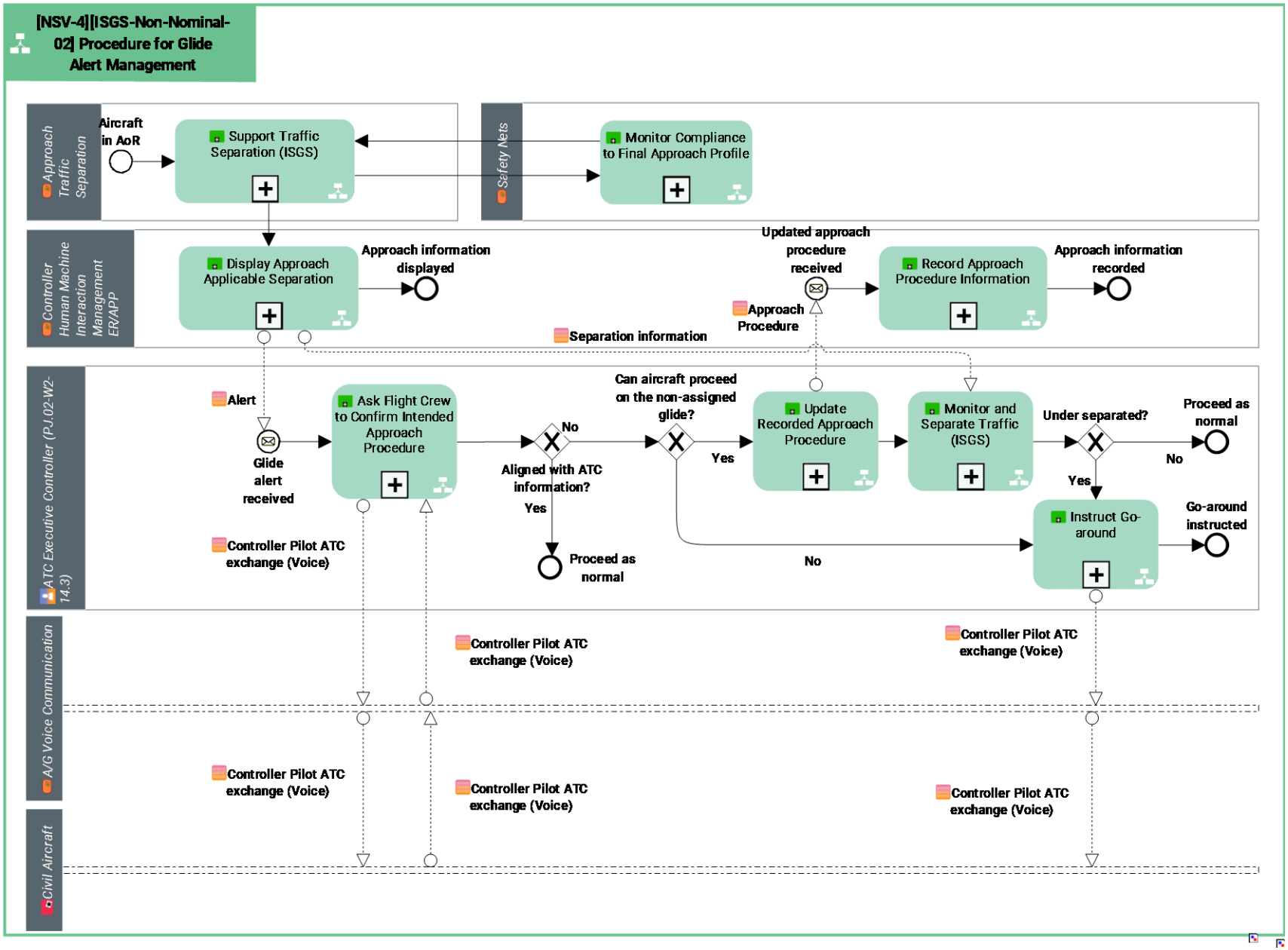




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279

| Role | Functional Block | Function |
|---|---|---|
| | Approach Traffic Separation | Support Traffic Separation (ISGS); |
| ATC Executive Controller (PJ.02-W2-14.3) | | Ask Flight Crew to Confirm Intended Approach Procedure; Instruct Go-around; Monitor and Separate Traffic (ISGS); Update Recorded Approach Procedure; |
| | Controller Human Machine Interaction Management ER/APP | Display Approach Applicable Separation; Record Approach Procedure Information; |
| | Safety Nets | Monitor Compliance to Final Approach Profile; |

280

| Function | Description |
|---|---|
| Ask Flight Crew to Confirm Intended Approach Procedure | ATC executive controller asks flight crew to confirm they are flying the intended approach procedure. |
| Display Approach Applicable Separation | That function displays the separation delivery indicators linked to each pair of aircraft to help the controller respect the necessary separations between aircraft and optimize the distance between 2 aircraft. |
| Instruct Go-around | Executive controller or Tower Runway Controller instructs a go-around to the aircraft that triggered the glide alert or to any heavy aircraft flying on the upper glide (SRAP one). |
| Monitor and Separate Traffic (ISGS) | Approach Executive Control sequences and merges the arrival traffic while respecting all separation and spacing criteria for ISGS procedure using speed and vectoring (altitude and heading) instructions whenever needed. |
| Monitor Compliance to Final | This Function monitors compliance to the final approach profile, i.e. interception of the right glide path and adherence to the correct glide |





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| | |
|---|---|
| Approach Profile | path. |
| Record Approach Procedure Information | This function enables the controller to input and record the approach procedure information. |
| Support Traffic Separation (ISGS) | This function will support the controller in the visualization of the separation to apply between each pair of aircraft (one of them following an ISGS procedure). |
| Update Recorded Approach Procedure | This function allows the controller to update the approach procedure information that had been recorded and to record the new one. |

281

282 #### 4.1.1.2.4 [NSV-4][ISGS-Non-Nominal-03] Loss of TBS-ORD separation indicators

283 This is a technical realisation of a non-nomial Use Case for loss of TBS/ORD separation indicators during
284 ISGS approach.
285

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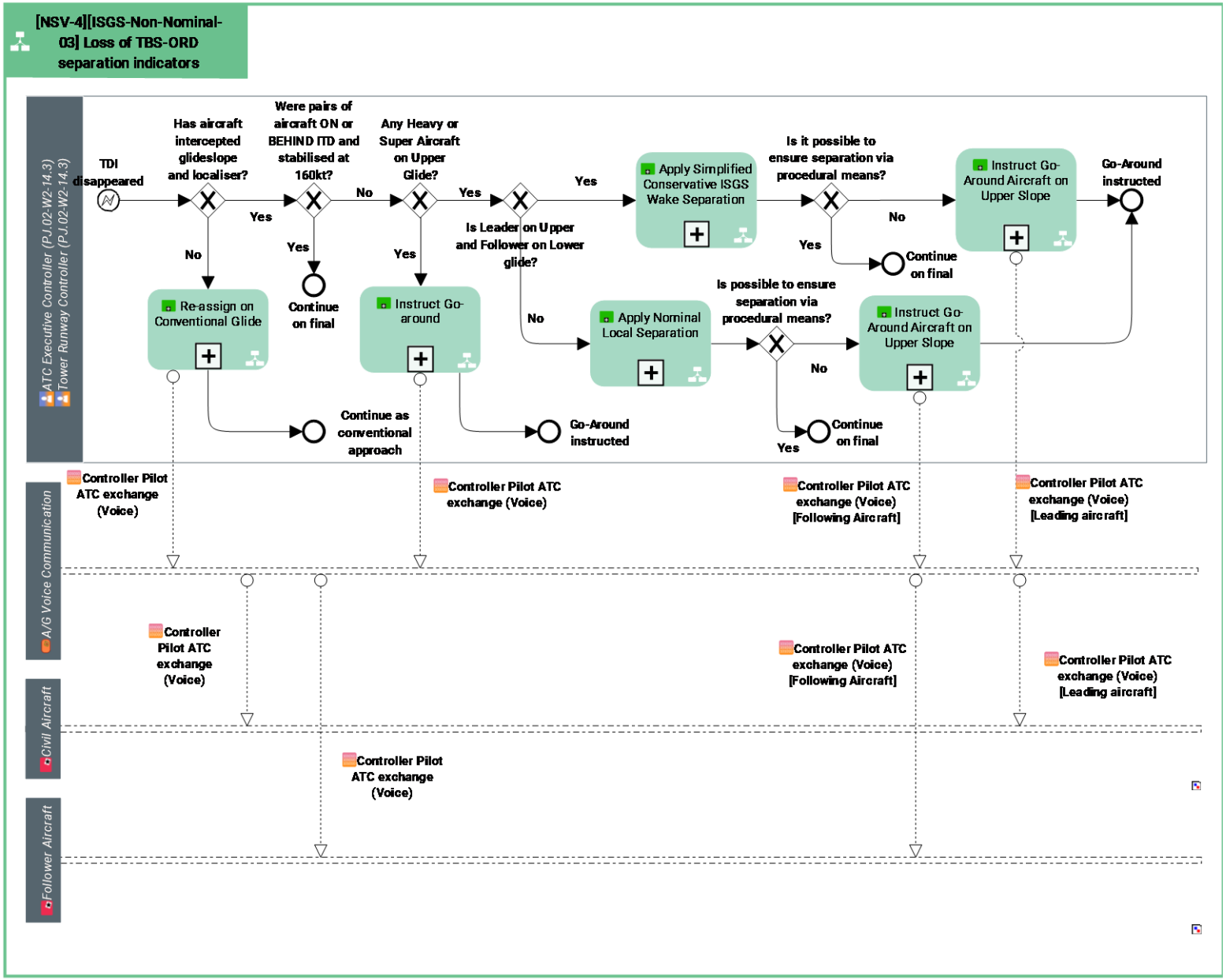




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288

| Role | Functional Block | Function |
|---|---|---|
| ATC Executive Controller (PJ.02-W2-14.3)Tower Runway Controller (PJ.02-W2-14.3) | | Apply Nominal Local Separation;<br>Apply Simplified Conservative ISGS Wake Separation;<br>Instruct Go-around;<br>Instruct Go-Around Aircraft on Upper Slope;<br>Instruct Go-Around Aircraft on Upper Slope;<br>Re-assign on Conventional Glide; |

289

| Function | Description |
|---|---|
| Apply Nominal Local Separation | Executive controller or Tower Runway controller applies the nominal wake separations in use at the airport. |
| Apply Simplified Conservative ISGS Wake Separation | In case of leader on upper glide and follower on lower glide, the separation has to be increased. To simplify the rule as the assistance tool is lost, a simplified conservative wake separation compliant with ISGS is applied by the ATCO, determined at each airport level, according to the separation used locally. |
| Instruct Go-around | Executive controller or Tower Runway Controller instructs a go-around to the aircraft that triggered the glide alert or to any heavy aircraft flying on the upper glide (SRAP one). |
| Instruct Go-Around Aircraft on Upper Slope | When necessary separation cannot be ensured, Executive controller or Tower Runway Controller instructs a go-around to the aircraft flying on the upper glide (SRAP one). |
| Re-assign on Conventional Glide | When separation indicators disappear, Executive controller reassigns to the conventional glide, all aircraft expected to fly a SRAP procedure or already cleared to it, that have not yet intercepted the glide. |

290

### 291 4.1.2 Resource Composition

292 N/A

293





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294 ### 4.1.3 Service view

295 #### 4.1.3.1 Service description

296

| Service | Service description |
|---|---|

297

298 #### 4.1.3.2 Service Provisioning

299

| Interaction | Consumer CC | Consumer System | Provider CC | Provider System |
|---|---|---|---|---|
| Controller Pilot ATC exchange(Voice).TWR_CC and Follower Aircraft_CC | Follower Aircraft | Aircraft; | TWR | Voice; |
| Error correction and Integrity.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Ground Based | GBAS Ground station; |
| Landing horizontal guidance.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Ground Based | ILS; |
| Landing vertical guidance.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Ground Based | ILS; |
| Position error correction.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Satellite Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Satellite Based | SBAS; |
| Coordination (OLDI).TWR_CC and APP ACC (Approach D-ATSU)_CC (Duplicata) | TWR | Aerodrome ATC; | APP ACC (Approach D-ATSU) | En-Route / Approach ATC; |
| Controller Pilot ATC exchange(Voice).Civil Aircraft (PJ.02-02)_CC and TWR_CC (Duplicata) | Civil Aircraft | Aircraft; | TWR | Voice; |
| Controller Pilot ATC exchange(Voice).Civil Aircraft (PJ.02-02)_CC and APP ACC (Approach D-ATSU)_CC (Duplicata) | Civil Aircraft | Aircraft; | APP ACC (Approach D-ATSU) | Voice; |





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| Interaction | Consumer CC | Consumer System | Provider CC | Provider System |
|---|---|---|---|---|
| GNSS signal (Position and Time synchronisation).Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Satellite Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Satellite Based | GPS (External); GALILEO (External); GLONASS (External); BEIDOU (External); |
| Landing guidance (FAS, TAP).Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata) | Civil Aircraft | Aircraft; | Navigation Infrastructure Ground Based | GBAS Ground station; |

### 4.1.3.3 Service Realization

#### 4.1.3.3.1 Interaction Controller Pilot ATC exchange(Voice).Civil Aircraft (PJ.02-02)_CC and APP ACC (Approach D-ATSU)_CC (Duplicata)

**System Port:** ATC_VOICE_MFC_GND at APP ACC_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC



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| Protocol Stack | Protocol |
|---|---|
| TC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** ATC_VOICE_MFC_GND at APP ACC_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** ATC_VOICE_MFC_GND at APP ACC_CC

| Protocol Stack | Protocol |
|---|---|



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| | |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| TC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| PC (Operational) Voice ground | |

**System Port:** ATC_VOICE_MFC_GND at APP ACC_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** ATC_VOICE at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |



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**System Port:** VOICE_RADIO_AIR at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |

#### 4.1.3.3.2 Interaction Controller Pilot ATC exchange(Voice).Civil Aircraft (PJ.02-02)_CC and TWR_CC (Duplicata)

**System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |



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334 **System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

335

336 **System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

337

338 **System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

339

340 **System Port:** ATC_VOICE_MFC_GND at TWR_CC





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| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** ATC_VOICE at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |

**System Port:** VOICE_RADIO_AIR at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |

#### 4.1.3.3.3 Interaction Controller Pilot ATC exchange(Voice).TWR_CC and Follower Aircraft_CC

**System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |





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350

351 **System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

352

353 **System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

354

355 **System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

356





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**System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** ATC_VOICE_MFC_GND at TWR_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |

**System Port:** VOICE_RADIO_GND at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice (MFC) ground | |
| | ATS MFC R2 |
| ATC Voice (QSIG) ground | |
| | ATS QSIG |
| ATC Voice (VoIP, control) ground | |
| | SIP |
| | TCP |
| | IP |
| ATC Voice (VoIP, media) ground | |





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| | |
|---|---|
| | RTP |
| | UDP |
| | IP |
| OPC (Operational) Voice ground | |

**System Port:** VOICE_RADIO_AIR at Communication Infrastructure_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |
| OPC (Operational) Voice air | |
| | VHF |
| | HF (selcal) |

**System Port:** ATC_VOICE at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| ATC Voice air | |
| | VHF - AM 25kHz/8.33kHz |
| | HF - AM 25kHz |

#### 4.1.3.3.4 Interaction Coordination (OLDI).TWR_CC and APP ACC (Approach D-ATSU)_CC (Duplicata)

**System Port:** IP_GND at Communication Infrastructure (PJ.02-02)_CC

| Protocol Stack | Protocol |
|---|---|
| IP | |

**System Port:** ATS_COORD_GND at APP ACC (PJ.02-02)_CC

| Protocol Stack | Protocol |
|---|---|
| FMTP ground | |
| | FMTP |
| | TCP |
| | IP |

**System Port:** ATS_COORD_GND at TWR (PJ.02-02)_CC

| Protocol Stack | Protocol |
|---|---|
| FMTP ground | |
| | FMTP |
| | TCP |





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| | |
|---|---|
| | IP |

**System Port:** IP_GND at Communication Infrastructure (PJ.02-02)_CC

| Protocol Stack | Protocol |
|---|---|
| IP | |

#### 4.1.3.3.5 Interaction Error correction and Integrity.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata)

**System Port:** NAV_GBAS_AIR at Navigation Infrastructure Ground Based_CC

| Protocol Stack | Protocol |
|---|---|
| GBAS | |
| | VDB Link VHF 108 - 117.95 MHz |

**System Port:** GBAS_VDB at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| GBAS | |
| | VDB Link VHF 108 - 117.95 MHz |

#### 4.1.3.3.6 Interaction GNSS signal (Position and Time synchronisation).Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Satellite Based_CC (Duplicata)

**System Port:** SAT_GNSS at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| GNSS GPS | |
| | L1 1575.42MHz |
| | L2 1227.6 MHz |
| | L5 1176.45 MHz |



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**System Port:** NAV_SAT_GNSS at Navigation Infrastructure Satellite Based_CC

| Protocol Stack | Protocol |
|---|---|
| GNSS BEIDOU | |
| | B1 1561.098 MHz |
| | B2 1207.147 MHz |
| | B3 1268.52 MHz |
| GNSS GALILEO | |
| | E1 1575.42 MHz |
| | E5a 1176.45 MHz |
| | E5b 1207.14 MHz |
| | E6 1278.75 MHz |
| GNSS GLONASS | |
| | L1 1598.0625 - 1605.375 MHz |
| | L2 1242.9375 - 1248.625 MHz |
| | L3 1201 MHz |
| GNSS GPS | |
| | L1 1575.42MHz |
| | L2 1227.6 MHz |
| | L5 1176.45 MHz |
| SBAS EGNOS | |
| | L1 1572.42MHz |

#### 4.1.3.3.7 Interaction Landing guidance (FAS, TAP).Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata)

**System Port:** NAV_GBAS_AIR at Navigation Infrastructure Ground Based_CC

| Protocol Stack | Protocol |
|---|---|
| BAS | |
| | VDB Link VHF 108 - 117.95 MHz |

**System Port:** GBAS_VDB at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| GBAS | |
| | VDB Link VHF 108 - 117.95 MHz |





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#### 4.1.3.3.8 Interaction Landing horizontal guidance.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata)

**System Port:** ILS_LOC at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| ILS Localiser air | |
| | UHF 108 - 112 MHz |

**System Port:** NAV_ILS_LOC_AIR at Navigation Infrastructure Ground Based_CC

| Protocol Stack | Protocol |
|---|---|
| ILS Localiser air | |
| | UHF 108 - 112 MHz |

#### 4.1.3.3.9 Interaction Landing vertical guidance.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Ground Based_CC (Duplicata)

**System Port:** ILS_GP at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| ILS Glideslope air | |
| | UHF 328.6 - 335.4 MHz |

**System Port:** NAV_ILS_GP_AIR at Navigation Infrastructure Ground Based_CC

| Protocol Stack | Protocol |
|---|---|
| ILS Glideslope air | |
| | UHF 328.6 - 335.4 MHz |

#### 4.1.3.3.10 Interaction Position error correction.Civil Aircraft (PJ.02-02)_CC and Navigation Infrastructure Satellite Based_CC (Duplicata)

**System Port:** SAT_EGNOS at Civil Aircraft_CC

| Protocol Stack | Protocol |
|---|---|
| SBAS EGNOS | |
| | L1 1572.42MHz |

**System Port:** NAV_SAT_GNSS at Navigation Infrastructure Satellite Based_CC

| Protocol Stack | Protocol |
|---|---|
| GNSS BEIDOU | |
| | B1 1561.098 MHz |
| | B2 1207.147 MHz |



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| | |
|---|---|
| | B3 1268.52 MHz |
| GNSS GALILEO | |
| | E1 1575.42 MHz |
| | E5a 1176.45 MHz |
| | E5b 1207.14 MHz |
| | E6 1278.75 MHz |
| GNSS GLONASS | |
| | L1 1598.0625 - 1605.375 MHz |
| | L2 1242.9375 - 1248.625 MHz |
| | L3 1201 MHz |
| GNSS GPS | |
| | L1 1575.42MHz |
| | L2 1227.6 MHz |
| | L5 1176.45 MHz |
| SBAS EGNOS | |
| | L1 1572.42MHz |

## 4.2 Functional and non-Functional Requirements

### 4.2.1 Requirements for ground

#### 4.2.1.1 Controller separation assistance tool

The following requirements are common to all concepts and they all refer to the controller separation assistance tool. These requirements are common with PJ02-01 requirements relating to that support tool.

[REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0050 |
| Title | Ground Speed |
| Requirement | Each Aircraft ground speed shall be provided by the surveillance |
| Status | <validated> |
| Rationale | |
| Category | |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

| | | |
|---|---|---|
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |

426

427 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0011 |
| Title | Sending Aircraft distance to FTD |
| Requirement | For each aircraft in the arrival sequence which has a leader aircraft in the arrival sequence, the system shall send the distance value between the aircraft and its targeted FTD to the Tower CWP and to the Approach CWP. |
| Status | <validated> |
| Rationale | Distance Aircraft - FTD can improve situational awareness for controllers |
| Category | <HMI> , <Interoperability> |

428

429 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

430

431 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0010 |
| Title | Display of Aircraft distance to FTD |
| Requirement | If an aircraft is<br>- eligible for TDIs display<br>- established on the centerline<br>- infringing its targeted ITD, and<br>the separation delivery tool shall send the distance value between the aircraft and the targeted FTD to the HMI |
| Status | <validated> |
| Rationale | If the aircraft has infringed ITD, Tower CWP needs to display distance to FTD to verify that the aircrafts does not go beyond the FTD |
| Category | <HMI> , <Interoperability> |

432

433 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

434

435 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0020 |
| Title | Gap HMI input |
| Requirement | The HMI shall provide the possibility to input a gap spacing value, in distance or in time, behind any aircraft eligible for TDI computation |
| Status | <validated> |
| Rationale | ATCo needs to be able to insert a gap behind an aircraft for departure or other reason |
| Category | <HMI> |

436

437 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |

438

439 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0026 |
| Title | Feedback following gap insertion |
| Requirement | The tool shall provide a feedback on whether or not the gap insertion or update is successful |
| Status | <in progress> |
| Rationale | Several reasons could lead to the gap insertion to fail, such as insufficient time between two aircrafts on the centre line for the gap value to be inserted, etc. |
| Category | <Functional> |

440





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441 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

442

443 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0021 |
| Title | Gap transmission |
| Requirement | Upon reception of a gap spacing instruction behind an aircraft, CWP HMI shall send the instruction along with the value to the Separation delivery tool |
| Status | <in progress> |
| Rationale | Self explanatory |
| Category | <Interoperability> , <HMI> |

444

445 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |

446

447 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0023 |
| Title | Gap HMI cancel |
| Requirement | The HMI shall provide the possibility to cancel a gap spacing value previously requested for an aircraft. |
| Status | <validated> |
| Rationale | ATCo needs to be able to cancel a gap behind an aircraft |
| Category | <HMI> |

448

449 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

450

451 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0024 |
| Title | Gap cancel recomputation |
| Requirement | Upon reception of a gap cancel instruction behind an aircraft, the system shall recompute the TDIs attached to the concerned aircraft taking into account the absence of Gap constraint |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Functional> |

452

453 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

454

455 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0030 |
| Title | Constraint information transmission |
| Requirement | For each aircraft, the system shall send to Tower and Approach CWP HMI the constraint type<br>MRS, or GAP, or WAKE, or ROT along with the sent TDIs |
| Status | <validated> |
| Rationale | HMI must be able to display the chevron differently taking into account the associated constraint |
| Category | <Interoperability> |

456

457 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

458

459 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0031 |
| Title | TDIs display with constraint |
| Requirement | The Tower CWP HMI and the Approach CWP HMI shall be able to apply different shapes to the displayed TDIs taking into account the applied constraint |
| Status | <validated> |
| Rationale | ATCO must be able to differentiate the constraint behind the TDIs |
| Category | <HMI> |

460

461 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

462

463 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0040 |
| Title | TDIs computation WAKE and MRS |
| Requirement | If the most constraining separation type is of ROT or GAP type, then the system shall automatically compute a second set of TDIs related to the most constraining separation value between MRS and WAKE. |
| Status | <in progress> |
| Rationale | System must be able to send the Safety constraint behind non safety constraints |
| Category | <Functional> |

464

465 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

466

467 [REQ]

| Identifier | REQ-02.01-TS-ARR1.0041 |
|---|---|
| Title | TDIs display WAKE and MRS |
| Requirement | If an infringement event is triggered on an ITD representing ROT or GAP constraint, the CWP HMI shall display the ITD related to related to the second set of TDIs sent by the System. |
| Status | <in progress> |
| Rationale | ATCO needs to know what is the Safety constraint behind the non safety constraint |
| Category | <HMI> |

468

469 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

470

471 [REQ]

| Identifier | REQ-02.01-TS-ARR1.0050 |
|---|---|
| Title | Runway change |
| Requirement | The HMI shall allow each aircraft in one arrival sequence to be assigned to another arrival sequence corresponding to a different runway. |
| Status | <validated> |
| Rationale | ATCO needs to have the possibility to change the assigned runway for al aircrafts |
| Category | <Interoperability> , <HMI> |

472

473 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

474

475 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0060 |
| Title | CSPR offline |
| Requirement | The offline configuration file for the system shall allow to specify if 2 runways are CSPR or not |
| Status | <in progress> |
| Rationale | Offline configuration of CSPR |
| Category | <Data> |

476

477 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

478

479 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0061 |
| Title | CSPR application |
| Requirement | For each pair of consecutive arrivals on 2 CSPR the TDIs shall apply an additional longitudinal constraint of a configurable minimum longitudinal separation between the 2 aircrafts. |
| Status | <in progress> |
| Rationale | Computation of TDIs in CSPR |
| Category | <Functional> |

480

481 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|

| | | |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |

482

483 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0070 |
| Title | Mode Change HMI |
| Requirement | The HMI shall allow the following mode change<br>from DBS to TBS<br>from TBS to DBS<br>for each arrival runway |
| Status | <validated> |
| Rationale | Controllers need to be able to activate or deactivate TBS mode on demand |
| Category | <HMI> |

484

485 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

486

487 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0071 |
| Title | Mode Change |
| Requirement | Upon each mode change, impacted TDIs shall be recomputed in consistency with the new mode applied |
| Status | <validated> |
| Rationale | TDIs must be recomputed upon each input change |
| Category | |

488

489 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

490

491 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0072 |
| Title | Mode Change Display |
| Requirement | The HMI shall show for each aircraft the mode of operation applied |
| Status | <validated> |
| Rationale | Controllers need to be aware of the current mode of operation |
| Category | |

492

493 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

494

495 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0080 |
| Title | Runway wind |
| Requirement | The current Runway surface wind may be provided to the Separation delivery tool |
| Status | <validated> |
| Rationale | Runway surface wind is not necessary fort TDIs computation but may increase controllers situational awareness |
| Category | |

496

497 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

498

499 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0090 |
| Title | Display Option |
| Requirement | The HMI may display the TDIs in different shapes depending on the type of TDI |
| Status | <validated> |
| Rationale | Controllers preferences need to be taken into account by the HMI |
| Category | |

500

501 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

502

503 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0091 |
| Title | Hide TDIS |
| Requirement | The HMI shall be able to hide selected TDIs |
| Status | <validated> |
| Rationale | Controller may need to unselect some displays |
| Category | |

504

505 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

506

507 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0100 |
| Title | Infringement alert 1 |
| Requirement | An infringement alert shall be sent by the separation delivery tool to HMI as soon as the Follower aircraft established on the centerline goes beyond its targeted ITD |
| Status | <validated> |
| Rationale | Infringement alert triggered by the separation delivery tool needs to be sent to HMI |
| Category | <Safety> , <Interoperability> |

508

509 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

510

511 [REQ]





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| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0101 |
| Title | Infringement alert 2 |
| Requirement | An infringement alert shall be sent by the separation delivery tool to HMI if both if the following conditions are met<br>- the ORD is less than d NM<br>- the follower aircraft established on the centerline goes beyond d NM from its targeted FTD |
| Status | <validated> |
| Rationale | Controllers need to be warned if the infringement is close but undetectable because of low compression |
| Category | |

512

513 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

514

515 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0102 |
| Title | Display of infringement alert |
| Requirement | HMI shall display the FTD upon reception of an infringement alert on an ITD |
| Status | <validated> |
| Rationale | Infringement alert of the ITD is needed to be displayed |
| Category | |

516

517 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

518

519 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0110 |
| Title | Distance step resolution |
| Requirement | The Separation Delivery tool HMI shall display indicators to at least a distance step resolution of 0.1NM |
| Status | <validated> |
| Rationale | Resolution needs to be high enough to avoid lack of situational awareness |





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| | |
|---|---|
| Category | |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

[REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0120 |
| Title | TDI association |
| Requirement | The HMI shall be able to show the association between each TDI and its follower aircraft |
| Status | <validated> |
| Rationale | Controllers may need to identify which aircraft is associated to each TDI |
| Category | |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

[REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0121 |
| Title | TDI value |
| Requirement | The HMI might display the TDIs values |
| Status | <in progress> |
| Rationale | TDIs are displayed, their values may be needed for additional awareness |
| Category | <HMI> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |





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530

531 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0122 |
| Title | Distance to TDI |
| Requirement | The HMI might display the distance between TDIs and the associated follower aircraft |
| Status | <in progress> |
| Rationale | Distance values might be useful to controllers |
| Category | <HMI> |

532

533 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |

534

535 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0130 |
| Title | Display approach arrival sequence |
| Requirement | The HMI may display the approach arrival sequence on all CWPs |
| Status | <validated> |
| Rationale | Approach arrival sequence is an additional information needed by the ATCO |
| Category | <HMI> |

536

537 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

538

539 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR1.0140 |
| Title | Wind display |
| Requirement | CWPs HMI may display glideslope and surface wind information |

| | |
|---|---|
| Status | <in progress> |
| Rationale | Wind information may be useful to approach controllers |
| Category | <HMI> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

[REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0020 |
| Title | List of approaches |
| Requirement | For each aircraft, the expected and cleared approach procedure selected by the approach controller shall be communicated to the separation delivery tool in order to use the appropriate separation minima between the leader and follower aircraft. |
| Status | <in progress> |
| Rationale | The separation delivery tool needs inputs related to all applicable enhanced approach procedures |
| Category | <HMI> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

[REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0021 |
| Title | Offline tables |
| Requirement | The separation delivery tool shall be provided with the approach separation minima for each combination of published approach procedure (i.e. GLS Z 32R or ILS Y 32R) with different glideslopes, which takes into account the associated navigation means and corresponding vertical accuracy around the published profile. |
| Status | <in progress> |
| Rationale | The separation delivery tool needs inputs related to all applicable enhanced approach procedures |
| Category | <Data> |





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549 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

550

551 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0022 |
| Title | Air Speed profiles |
| Requirement | For each aircraft, the system shall include offline defined air speed profiles for each of the procedures applicable to this aircraft among the following<br>ILS<br>VFR<br>IGS<br>SRAP<br>CSPR-DT<br>A-IGS<br>IGS-to-SRAP. |
| Status | <in progress> |
| Rationale | The separation delivery tool needs inputs related to all applicable enhanced approach procedures |
| Category | <Data> |

552

553 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

554

555 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0023 |
| Title | EAP TDI's recomputation for leader |
| Requirement | Upon confirmed change of approach procedure for aircraft A, and if A has a leader in the arrival sequence, the system shall recompute the TDIs targeted by A , updating<br>- the separation table taking into account aircraft A's leader approach and aircrafts A's new selected approach and<br>- the new speed profile for aircraft A corresponding to its new selected approach |
| Status | <validated> |
| Rationale | TDIs must be updated upon any input change |
| Category | |





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556

557 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

558

559 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0024 |
| Title | EAP TDI's recomputation for follower |
| Requirement | Upon confirmed change of approach procedure for aircraft A, and if A has a follower in the arrival sequence, the system shall recompute the TDIs of aircraft A, updating<br>- the separation table taking into account aircraft A's new approach and aircraft A's follower approach and<br>- the new speed profile for aircraft A corresponding to its new selected approach |
| Status | <validated> |
| Rationale | TDIs must be updated upon any input change |
| Category | <Functional> |

560

561 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

562

563 [REQ]

| | |
|---|---|
| Identifier | REQ-02.01-TS-ARR3.0030 |
| Title | Visual Approach |
| Requirement | Upon a Visual Approach clearance for aircraft A, CWP HMI shall inhibit the display of the following indications<br>- ITD display<br>- FTD display<br>- Catch-up alert<br>- Speed alert<br>- Infringement alert |
| Status | <validated> |
| Rationale | Visual approach separation is under pilot's responsibility |
| Category | <HMI> |

564





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565 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

566

567 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0010 |
| Title | Input Wind format for separation |
| Requirement | The separation delivery tool shall receive at each online update the following wind data for each Runway and for each predefined altitude layer<br>- current heading to apply<br>- current speed to apply<br>from the MET data provider |
| Status | <validated> |
| Rationale | heading and speed are needed to be provided to the separation delivery tool |
| Category | |

568

569 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

570

571 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0011 |
| Title | Input wind format for prediction |
| Requirement | The system supporting the separation delivery tool should receive the following wind data<br>- forecast heading<br>- forecast speed<br>from the MET data provider |
| Status | <in progress> |
| Rationale | MET data are necessary for separation provision |
| Category | <Interoperability> |

572

573 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|





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| | | |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

574

575 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0012 |
| Title | Runway surface wind |
| Requirement | The MET data provider shall send the current runway surface wind heading and wind speed to the separation delivery tool |
| Status | <validated> |
| Rationale | MET current data are necessary for separation provision |
| Category | |

576

577 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

578

579 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0013 |
| Title | Forecast runway surface wind |
| Requirement | The MET data provider shall send the forecast runway surface wind heading and wind speed to the separation delivery tool |
| Status | <in progress> |
| Rationale | MET forecast data are necessary for separation provision |
| Category | <Interoperability> |

580

581 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

582

583 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0020 |
| Title | Traffic data |
| Requirement | The surveillance system shall provide<br>- a unique identifier<br>- a position value<br>- altitude information |





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|---|---|
| | - ground speed<br>to each arrival aircraft that is correlated in the traffic |
| Status | <validated> |
| Rationale | Aircraft live track data in appropriate category is necessary for display on the HMI |
| Category | |

584

585 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

586

587 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0030 |
| Title | Flight data |
| Requirement | The Flight Data Processing shall provide<br>- a unique identifier<br>- aircraft type<br>- wake category<br>to each arrival aircraft that is correlated in the traffic |
| Status | <validated> |
| Rationale | Aircraft live FPL data in appropriate category is necessary for display on the HMI |
| Category | |

588

589 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

590

591 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-INT1.0040 |
| Title | Runway Intent |
| Requirement | Each aircraft's runway intent shall be provided by the Flight Data Processing |
| Status | <validated> |
| Rationale | Aircraft live FPL data in appropriate category is necessary for<br><br>display on the HMI |





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| | |
|---|---|
| Category | |

592

593 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

594

595 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0010 |
| Title | Wake separation provision |
| Requirement | The system shall allow to define wake separation tables among the following<br>- ICAO<br>- RECAT-EU<br>- RECAT-2<br>- WDS |
| Status | <validated> |
| Rationale | Necessary inputs to the separation delivery tool must be offline configurable |
| Category | |

596

597 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

598

599 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0020 |
| Title | Wake separation value |
| Requirement | Wake separations values shall be provided to the system both<br>- in distance and<br>- in corresponding time to fly |
| Status | <validated> |
| Rationale | Safety separations to apply need to be input to the separation delivery tool |

| | |
|---|---|
| Category | |

600

601 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

602

603 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0021 |
| Title | MRS value |
| Requirement | Offline modifiable Minimum Radar Separation values shall be provided to the system |
| Status | <validated> |
| Rationale | Safety separations to apply need to be input to the separation delivery tool |
| Category | |

604

605 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

606

607 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0022 |
| Title | Runway Spacing |
| Requirement | Offline modifiable specific Spacing values shall be provided to the system |
| Status | <validated> |
| Rationale | Specific separations to apply need to be input to the separation delivery tool |
| Category | |

608

609 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

610





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611 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0030 |
| Title | Buffer for uncertainties on wind and speed profile |
| Requirement | The system shall be provided with offline defined "buffer" separation values - in distance for DBS mode and in time for TBS mode - representing combined impact of the uncertainties for aircraft air speed profile and glideslope wind values |
| Status | <validated> |
| Rationale | Uncertainties need to be taken into account for safety matters |
| Category | |

612

613 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

614

615 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0040 |
| Title | TDIs transmission in all modes |
| Requirement | The system shall send to CWP HMI the TDIs values for each pair of arriving aircraft in the sequence for one selected mode among the following<br>TBS<br>WDS<br>S-PWS |
| Status | <validated> |
| Rationale | Controllers need to visualize separations to apply |
| Category | |

616

617 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

618

619 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0050 |
| Title | TDIs display |
| Requirement | The CWP HMI shall be able to display the TDIs sent by the system |





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| | |
|---|---|
| Status | <validated> |
| Rationale | Controllers need to visualize separations to apply |
| Category | |

620

621 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

622

623 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0060 |
| Title | Aircraft Data |
| Requirement | The Separation delivery tool shall be provided with the following online data for each aircraft in the traffic<br>- ICAO Aircraft Type<br>- Wake Turbulence Category<br>- True air speed profile on the final glide slope<br>- Runway Occupancy Time<br>- Runway Intent |
| Status | <validated> |
| Rationale | Aircraft offline data in appropriate category is necessary for display on the HMI |
| Category | <Interoperability> , <Data> |

624

625 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

626

627 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0061 |
| Title | Traffic data |
| Requirement | The System shall be provided with the following online data for each aircraft, updated at each system timestamp<br>- position<br>- altitude<br>- time of the system- current ground speed |
| Status | <validated> |
| Rationale | Aircraft live track data in appropriate category is necessary for display on the HMI |





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| | |
|---|---|
| Category | <Data> , <Interoperability> |

628

629 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

630

631 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0070 |
| Title | FTD computation with constraints |
| Requirement | For each pair of arriving aircraft, in case one set of TDIs is computed by the system, the FTD shall take the value of the greatest separation constraints among ROT, Gap request, MRS, Wake separation and any other offline defined specific separation involving one of the aircraft in the pair |
| Status | <validated> |
| Rationale | FTD represents the most constraining separation to respect between 2 consecutive aircraft |
| Category | |

632

633 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

634

635 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0071 |
| Title | Second FTD computation with constraints |
| Requirement | For each pair of arriving aircraft, in case a second set of TDIs is computed by the system (infringement of Gap or ROT ITD), the FTD of the second set shall take the value of the greatest separation constraints among MRS and Wake separation. |
| Status | <validated> |
| Rationale | Safety critical separation need to be displayed even if not the most constraining separation |





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| | |
|---|---|
| Category | |

636

637 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

638

639 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0080 |
| Title | Arrival Sequence |
| Requirement | The system shall be provided with the online current arrival sequence, updated at least at each change in the sequence among the following<br>- Aircraft removed from the sequence<br>- Aircraft added in the sequence<br>- Change of index of an Aircraft in the sequence<br>- Runway Intent for each aircraft in the sequence |
| Status | <validated> |
| Rationale | Any update in the sequence needs to be sent to the separation delivery tool |
| Category | <Functional> , <Interoperability> |

640

641 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

642

643 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0090 |
| Title | Required data for FTD computation in TBS mode |
| Requirement | For a pair of consecutive arriving aircraft (Leader;Follower), the system shall compute the FTD based on the following data<br>- Glide slope wind data (strength and direction)<br>- Wake separation value to apply (in time or distance depending on the chosen mode)<br>- Leader's ROT<br>- Follower's Air Speed Profile<br>- MRS value<br>- Any potential Gap request behind the leader |
| Status | <validated> |
| Rationale | FTD computation needs all applicable constraints |

| | |
|---|---|
| Category | |

644

645 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

646

647 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0091 |
| Title | Required data for ITD computation in TBS mode |
| Requirement | For a pair of consecutive arriving aircraft (Leader;Follower), the system shall compute the ITD based on the following data<br>- Glide slope wind data (strength and direction)<br>- FTD position<br>- Follower's Air Speed Profile<br>- Leader's Air Speed profile |
| Status | <validated> |
| Rationale | ITD needs wind and speed information on top of FTD data |
| Category | |

648

649 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

650

651 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0100 |
| Title | Required data for FTD update in TBS mode |
| Requirement | For a pair of consecutive arriving aircraft (Leader;Follower), the system shall update the FTD upon any online change among the following data<br>- Glide slope wind data (strength and direction)<br>- Wake separation value to apply<br>- Leader's ROT<br>- Follower's Speed Profile<br>- MRS value<br>- Any potential Gap request behind the leader<br>- Leader's position |
| Status | <validated> |
| Rationale | TDIs must be updated upon any input change |
| Category | |





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652

653 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

654

655 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0101 |
| Title | Required data for ITD update in TBS mode |
| Requirement | For a pair of consecutive arriving aircraft (Leader;Follower), the system shall update the ITD upon any online change among the following data<br>- Glide slope wind data (strength and direction)<br>- Wake separation value to apply<br>- Leader's ROT<br>- Leader's True Air Speed profile on the glideslope<br>- Follower's True Air Speed Profile on the glideslope<br>- MRS value<br>- Any potential Gap request behind the leader<br>- FTD position |
| Status | <validated> |
| Rationale | TDIs must be updated upon any input change |
| Category | <Functional> |

656

657 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

658

659 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0102 |
| Title | Sequence change |
| Requirement | For each pair of consecutive arriving aircraft, (Leader ; Follower), if either the Leader or the Follower changes, TDIs shall be recomputed at the next update |
| Status | <validated> |





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| | |
|---|---|
| Rationale | TDIs must be updated upon any input change |
| Category | |

660

661 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

662

663 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0103 |
| Title | Sequence arrival |
| Requirement | One arrival sequence per runway shall be provided to the Separation delivery tool |
| Status | <validated> |
| Rationale | Each runway needs one and only one sequence as input |
| Category | |

664

665 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

666

667 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0110 |
| Title | ITD greater than FTD |
| Requirement | For a pair of (Leader;Follower) aircraft, if the initially computed ITD value is smaller that the FTD, the ITD shall automatically take the same value as the FTD |
| Status | <validated> |
| Rationale | FTD is the minimum applicable separation between 2 consecutive aircraft |
| Category | |

668

669 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

670

671 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0120 |
| Title | Wake separation Definition for DBS mode |
| Requirement | In any DBS mode – ICAO, RECAT-EU or S-PWS - the wake constraint shall match the distance to fly defined in the separation table |
| Status | <validated> |
| Rationale | Offline data and displayed data need to be consistent in time and in distance |
| Category | <Functional> |

672

673 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

674

675 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0121 |
| Title | Wake separation Definition for TBS mode |
| Requirement | In any TBS and WDS mode – ICAO, RECAT-EU or S-PWS - the wake constraint shall match the time to fly defined in the separation table |
| Status | <validated> |
| Rationale | Offline data and displayed data need to be consistent in time and in distance |
| Category | |

676

677 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

678

679 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0130 |
| Title | TDIs display on the centerline 1 |
| Requirement | TDIs shall be displayed on the extended centerline at the correct distance (FTD and ITD) behind the Leader. |
| Status | <validated> |
| Rationale | Controllers need an aiming point on the extended centreline |
| Category | <Functional> |

680

681 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

682

683 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0131 |
| Title | TDIs display on the centerline 2 |
| Requirement | If<br>- the Leader aircraft is eligible for TDIs display<br>- the Leader aircraft is not established on the centerline<br>- the Leader aircraft's projected position on the centerline is behind its targeted ITD<br>Then its TDIs shall be displayed on the extended centerline at the correct distance behind the projected position of the Leader on the extended centerline |
| Status | <validated> |
| Rationale | Controllers need an aiming point on the extended centreline |
| Category | |

684

685 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

686

687 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0132 |
| Title | TDIs display on the centerline 3 |
| Requirement | If<br>- the Leader aircraft is eligible for TDIs display<br>- the Leader aircraft is not established on the centerline<br>- the Leader aircraft's projected position on the centerline is in front of its targeted ITD<br>Then its TDIs shall be displayed on the extended centerline at the correct distance behind the position of the leader's ITD on the extended centerline |
| Status | <validated> |
| Rationale | Controllers need an aiming point on the extended centreline |
| Category | |





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688

689 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

690

691 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0140 |
| Title | Speed conformance alert |
| Requirement | The Seperation Delivery Tool shall send to CWP HMI a speed conformance alert when an aircraft's ground speed exceeds its offline defined air speed - corrected by the wind value - by a predefined offline tolerance value |
| Status | <validated> |
| Rationale | Controller needs to aware of any inconsistency between offline data and real data |
| Category | |

692

693 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |

694

695 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0150 |
| Title | Catch-up alert |
| Requirement | The Separation delivery tool may send a catch-up alert to the HMI when a follower aircraft is expecting to reach the ITD in less than T seconds, T being an offline defined parameter. |
| Status | <validated> |
| Rationale | Controller may need to be aware of any potential separation infringement in the near future |
| Category | |

696





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697 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

698

699 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0160 |
| Title | Sequence alert |
| Requirement | The separation delivery tool shall send a sequence alert to the HMI when the order of arrival in the arrival sequence list differs from the order of aircraft position on the extended runway centerline starting from the Runway threshold |
| Status | <validated> |
| Rationale | Sequence order on the final approach need to be correct for safety |
| Category | <Safety> |

700

701 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

702

703 [REQ]

| | |
|---|---|
| Identifier | REQ-12.02.02-TS-OPS1.0170 |
| Title | System failure |
| Requirement | The separation delivery tool shall send to the HMI an error message in case of system failure |
| Status | <in progress> |
| Rationale | Controllers need to be aware of any system failure |
| Category | <Safety> |

704

705 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

706





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#### 4.2.1.2 Other ground requirements

[REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0001 |
| Title | Expected Approach procedure selection by Approach Executive Controller |
| Requirement | For each arrival traffic, the flight label on ATC display should enable the Approach Executive Controller to select the expected approach procedure, among the list of active approach procedures being eligible for this traffic (e.g. based on the traffic navigation guidance capabilities declared in the flight plan), and then to record it. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Design> , <Safety> , <Functional> , <HMI> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1007 |
| <ALLOCATED_TO> | <Function> | Identify Eligible Approach Procedures<br><br>Request Eligible Approach Procedures |

[REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0002 |
| Title | Expected approach procedure display |
| Requirement | The selected expected approach procedure should be displayed in the flight label and/or flight plan information. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Design> , <Functional> , <Safety> , <HMI> |

[REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |





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| | | |
|---|---|---|
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1007 |
| <ALLOCATED_TO> | <Function> | Display Eligible Approach Procedures |

715

716 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0003 |
| Title | Cleared Approach procedure selection by Approach Executive Controller |
| Requirement | For each arrival traffic, the flight label on ATC display should enable the Approach Executive Controller to select the cleared approach procedure among the list of active approach procedures eligible for that aircraft, not necessarily the expected one previously recorded, and then to record it. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Design> , <HMI> , <Functional> , <Safety> |

717

718 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1016 |
| <ALLOCATED_TO> | <Function> | Record Approach Procedure Information |

719

720 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0004 |
| Title | Distinct display of expected and cleared approach procedures for Approach Executive Controller |
| Requirement | Expected and cleared approach procedures shall be displayed in distinct ways so that the Approach Executive Controller can easily and unambiguously distinguish aircraft already cleared from the others. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Functional> , <HMI> , <Design> , <Safety> |

721

722 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1016 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1007 |

723

724 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0005 |
| Title | Update of expected approach procedure by Approach Executive Controller |
| Requirement | The flight label on ATC display shall enable the Approach Executive Controller to update the expected approach procedure by selecting a different one among the list of active approach procedures eligible for that aircraft. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Safety> , <Functional> , <Design> , <HMI> |

725

726 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1017 |
| <ALLOCATED_TO> | <Function> | Display Eligible Approach Procedures |

727

728 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0006 |
| Title | Display of Wake Turbulence Category (WTC) for Approach and Tower Controller |
| Requirement | Where a separation tool is used, the Wake Turbulence Category (WTC) shall remain displayed to the Approach and Tower Controller with the flight label |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Functional> , <Safety> , <Design> , <HMI> |

729

730 [REQ Trace]





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| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1106 |

731

732 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0007 |
| Title | Guidance for Approach Executive Controller's screen |
| Requirement | The ATC system HMI adaptations shall not clutter the Approach Executive Controller's screen, and shall follow human factor design best practices. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Design> , <Functional> , <HMI> , <Safety> |

733

734 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1110 |

735

736 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0008 |
| Title | Final approach interception location references display for Approach Executive Controller |
| Requirement | Final approach interception location references should be displayed on the Approach Executive Controller display, according to local assessment. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Design> , <HMI> , <Functional> , <Safety> |

737

738 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|





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| | | |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1110 |
| <ALLOCATED_TO> | <Function> | Monitor and Separate Traffic (ISGS) |

739

740 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0009 |
| Title | Alerting function for Approach Executive Controller for detecting non compliance to assigned profile |
| Requirement | An alerting function shall warn the Approach Executive Controller for detecting situations when an aircraft is not complying / is deviating from the assigned published final approach profile, among multiple active approach procedures. |
| Status | <in progress> |
| Rationale | Self explanatory |
| Category | <Functional> , <Safety> |

741

742 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1109 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1112 |
| <ALLOCATED_TO> | <Function> | Safety Nets |

743

744 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0010 |
| Title | Arrival sequencing optimisation function to Approach Executive Controller |
| Requirement | An arrival sequencing optimisation function should assist the Approach Executive Controller in proposing the optimum approach procedure for each aircraft, taking into account the active approach procedures and aircraft capabilities, in order to optimise the sequence. |
| Status | <in progress> |
| Rationale | Self explanatory |
| Category | <Performance> , <Functional> |

745





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746 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1111 |

747

748 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0011 |
| Title | Arrival sequencing optimisation role to Approach Executive Controller |
| Requirement | An arrival sequencing optimisation role should assist the Approach Executive Controller in proposing the optimum approach procedure for each aircraft, taking into account the active approach procedures and aircraft capabilities, in order to optimise the sequence. |
| Status | <in progress> |
| Rationale | Self explanatory |
| Category | <Functional> , <Performance> |

749

750 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1111 |

751

752 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0012 |
| Title | Training/briefing on IGS procedures |
| Requirement | Approach Executive Control and Tower Runway Control shall be briefed and trained on how to conduct IGS operations, and the impact compared to conventional approaches with regards to e.g. changes to the separation minima, working methods, impact on speed management instructions, new interception points, change to visual aids |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Safety> |





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753

754 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1008 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1014 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1006 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1009 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1004 |
| <ALLOCATED_TO> | <Role> | ATC Executive Controller (PJ.02-W2-14.3)<br><br>Tower Runway Controller (PJ.02-W2-14.3) |

755

756 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0013 |
| Title | Training on non nominal cases and degraded modes linked to IGS procedures |
| Requirement | Approach Executive Control and Tower Runway Control and Supervisors,including new recruits, shall be trained as appropriate to apply the revised contingency procedures in case of non-nominal or degraded modes of operations (see list of hazards..), including skills to work without separation indicators as necessary under application of degraded modes/contingency procedures (e.g. with manual application of simplified separation scheme) |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Safety> |

757

758 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1010 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-GALT.0001 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-GALT.0002 |

| | | |
|---|---|---|
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-GALT.0003 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-GALT.0004 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0001 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0002 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0003 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0004 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0005 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0006 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0007 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ORDF.0008 |
| <ALLOCATED_TO> | <Role> | ATC Executive Controller (PJ.02-W2-14.3)<br><br>Tower Runway Controller (PJ.02-W2-14.3) |

759

760 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0014 |
| Title | Particular training for vectoring for IGS |
| Requirement | Training of Approach Executive Control shall consider the need for vectoring the aircraft onto IGS approach such as to avoid final approach interception from above |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Safety> |

761

762 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1015 |
| <ALLOCATED_TO> | <Role> | ATC Executive Controller (PJ.02-W2-14.3) |

763

764 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0015 |
| Title | PAPI/VASI for IGS |
| Requirement | PAPI/VASI shall provide appropriate landing visual guidance when flying on an IGS approach (e.g. a dedicated PAPI in |





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| | |
|---|---|
| | addition of one for conventional approach, or adaptive PAPI serving both slopes) |
| Status | <in progress> |
| Rationale | Self explanatory |
| Category | <Safety> |

765

766 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-APT-1301 |

767

768 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-GND-0016 |
| Title | Update of cleared approach procedure by Approach Executive Controller |
| Requirement | The flight label on ATC display shall enable the Approach Executive Controller to update the cleared approach procedure by selecting a different one among the list of active approach procedures eligible for that aircraft. |
| Status | <validated> |
| Rationale | Self explanatory |
| Category | <Functional> , <Safety> , <Design> , <HMI> |

769

770 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1012 |
| <ALLOCATED_TO> | <Role> | ATC Executive Controller (PJ.02-W2-14.3) |

771 ### 4.2.2 Requirements for aircraft systems

772 The following requirements apply to aircraft systems supporting ISGS concept.

773 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0001 |
| Title | Operational conditions for IGS (1/2) |
| Requirement | Aircraft Manufacturer may define per aircraft type the suitable operational conditions for flying an increase glideslope, as |

| | |
|---|---|
| | function of the slope angle |
| Status | <in progress> |
| Rationale | Flight crew shall be aware of the aircraft capability for IGS operations |
| Category | <Safety> , <Functional> |

774

775 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2105 |

776

777 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0002 |
| Title | Operational conditions for IGS (2/2) |
| Requirement | Aircraft Operators should define per aircraft type the suitable operational conditions for flying an increase glideslope, as function of the slope angle |
| Status | <in progress> |
| Rationale | Flight crew shall be aware of the aircraft capability for IGS operations |
| Category | <Safety> , <Functional> |

778

779 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

780

781 [REQ]





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| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0003 |
| Title | IGS impact on MMEL |
| Requirement | The Aircraft Manufacturer shall provide in the master minimum equipment list (MMEL) the operational impact in case a specific functionality is required by IGS operations (e.g. the energy management function and/or the flare assistance supporting function) |
| Status | <in progress> |
| Rationale | Flight crew shall be aware of the aircraft capability for IGS operations |
| Category | <Safety> , <Functional> |

782

783 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2104 |

784

785 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0004 |
| Title | IGS impact on MEL |
| Requirement | The Aircraft Operator may provide in its minimum equipment list (MEL) the operational impact in case a specific functionality is required by IGS operations (e.g. the energy management function and/or the flare assistance supporting function) |
| Status | <in progress> |
| Rationale | Flight crew shall be aware of the aircraft capability for IGS operations |
| Category | <Safety> , <Functional> |

786

787 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2104 |

788

789 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0005 |
| Title | IGS training |
| Requirement | The Flight Crew shall be trained for managing and flying IGS operations |
| Status | <validated> |
| Rationale | e.g. IGS principles, differences in visual references, etc |
| Category | <Functional> |

790

791 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2105 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2104 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2101 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2108 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-CTL.1013 |

792

793 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0006 |
| Title | Flare assistant for IGS |
| Requirement | Flight Crew may be assisted by a flare assistance function |
| Status | <validated> |
| Rationale | A flare assistance function may be useful for flying approaches under operational conditions leading to more complex flare maneuver (e.g. increased vertical speed, etc) |
| Category | <Functional> |

794

795 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

796

797 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0007 |
| Title | Flare assistant slope range |
| Requirement | Flare assistant shall support glideslopes up to 4.49°. |
| Status | <validated> |
| Rationale | Maximum slope considered by PJ02-02 enhanced approach procedures. |
| Category | <Design> |

798

799 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2107 |

800

801 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0008 |
| Title | Flare assistant |
| Requirement | Flare assistant shall help flight crew to correctly perform flare |
| Status | <validated> |
| Rationale | To avoid hard landing or long landing. |
| Category | <Functional> |

802

803 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

804

805 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0009 |
| Title | Flare assistant compatibility with flight modes |
| Requirement | Flare assistant shall be available with manual flight only. |





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| | |
|---|---|
| Status | <validated> |
| Rationale | If Flare assistant indications do not correspond to Autopilot actions, It could disturb the monitoring performed by the flight crew, encourage them to takeover controls or perform a go-around. |
| Category | <Design> |

806

807 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

808

809 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0010 |
| Title | Flare assistant SOP |
| Requirement | Flare assistant shall not significantly modify current SOP. |
| Status | <validated> |
| Rationale | For Human Performance reasons |
| Category | <Functional> |

810

811 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2107 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

812

813 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0011 |
| Title | Flare assistant compatibility with approaches |
| Requirement | Flare assistant should be available on any type of approaches. |
| Status | <validated> |
| Rationale | For Human Performance reasons, it is important to provide a similar level of assistance whatever the type of approach |
| Category | <Design> |

814

815 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2103 |

816

817 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0012 |
| Title | Energy management assistant for IGS |
| Requirement | Flight Crew may be assisted by an energy management function |
| Status | <validated> |
| Rationale | An energy management assistance function may be useful for flying approaches under operational conditions leading to more complex management of energy dissipation (e.g. increased glide path angle, tailwind, etc) |
| Category | <Functional> |

818

819 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2106 |

820

821 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0013 |
| Title | EM assistant slope range |
| Requirement | Energy management assistant shall support glideslopes up to 4.49°. |
| Status | <validated> |
| Rationale | Maximum slope considered by PJ02-02 enhanced approach procedures |
| Category | <Design> |

822

823 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|





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| | | |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2107 |

824

825 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0014 |
| Title | Energy management assistant |
| Requirement | Energy management assistant shall help flight crew determine whether the aircraft can decelerate to be timely stabilized. |
| Status | <validated> |
| Rationale | Flight Deck shall be able to decelerate the aircraft during final approach, even under flight conditions that reduce deceleration capability |
| Category | <Functional> |

826

827 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |

828

829 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0014 |
| Title | EM compatibility with flight modes |
| Requirement | Energy management assistant should be available with both manual and automatic flight. |
| Status | <validated> |
| Rationale | As long as the flight crew is involved in the energy management task, assistance is useful both in manual and automatic flight. |
| Category | <Design> |

830

831 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |

| | | |
|---|---|---|
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2106 |

832

833 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0015 |
| Title | EM SOP |
| Requirement | Energy management assistant shall not significantly modify current SOP. |
| Status | <validated> |
| Rationale | For Human Performance reasons |
| Category | <Functional> |

834

835 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2107 |

836

837 [REQ]

| | |
|---|---|
| Identifier | REQ-14.3-TS-ACFT-0016 |
| Title | EM assistant compatibility with approaches |
| Requirement | Energy management assistant shall be available on any type of approaches. |
| Status | <validated> |
| Rationale | For Human Performance reasons, it is important to provide a similar level of assistance whatever the type of approach |
| Category | <Design> |

838

839 [REQ Trace]

| Relationship | Linked Element Type | Identifier |
|---|---|---|
| <ALLOCATED_TO> | <SESAR Solution> | PJ.02-PJ.02-W2-14.3 |
| <SATISFIES> | < ATMS Requirement> | REQ-14.3-SPRINTEROP-ACFT.2102 |

# 5 Implementation Options

PJ.02-W2-14.3 solution encompasses several technical enablers. The chapter 3.1.1 of this document specify for each enabler if it is optional or required.

The list of the optional enablers is given below.

| EN code | EN description |
|---|---|
| A/C-01 | Enhanced positioning for LPV/RNP based on Single Frequency SBAS |
| A/C-02a | Enhanced positioning using GBAS single frequency |
| A/C-04a | Flight management and guidance for Advanced RNP |
| A/C-04 | Flight management and guidance for improved lateral navigation in approach via RNP |
| A/C-05a | APV Barometric VNAV |
| A/C-06 | Flight management and guidance for LPV approach based on SBAS |
| A/C-56a | Flight management and guidance for Precision Approach GBAS CATII/III using GPS L1 |
| A/C-86 | On-board assistance to aircraft energy management |
| A/C-87 | On-board assistance to flare |
| AERODROME-ATC-71 | Aerodrome ATC System to support IGS operations (separation delivery) |
| APP ATC 114 | Approach ATC System to support IGS operations (separation delivery) |
| CTE-N06 | Space Based Augmentation System (SBAS) |
| CTE-N07a | GBAS Cat I based on Single-Constellation / Single-Frequency GNSS (GPS L1) |
| CTE-N07b | GBAS Cat II/III based on Single-Constellation / Single-Frequency GNSS (GPS L1) |
| CTE-N07 | Ground Based Augmentation System (GBAS) |

**Table 5: optional enablers of solution PJ.02-W2-14.3**

A/C-01 to A/C-56a, and CTE enablers reflect the fact that SRAP can be guided by any of the means listed. A/C-86 and A/C-87 may complement the training required for the AO-320 (HUM-022 – Flight Crew training for IGS approach), as they are meant to assist the pilot during a manual landing. They may become necessary on some aircraft types, and/or for some slope values. AERODROME-ATC-71 and APP ATC 114 enablers are inked to separation delivery assistance. They are not necessarily required if ISGS procedure is active when the traffic pressure if not high (at night, for example), when few aircraft types are coming to an airport, etc.



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# 6 Assumptions

This section aims at describing the assumptions made that have an impact on the technical specification.

The optional enabler A/C 87 (On-board assistance to flare) proposed in the scope of IGS operations is based on the assumption that IGS operations will be possible on manual landing.



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# 7 References and Applicable Documents

## 7.1 Applicable Documents

### Content Integration

1. EATMA Community pages
2. SESAR ATM Lexicon

### Content Development

3. B4.2 D106 Transition Concept of Operations SESAR 2020

### System and Service Development

4. 08.01.01 D52: SWIM Foundation v2
5. 08.01.01 D49: SWIM Compliance Criteria
6. 08.01.03 D47: AIRM v4.1.0
7. 08.03.10 D45: ISRM Foundation v00.08.00
8. B.04.03 D102 SESAR Working Method on Services
9. B.04.03 D128 ADD SESAR1
10. B.04.05 Common Service Foundation Method

### Performance Management

11. B.04.01 D108 SESAR 2020 Transition Performance Framework
12. B.04.01 D42 SESAR2020 Transition Validation
13. B.05 D86 Guidance on KPIs and Data Collection support to SESAR 2020 transition.
14. 16.06.06-D68 Part 1 –SESAR Cost Benefit Analysis – Integrated Model
15. 16.06.06-D51-SESAR_1 Business Case Consolidated_Deliverable-00.01.00 and CBA
16. Method to assess cost of European ATM improvements and technologies, EUROCONTROL (2014)
17. ATM Cost Breakdown Structure_ed02_2014
18. Standard Inputs for EUROCONTROL Cost Benefit Analyses
19. 16.06.06_D26-08 ATM CBA Quality Checklist
20. 16.06.06_D26_04_Guidelines_for_Producing_Benefit_and_Impact_Mechanisms

### Validation

21. 03.00 D16 WP3 Engineering methodology
22. Transition VALS SESAR 2020 - Consolidated deliverable with contribution from Operational Federating Projects
23. European Operational Concept Validation Methodology (E-OCVM) - 3.0 [February 2010]

### System Engineering

24. SESAR 2020 Requirements and Validation Guidelines

### Safety

25. SESAR, Safety Reference Material, Edition 4.0, April 2016
26. SESAR, Guidance to Apply the Safety Reference Material, Edition 3.0, April 2016
27. SESAR, Final Guidance Material to Execute Proof of Concept, Ed00.04.00, August 2015
28. SESAR, Resilience Engineering Guidance, May 2016

### Human Performance

29. 16.06.05 D 27 HP Reference Material D27
30. 16.04.02 D04 e-HP Repository - Release note

### Environment Assessment

31. SESAR, Environment Reference Material, alias, “Environmental impact assessment as part of the global SESAR validation”, Project 16.06.03, Deliverable D26, 2014.
32. ICAO CAEP – “Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes” document, Doc 10031.

### Security

33. 16.06.02 D103 SESAR Security Ref Material Level
34. 16.06.02 D137 Minimum Set of Security Controls (MSSCs).
35. 16.06.02 D131 Security Database Application (CTRL_S)

## 7.2 Reference Documents

36. ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.
37. PJ.02-W2.14.3 D4.3.002, PJ.02-W2-14.3 SPR-INTEROP/OSED V3 Final
38. PJ02-02 D2.1.04 SESAR PJ02-02 VALR, Edition 00.01.00



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# 8 Service Description Document (SDD)

N/A



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# 9 Service Technical Design Document (STDD)

N/A



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