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|--------|-----|------------------------------------|-----|-----|-----|-----|----|-----|-----|-----|
| SESAAR | | Initial | | | | | | | LOC | |
| ATC21 | | Composite surveillance (ADS-B/WAM) | | | | | | | | |
| REG | ASP | MIL | APO | USE | INT | IND | NM | MET | AIS | USP |

Subject matter and scope

This implementation objective is addressing a surveillance system that exploits the similarities between the two surveillance techniques (ADS-B and WAM) and combines them into a single system. The term composite is used to signify that various system components and data items are shared whilst ensuring that the required degree of channel autonomy/independence is retained. ADS-B information received by WAM system is evaluated and if matching with WAM information extracted by others methods, then it's used in the WAM output. Information is then periodically re-evaluated.

The exploitation of synergies between the two surveillance techniques into a "composite surveillance system" supports a number of benefits and performance enhancements, compared with the use of 2 separated systems, WAM and ADS-B. These include:

- cost savings, achieved through the co-mounting of system components into a single unit and the associated savings in terms of site costs, communications and efficient utilization of certain common components
- Use of ADS-B message information to support passive acquisition of an aircraft, reducing the 1030/1090 MHz footprint of a WAM surveillance system, especially a reduction in the number of 1030 MHz interrogations.
- cost effective security mitigation techniques, based on the use of additional 'raw' RF and timing data (not available in other components of a surveillance infrastructure), which can be used to derive additional indicators, such as Ground based 'confidence/credibility' measure enabling e.g. the early identification of anomalous avionic behaviour, or spoofed 'ADS-B transmissions'.
- Means for performance monitoring and alerting of faults in the system, by supplementing the WAM channels BITE with the comparison between the ADS-B position and WAM channel data as a way to detect failure conditions.
- Improvement of the performance of the ADS-B channel, e.g. by enabling the allowance of temporary reductions in ADS-B quality indicator values, by resolving ADS-B data-to-track association issues related to non-unique 24-bit addresses, by reducing the effects on the resulting along-track horizontal position error.

NOTE 1: The aircraft systems are assumed compliant with the EU Regulation 1207/2011 (Surveillance Performance and Interoperability Implementing Rule - SPI IR) as amended..

NOTE 2: This objective should be seen as a possible mean of compliance with the applicable Regulations. It is without prejudice to the choice of the ANSPs to deploy the most appropriate surveillance solution taking into account the local conditions.

NOTE FOR MILITARY AUTHORITIES: It is the responsibility of each military authority to review this Objective IN ITS ENTIRETY and address each of the SLoAs that the military authority considers RELEVANT for itself. This has to be done on top and above of the review of "MIL" SLoAs which identify actions EXCLUSIVE to military authorities.

Applicability Area(s) & Timescale(s)

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|---|--------------|------------|-----------------------|
| Applicability Area (Subject to local needs) | | | |
| Timescales: | From: | By: | Applicable to: |
| IOC used for Analytics functioning only - not for implementation planning | 15/09/2020 | | Applicability Area |
| FOC used for Analytics functioning only - not for implementation planning | | 31/12/2030 | Applicability Area |

References

European ATM Master Plan

| | | | | | | |
|------------|--------------------------------|----------|----------|---------|---------|--|
| OI step - | - No OI Link - | | | | | |
| Enablers - | CTE-S03a | CTE-S03b | CTE-S04a | CTE-S05 | CTE-S06 | |

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|---------|----------|--------------------------------------|-----------------|---|----------|--|
| Legend: | WXYZ-001 | Covered by SLoA(s) in this objective | WXYZ-002 zzz | Covered by SLoA(s) in another objective Objective covering the enabler | WXYZ-003 | Not covered in the Implementation Plan |
|---------|----------|--------------------------------------|-----------------|---|----------|--|

Applicable legislation

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| Regulation (EU) No 2020/587 amending Regulation (EU) No 1207/2011 (SPI) |
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Essential Operational Changes

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|--------------|---|
| ATC21 | Composite surveillance (ADS-B/WAM) |
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CNS Infrastructure and Services

SESAR Solution

#114 - Cooperative Surveillance ADS-B / WAM

ICAO GANP - ASBUs

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|-----------|---|
| ASUR-B0/1 | Automatic Dependent Surveillance – Broadcast (ADS-B) |
| ASUR-B0/2 | Multilateration cooperative surveillance systems (MLAT) |

Deployment Programme

- none -

European Plan for Aviation Safety

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|----------|---|
| RMT.0519 | Maintaining CS-ACNS |
| RMT.0679 | Revision of surveillance performance and interoperability (SPI) |

Operating Environments

Airport
En-Route
Terminal Airspace

Stakeholder Lines of Action (SLoAs)

| SLoA ref. | Title | From | By |
|--------------------|--|------------|------------|
| ATC21-REG01 | Mandate the airborne carriage and operation of suitable equipment (ADS-B transponders) | 15/09/2020 | 01/01/2030 |
| ATC21-ASP01 | Deploy composite surveillance ADS-B/WAM systems | 15/09/2020 | 01/01/2030 |
| ATC21-ASP02 | Develop a local safety assessment | 15/09/2020 | 01/01/2030 |

Description of finalised and deleted SLoAs is available on the eATM Portal @ https://www.eatmportal.eu/working/depl/essip_objectives

Expected Performance Benefits

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|--------------------------------|--|
| Safety: | - |
| Capacity: | - |
| Operational Efficiency: | - |
| Cost Efficiency: | System provides two surveillance layers sharing HW components, with the associated cost reduction. |
| Environment: | - |
| Security: | Increases security of ADS-B surveillance layer by verification of received information. |

Detailed SLoA Descriptions

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|-----------------------------------|---|----------------------------|--------------------------|
| ATC21-REG01 | Mandate the airborne carriage and operation of suitable equipment (ADS-B transponders) | From: 15/09/2020 | By: 01/01/2030 |
| Action by: | Regulatory Authorities | | |
| Description & purpose: | Mandate the equipage of aircraft, with a maximum certified take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, operating as IFR/GAT with appropriate ADS-B equipment <i>Note :for the EU+ States, the carriage requirement is addressed by the SPI Regulation (EU) No 1207/2011 as amended by Regulation 2020/587, therefore this SLoA is not relevant and should be considered as not applicable. However, this SLoA may be applicable in case the States wishes to extend the carriage requirements beyond the scope of the SPI IR. The non-EU States may have to issue local mandates for the carriage and operation of ADS-B transponders.</i> | | |
| Supporting material(s): | EASA - CS ACNS - Certification Specifications for Airborne Communications Navigation and Surveillance - Issue 3 / 05/2021 Url : https://www.easa.europa.eu/document-library/certification-specifications/cs-acns-issue-3 ICAO - Doc 9871 - Technical Provisions for Mode S Services and Extended Squitter - Advanced Edition / 04/2012 Url : https://store.icao.int/ | | |
| Finalisation criteria: | 1 - Mandate to equip the relevant aircraft with appropriate equipment has been issued by the regulator. 2 - Airworthiness certificate has been issued by the regulator for aircraft appropriately equipped. | | |

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| ATC21 | Composite surveillance (ADS-B/WAM) |
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|--------------------------------------|--|---------------------|-------------------|
| ATC21-ASP01 | Deploy composite surveillance ADS-B/WAM systems | From: 15/09/2020 | By: 01/01/2030 |
| Action by: | ANS Providers | | |
| Description & purpose: | <p>Composite Surveillance system is a distributed network of time synchronized ground-based 1090 MHz receivers passing data to a Centralised Processor System (CPS). The CPS processes and consolidates the data received and outputs surveillance data for integration within subsequent surveillance data processing systems of the ANSPs ATM infrastructure or for integration within a local display suite.</p> <p>Composite ADS-B and WAM surveillance systems typically consist of the following main ground components:</p> <ul style="list-style-type: none"> • Ground Station Components – deployed in a distributed nature. (A suite of 1090 MHz receivers plus, optionally, 1030 MHz transmitter(s)) • Central Processor System - configurable to include those components required to support optional functionality e.g. active 1030 MHz interrogations, output to a legacy display etc. Some association functions can be performed inside the Central Processor System in the Composite surveillance sensor. This functionality will be executed in the CPS and will be performed with position calculation and association of information objectives. Pre-ASTERIX association is performed in the CPS. The tracking function inside the surveillance sensor different than the one used in the tracker. • MSDF Tracker: Element to perform post ASTERIX tracking. This component is not included in the Composite WAM – ADS-B sensor. • Control and Monitoring System: The CMS elements of the system perform the specified control and monitoring system functions of the system. • Network connections: Communication links between the distributed component parts of the Composite Surveillance System and its CPS. | | |
| Supporting material(s): | <p>EUROCAE - ED-129B - EUROCAE Technical Specifications for ADS-B Ground system (ED-129B) Url : https://eshop.eurocae.net/eurocae-documents-and-reports/ed-129b/</p> <p>EUROCAE - ED-142A - EUROCAE Technical Specification for Wide Area Multilateration (WAM) systems (ED142A) SJU - SESAR Solution 114: Data Pack for Composite surveillance (ADS-B/WAM) Data Pack Url : https://www.sesarju.eu/sesar-solutions/composite-surveillance-ads-b-wam</p> | | |
| ATM Master Plan relationship: | <p>[CTE-S03a]-ADS-B station for NRA surveillance [CTE-S03b]-ADS-B station for RAD and APT surveillance [CTE-S04a]-Wide Area Multilateration (WAM) [CTE-S05]-Gradual rationalisation of conventional surveillance infrastructure (ADS-B/WAM vs SSR and MSPSR vs PSR) [CTE-S06]-Composite Surveillance</p> | | |
| Finalisation criteria: | 1 - The Ground system has been upgraded in terms of composite WAM-ADS-B functionality, including sensors, SDPD and ASTERIX interfaces. | | |
| ATC21-ASP02 | Develop a local safety assessment | From: 15/09/2020 | By: 01/01/2030 |
| Action by: | ANS Providers | | |
| Description & purpose: | <p>When proceeding with the local implementation of this Objective changes in the ATM functional system derived from the deployment of composite surveillance ADS-B/WAM are subject to the elaboration of a safety argument considering local specific risks and mitigation measures to those risks.</p> <p>The tasks to be done are as follows:</p> <ul style="list-style-type: none"> • Conduct hazard identification, risk assessment in order to define safety objectives and safety requirements mitigating the risks; • Develop safety assessment; • Deliver a safety assessment report to the NSA, if new standards are applicable or if the severity class of identified risks is 1 or 2. <p>This safety assessment shall be based on fully validated/recognised method.</p> | | |
| Supporting material(s): | <p>EC - COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 - (OJ L 62, 8.03.2017, p. 1) - COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 10/2011 Url : https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0373&from=EN</p> <p>EUROCONTROL - Air Navigation Systems Safety Assessment Methodology (SAM) - Version 2.1 / 11/2006 Url : https://www.eurocontrol.int/tool/safety-assessment-methodology</p> <p>SJU - SESAR Solution 114: Data Pack for Composite surveillance (ADS-B/WAM) Data Pack Url : https://www.sesarju.eu/sesar-solutions/composite-surveillance-ads-b-wam</p> | | |
| Finalisation criteria: | 1 - The safety assessment report for the changes has been developed and delivered to the Regulator/NSA/Competent Authority, as necessary. | | |

