

Executive Directorate

Air Traffic Department

## Report

EASA technical assistance to the Commission for the  
SESAR deployment phase for the period 2023-2025

-

### AF6 Industrialisation and Readiness

### Final report

D5.1.3226

Issue 1.5



Air Traffic Department

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AF6 Industrialisation and Readiness  
Final report

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1	European Commission - Directorate General for Mobility and Transport MOVE/E3
2	
3	
4	
5	



## TABLE OF CONTENTS

Acronyms.....	9
1 Executive summary.....	11
2 Introduction.....	16
3 Industrialisation.....	18
3.1 Industrialisation requirements .....	18
3.2 Industry Standards - availability .....	19
3.2.1 Standards for ADS-C/EPP data provision.....	19
3.2.2 Standards for ADS-C Common Service .....	20
3.2.3 Standards for ADS-C Ground Distribution Service.....	21
3.2.4 Standard for initial trajectory data use. ....	22
3.2.5 Standard for the use of ADS-C/EPP data by the NM system.....	23
3.3 Certification and Detailed Specification .....	24
3.3.1 Certification Specifications (CS-ACNS).....	24
3.3.2 Detailed Specification (DS-GE.CER/DEC and DS-GE.SoC) .....	25
4 Readiness.....	27
4.1 Verification and Validation - technical .....	27
4.1.1 Aircraft ADC-S/EPP data transmission.....	27
4.1.2 ADS-C/EPP data use – ground systems.....	28
4.1.3 ADS-C/EPP ground distribution .....	28
4.2 ADS-C Common service .....	28
4.3 Operational Benefits.....	30
4.4 Implementation Considerations.....	33
4.4.1 Airborne Implementation.....	33
4.4.2 ANPS Implementation .....	36
4.4.3 Air/Ground Communications .....	36
5 Airspace user assessment.....	40



6	Regulatory obligations on aircraft operation .....	42
7	Conclusions.....	43
7.1	Industrialisation.....	43
7.2	Readiness.....	45
7.3	Overall conclusion .....	46
8	Recommendations.....	47
9	Reference documents.....	50
Annex 1	.....	51
Annex 2	.....	54
Table 1:	CP1 CBA results .....	30
Table 2:	ADS-C/EPP data.....	31
Table 3:	ATS-B2 services .....	35
Figure 1:	Provider Abort (OA) rate .....	37
Figure 2:	Technical round trip delay.....	37
Figure 3:	SDM Multilink Implementation Roadmap.....	38



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## Project Fact sheet

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## ACRONYMS

ACDLS	ATS common datalink services
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
AHMS	ATS message handling system
ANSP	Air Navigation Service Provider
ATFM	Air Traffic Flow Management
CBA	Cost Benefit Analysis
CP1	Common Project 1
CPDLC	Control Pilot Data Link Communications
CS	Certification Specifications
CWP	Controller Working Position
DS	Detailed Specifications
EASCG	European ATM Standards Coordination Group
EPP	Extended Projected Profile
OEM	Original Equipment Manufacture
OLDI	On-Line Data Interchange
MUAC	Maastricht Upper Area Control Centre
NM	Network Manager
S3JU	SESAR 3 Joint Undertaking
SDM	SESAR Deployment Manager
SDP	SESAR Deployment Programme
SESAR	Single European Sky ATM Research
TBO	Time Based Operations
TMA	Terminal Movement Area
TRL	Technical Readiness Level
VDLM2	VHF Data Link Mode 2



VHF                      Very High Frequency



## 1 EXECUTIVE SUMMARY

This report is a deliverable of the activities to assist the European Commission in monitoring the effective deployment and the readiness of the ATM functionalities specified in Regulation (EU) 2021/116, the Common Project 1 (CP1) regulation, supporting improvements in the operation of European aviation.

The CP1 regulation has established an industrialisation target date for ATM Functionality 6 (AF6) of 31st December 2023; at this date, the standards and specifications are to be available to enable implementation. Also at this date, the European Commission, with the support of the European Union Aviation Safety Agency, shall verify that AF6 has been standardised and that it is ready for implementation.

The assessment and the conclusions presented in this final report contain the results stemming from the discussions, data and evidence presented in the CP1 Industrialisation forum. It is further elaborated with additional data received via Notice of Proposed Amendments (NPA) 2023-07 consultation, EASA own investigations and information received from stakeholders. This final report aims to provide the industrialisation and readiness for implementation status on 31<sup>st</sup> December 2023 and further refines the assessment and the conclusions presented in the preliminary report (D5.1.3192) issued on 18<sup>th</sup> December 2023.

To fully achieve industrialisation objectives EASA considers the following had to be achieved by 31<sup>st</sup> December 2023.

- i. Research validation activities have been completed.
- ii. Documentation (i.e., certification and detailed specifications and supporting industrial standards) to permit the design and certification/declaration of a systems are available.

AF6 comprise of the following sub-functionalities:

- i. Air - ground exchange of ADS-C/EPP data, display and alerting of trajectory information.
- ii. Enhancement of the trajectory by the Network Manager.
- iii. Ground – ground exchange of trajectory information.



### Status of industrialisation for the sub-functionalities

For Air - Ground exchange of ADS-C/EPP data, display and alerting of trajectory information not all the required industry standards and EASA certification and detailed specification have been published, however, work has sufficiently progressed during 2023 and some material is close to finalisation and publications, as described in this report. The specifications and standards to be published are:

- Industry standards.
  - Standards addressing the alerting conditions, publication date to be coordinated at the EASCG.
- EASA specifications.
  - Airborne certification requirements (CS-ACNS) (Publication postponed pending EC formal decision with regards to continuation of AF6).
  - Ground detailed specification (DS-GE.CER/DEC) containing requirements for alerting and for ADS-C common service, publication planned end 2024.

For Enhancement of the trajectory by the Network Manager the research activities undertaken in SESAR project PJ 18-06b1 - NM profile improvement using ADS-C are entered into the completion phase to reach the required TRL. The development of technical specification for the iNM system and the ground detailed specification (DS-GE.SoC) are planned on the basis of the results from the research activities.

For Ground – Ground exchange of trajectory information not all required industry standards and EASA certification and detailed specification are published . The specifications and standards to be published are:

- Industry standards.
  - Addition SWIM Service Definition' specification published for consultation October 2023; publication planned Q2/2024.
- EASA specifications.
  - Ground detailed specification (DS-GE.CER/DEC) containing requirements for specific SWIM distribution requirements for ADS-C/EPP, publication planned end 2024.

### Implementation readiness



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With regards to implementation, the following accompanying measures have been identified:

- ADS-C common service: a mitigation plan presented for ground-ground distribution is required in case of delay.
- Unique logon address to be made available to support use of ADS-C/EPP.
- Aircraft equipment manufacturers: a mitigation plan for aircraft operators is required in case of delay.
- Exemption conditions and processes require to be further elaborated for aircraft undertaking a single operation in SES airspace.

Airline operators have confirmed that they are ready to invest in ADS-C/EPP.

From the information presented and EASA investigations this report concludes that:

- (i) the industrialisation phase is complete, and
- (ii) accompanying measures for the next phase are required to ensure a successful deployment; those measures are listed below as recommendations.

It is to be stressed that operational benefits can be achieved on a pan European basis through the effective use of downlinked aircraft data and the use of expanded CPDLC messages at all flight levels, however, these aspects are not fully addressed by the CP1 regulation. In this regard, activities should continue to further define the operational use and the minimum data set required.

### Recommendations

EASA recommends that:

#### With respect to industrialisation.

- EASCG (European ATM Standards Coordination Group) to review the sufficiency of EUROCONTROL - SPEC – 192 and if needed to coordinate the publication of its evolution as soon as feasible possible.
- EASCG to coordinate the development of a standard defining the processing and parameters to trigger the warnings on the controller working position in case of a discrepancy between the downlinked aircraft trajectory and the ground system trajectory with a publication as soon as feasible possible.



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- S3JU complete SESAR project PJ 18-06b1 - NM profile improvement using ADS-C research to readiness level TRL6 as soon as feasible possible.
- NM to publish iNM system technical requirements fully consolidated and specified in a publicly available document as soon as feasible possible.
  - EASA to publish the resulting Detailed Specification as soon as feasible possible.

With respect to readiness.

- NM to provide a detailed implementation plan for a change to the iNM by 30 June 2024 demonstrating effective integration of ADS-C/EPP data in the NM derived trajectory.
- SDM to establish by 30 June 2024 an effective means to monitor equipment manufacturers and aircraft manufactures progress in developing and delivering compliant systems.
- SDM/NM/S3JU in conjunction with EASA to determine a realistic roadmap for VDLM2 improvements by 30 June 2024.
- EU ICAO coordination to be triggered for the establishment of a unique logon address by 30 June 2024.
- National Authorities to clarify with the ANSP under their oversight the need for application of the logon list by 31 December 2024, with the aim of limiting its use to properly justified circumstances, considering its negative impact on data link performance.

and

- i. The EASA oversight activities should be expanded to monitor the above actions, including ADS-C and CPDLC implementation.
- ii. Further activities should continue to detail the use of expanded CPDLC, downlinked aircraft data (ADS-C data) and the required minimum data set, taking into consideration the recommendations of the EASA Future Connectivity for Aviation (FCAV) White Paper issued in conjunction with the Federal Aviation Administration, Airbus and Boeings, establishing the roadmap for the transition to operation based on ATS-B2 and the ongoing developments undertaken by the SDM in support of Trajectory Based Operations (TBO).



To undertake these activities, a Work Programme should be established for the transition to operations based on ATS-B2. EASA is ready to establish such a work programme, which may include the issuance of an Opinion by early 2026 with the required regulatory packages, and an implementation plan. These deliverables to be prepared in conjunction with Member States, European institutional actors, ANSPs, aircraft operators, manufacturers, and standard developing organisations, taking due account of ICAO and Federal Aviation Administration developments.



## 2 INTRODUCTION

The European Commission published Regulation (EU) 2021/116 on the establishment of the Common Project One (CP1) supporting the implementation of the European Air Traffic Management Master Plan<sup>1</sup>. Altogether, 6 ATM functionalities (AFs) requiring harmonised and synchronised deployment have been defined. These ATM functionalities were assessed as being ready for implementation, except for ATM functionality 6 (AF6) – initial trajectory information sharing, where there is a prescribed industrialisation target date of 31 December 2023. By that date, the European Commission, with the support of EASA, shall verify that AF6 has been standardised and that it is ready for implementation.

Upon the request of the European Commission, EASA conducted in 2022 an assessment of the readiness for deployment of AF6, (see report D3-3121), which concluded that the closing of the industrialisation phase must be accompanied by the implementation of specific measures. The identified measures are mainly due to support industry standards and the need to confirm the operational definition and expected benefits, as well as the needed connectivity improvements.

In accordance with the contribution agreement established between the European Commission and EASA for technical assistance for the SESAR deployment phase for the period 2023-2025, and in accordance with the objective of Regulation (EU) 2018/1139, Commission Implementing Regulation (EU) No 409/2013 and the CP1 regulation, EASA established a ‘CP1 Industrialisation Forum’. The objective of the forum is to ensure consistent and coordinated actions with respect to the industrialisation activities and readiness for implementation, in relation with the ATM functionalities included in the CP1 regulation, see Annex 1 for the Terms of Reference.

Based on the findings of EASA report D3-3121 the CP1 Industrialisation Forum established several elements to be addressed to determine the industrial and readiness for implementation status of AF6. These elements and the status as determined by the CP1 Industrialisation Forum are shown in Annex 2.

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<sup>1</sup> OJ L 36, 2.2.2021, P. 38





This final report contains the results stemming from the discussions, data and evidence presented in the CP1 Industrialisation Forum. It is further elaborated with additional data received via Notice of Proposed Amendments (NPA) 2023-07, EASA own investigations and information received from stakeholders and refine the information presented in the preliminary report (D5.1.3192). This final report aims to provide the status on 31<sup>st</sup> December 2023.



### 3 INDUSTRIALISATION

#### 3.1 Industrialisation requirements

In accordance with regulation (EU) No 409/2013<sup>2</sup> in order for an ATM Functionality to be fit for deployment it is required to be industrialised, the definition of industrialisation is:

*‘industrialisation’ of ATM functionalities means the activities and processes, following their validation that include standardisation, certification and production by the manufacturing industry (ground and airborne equipment manufacturers).*

EASA understanding that this definition means that the ATM Functionality is required to have:

- i. All research validation activities completed.
- ii. All documentation (i.e., certification and detailed specifications and industrial standards) to permit the design and certification/declaration of a systems available.
- iii. Certification/declarations projects are ongoing. (e.g., application have been received by the competent authorities).

With respect to those ATM Functionalities (i.e., CP1/AF6) that do not fulfil the industrialisation objective of the above definition, they are required to be industrialised by a given date that is defined as follow:

*‘Industrialisation target date’ means a date by when the standards and specifications are to be available for the ATM functionality or sub-functionality to enable its implementation.*

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<sup>2</sup> COMMISSION IMPLEMENTING REGULATION (EU) No 409/2013 of 3 May 2013 on the definition of common projects, the establishment of governance and the identification of incentives supporting the implementation of the European Air Traffic Management Master Plan (OJ L 123, 4.5.2013, p. 1)



EASA understanding of this definition is that points i and ii above must be fulfilled. Point i is considered as a prerequisite to ensure the appropriate documents required by point ii fully achieve the operational objectives as determined by the SESAR solution and ATM Functionality. Point iii cannot be fulfilled due to the non-availability of certification specifications and industry standards, however, it is not considered as requirement to fulfil the industrialisation target date objective.

The term specification in the above definition is being interpreted to include the availability aircraft certification specifications (CS-ACNS and CS-ETSO) and the detail specifications (DS-GE.CER/DEC and DS-GE.SoC) applicable to ground systems in accordance with regulation (EU) 2023/1768<sup>3</sup>.

## 3.2 Industry Standards - availability

The availability of the appropriate and validated industry standards underpins effective implementation as safe operations in addition to being the foundation of compliance demonstration to the certification and detailed Specifications.

### 3.2.1 Standards for ADS-C/EPP data provision

The basic standards defining ADS-C applications, including the Extended Projected Profile (EPP), are available and published by EUROCAE, as follows:

- ED-228A - Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)
- ED-229A - Interoperability Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 Interop Standard)

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<sup>3</sup> COMMISSION DELEGATED REGULATION (EU) 2023/1768 of 14 July 2023 laying down detailed rules for the certification and declaration of air traffic management/air navigation services systems and air traffic management/air navigation services constituents.(OJ L 228, 15.9.2023, p. 1)



It should be noted that on 12 October 2023 EUROCAE published a revision to the above standards that has included several amendments and additional messages that improve the potential overall effectiveness of operations supported by data link. However, the minimum requirements applicable to EPP data, see paragraph 4.3, are unchanged. In addition, the publication of the revision occurred late in 2023, making it impossible to be included in the relevant EASA specification required to fulfil point ii of paragraph 3.1.

### 3.2.2 Standards for ADS-C Common Service

EASA notes the positive evolution of the EUROCONTROL standard applicable to the technical and operational aspects of the ADS-C Common Service. The standard - Specification for Data Link Common Services for the Aeronautical Telecommunication Network (ATN)<sup>4</sup>, was published by EUROCONTROL in December 2023 as scheduled.

An EASA review of the draft standard observed that it repeats obligations already addressed in the regulatory framework and introduced requirements for stakeholders which feasibility or verifiability that requires further evaluation.

Based on these observations it is EASA opinion that this standard requires amendment to enable its recognition within the EASA framework.

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<sup>4</sup> EUROCONTROL - SPEC – 192, EUROCONTROL Specification for Data Link Common Services for the Aeronautical Telecommunication Network (ATN)



Without those amendments, significant regulatory work will be needed for EASA to embody the standards within the DS within the next iteration of the specifications planned as per EPAS RMT.0744. Any implementation based only on this standard prior to the publication of the applicable DS require addition effort resulting from the evaluation in accordance with Article 7 of Regulation (EU) 2023/1768. However, this is not considered to hinder the implementation date of AF6 by end of 2027.

### 3.2.3 Standards for ADS-C Ground Distribution Service

EASA acknowledges the positive evolution of the SWIM distribution standard being developed by EUROCONTROL. The technical standard - Specification for Data Link Ground Distribution SWIM Services<sup>5</sup>, was published by EUROCONTROL in December 2023 as scheduled.

Further to the development of the SWIM distribution standard for ADS-C/EPP data distribution, EUROCONTROL published for consultation from 16<sup>th</sup> October 2023 to 26<sup>th</sup> January 2024, an additional SWIM standard, 'EUROCONTROL Specification for SWIM Service Definition'. The consultation further described that the *'specification is applicable in the context of the Common Project One Regulation (CP1) and the SESAR Deployment Programme that requires service providers to Conform to published service definitions'*.

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<sup>5</sup> EUROCONTROL - SPEC – 193, EUROCONTROL Specification for Data Link Ground Distribution SWIM Services



It is noted that the SDM has yet to list the 'EUROCONTROL Specification for SWIM Service Definition' standard within the supporting material of the SESAR Deployment Programme (SDP), and that Service Providers are to deploy information services that conform to published service definitions (if available and applicable). Furthermore, it has been reported that other SWIM implementations are applying this draft standard. The intent of this standard is to define the requirements for service definitions for a harmonised service implementation of SWIM. All those required standards have to be available to ensure harmonisation to support the harmonised and effective deployment of data distribution via SWIM. However, this is not considered to hinder the implementation date of AF6 by end of 2027.

#### 3.2.4 Standard for initial trajectory data use.

EASA report D3 – 3121 - Assessment of AF6 fitness-for-purpose, identified the need for a standard to define the display of ADS-C/EPP data and the warning to controllers in case of a discrepancy between the downlinked ADS-C/EPP data and the ground system trajectory on a CWP. NM, S3JU and SDM have expressed the position that a standard is not needed for the use of the initial trajectory data.

Following the CP1 Implementation Forum discussions EASA concurred that a standard for the display (e.g., colour, location on the CWP) of ADS-C/EPP data may not be necessary to support this specific implementation but stressed that a standard for the parameters to trigger the warnings on a CWP are needed to ensure a harmonised implementation and should be included in the DS relevant to ATC services.

The position of the S3JU, SDM and NM on the absence of a need to standardise the parameters that would trigger the display and resulting warning on a CWP, assumes that potentially different implementations would not impact the potential benefits from AF6 implementation. EUROCONTROL Guidance Material based on MUAC deployment and experience was published by EUROCONTROL in December 2023 as scheduled. Furthermore, the S3JU and NM indicated that during the implementation phase, the need of standards and specifications to enhance safety could be identified and then the relevant developments triggered.



If implementation is to continue without a standard for ATC equipment to be included in the DS, non-harmonised implementations will occur with a potential safety impact. Such non-harmonised and diverse implementations could result in an unknown baseline that could hinder expanding ADS-C data use within the Single European Sky. An implementation prior to the publication of the applicable DS requires additional effort resulting from the evaluation in accordance with Article 7 of Regulation (EU) 2023/1768. However, this is not considered to hinder the implementation date of AF6 by end of 2027.

### 3.2.5 Standard for the use of ADS-C/EPP data by the NM system

NM expressed a view that a standard addressing the need to define how ADS-C/EPP data is processed within the NM system is not required to fulfil the industrialisation objectives, as this is like any other surveillance / trajectory data processing that has already been implemented in existing NM systems. However, considering both the requirements of paragraph 6.1.2 of the Annex to the CP1 regulation and Regulation (EU) 2023/1768, the use of ADS-C/EPP data by the NM system is related to ATFM, thus requiring a DS to be available, and is relevant for harmonised operations at network level. The non-availability of a standards defining how the data is to be incorporate with the NM system, results in a lack of visibility for the actors interfacing the NM system and their ability to develop their systems effectively without further verification and validation activities, and potential readaptation to the future NM implementation. Furthermore, without an agreed standard, ensuring correct and appropriate implementation is difficult for EASA as Competent Authority to verify. For these reasons, EASA considers it necessary that NM user/service and technical requirements are specified in a publicly available document to fulfil the objectives of point ii of paragraph 3.1. This may have an effect on the overall cost of the development of the functionalities by the mandated parties, however, it does not hinder the implementation target date of AF6 by end of 2027.



It should be noted that the research activities, solution PJ 18-06b1 - NM profile improvement using ADS-C, to define the requirements associated to processing ADS-C/EPP data within the NM system only achieved a lower TRL<sup>6</sup> at the closure of the SESAR 2020 programme. An additional activity within the SESAR3 research programme aims at validating the integration of a portion of EPP data within the NM trajectory to TRL6. The required standardisation activities will commence after the validation has been performed.

### 3.3 Certification and Detailed Specification

Certification and detailed specification provide the means to ensure the safe implementation and subsequent operation of technical systems. It is important that both the airborne and ground minimum requirements specified are aligned, support the intended operation, and are balanced in terms of impact on aviation stakeholders, and not being too detrimental for specific stakeholders.

#### 3.3.1 Certification Specifications (CS-ACNS)

NPA 2023-07 with respect CS-ACNS supporting the implementation of data link functionality in aircraft equipment was published in June 2023 and the period for comments has closed in September 2023.

The NPA proposed a minimal change to CS-ACNS to include only the ADS-C/EPP requirements as defined in ED-228A and ED-229A and maintained the existing CPDLC as defined in ED-120 and ED-110 which was the standard required by the now repealed Regulation (EC) No 29/2009<sup>7</sup>.

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<sup>6</sup> [SESAR Joint Undertaking | NM profile improvement using ADS-C \(sesarju.eu\)](https://sesarju.eu)

<sup>7</sup> Regulation (EC) No 29/2009 has been repealed and replaced by Regulation (EU) 2023/1770.





Varied feedback on the proposed approach was received with respect to the required minimum standard that aircraft should support. ANSPs and aircraft operators requested the CS to reflect additional functionality in excess of the minimum mandated by the CP1 regulation, while other comments were against the combination of the ATN B1 and ATS-B2 standards. EASA investigated the possibility to add additional functionality, with the aim to complete the amendment to CS-ACNS. However, it is not foreseen to include “full” ATS-B2 compliance in this amendment to support the CP1 regulation. See paragraph 4.4.1 for additional information.

While the target date for the ED Decision containing the amendment to CS-ACNS was Q4 2023, due to the uncertainties further described in paragraph 4.3 and 4.4.3, EASA intends to publish the related ED Decision as soon as the AF6 decision has been communicated.

In this case such a postponement should be seen as meeting the objectives of point ii of paragraph 3.1.

### 3.3.2 Detailed Specification (DS-GE.CER/DEC and DS-GE.SoC)

NPA 2023-05 on the Detailed Specifications for ATM Ground Equipment was published for consultation between 14<sup>th</sup> June 2023 and 2<sup>nd</sup> August 2023, the resulting issue 1 of DS-GE.CER/DEC and DS-GE.SoC were published on the 26<sup>th</sup> October 2023<sup>8</sup>. These DS provided the basic requirements and means of compliance for the datalink systems used within ATS systems and only incorporate functional requirements to:

- i. establish CPDLC and ADS-C transactions.
- ii. exchange operational CPDLC and ADS-C messages.
- iii. transfer CPDLC authority.
- iv. terminate CPDLC and ADS-C transactions.
- v. update ADS-C data.
- vi. forward logon parameters.



The specific requirements for the ADS-C common service were not incorporated in issue 1 due to the non-availability of published standards for the ADS-C Common Service. The specific requirements will be included in the next iterations of the DS. The next routine amendment of the DS in which a significant change could be incorporated is planned for Q1 2025 based on an NPA scheduled in Q3 2024 under EPAS RMT.0744.

EASA considers it necessary that the technical requirements are incorporated in the relevant DS to fulfil the objectives of point ii of paragraph 3.1.

The fitness for purpose of the standards covered in paragraph 3.2.2 and 3.2.3, incorporation of the requirements in the DS in the next amendment, and the recognition of the standards will require additional time, if these standards are not fit for purpose as AMC.

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<sup>8</sup> [ED Decision 2023/015/R - Conformity assessment of ATM/ANS equipment | DS-GE.CER/DEC — Issue 1 and DS-GE.SoC — Issue 1 | EASA \(europa.eu\)](#)



## 4 READINESS

### 4.1 Verification and Validation - technical

The use of ADS-C/EPP data is a multi-stakeholder activity in which all actors need to be aware of their obligations and it needs to be ensured that the required data is produced, transmitted, received, and used correctly. This is normally undertaken in accordance with verified and validated standards and specifications. The applicable ADS-C/EPP standards have been developed based on research activities undertaken in a “controlled” environment and validated based on expert judgement of the relevant working groups. Previous implementations have shown that although demonstrated satisfactory during research and development, the deployment on multiple platforms (airborne and ground) has resulted in errors. The following paragraphs describe EASA understanding of the verification and validation activities.

#### 4.1.1 Aircraft ADC-S/EPP data transmission

The only aircraft type currently equipped and certified to transmit ADS-C/EPP is the AIRBUS A320/A330 family which is capable of transmitting data in excess on the minimum required by the CP1 regulation. The SESAR DIGITS project research activities have shown that the A320 specific installation will transmit ADC-S data effectively, in accordance with the standard. However, no other manufacturers have yet developed a solution applicable to their aircraft types, platform architecture and sensor availability. Due to a wide variation in aircraft system architectures differences in the ADS-C data between aircraft types are possible, as previously seen in other deployment, such as ADS-B, where there was an initial significant variation in the data transmitted. It is recommended to validate the application of the certification requirements to take into account other aircraft types prior to future additional mandates.



#### 4.1.2 ADS-C/EPP data use – ground systems

The use of ADS-C data including the EPP data has been integrated into several air traffic control centres (ACC) as part of the PJ38 demonstration projects. As these ACC have successfully integrated the data into their system, in accordance with the standard, and no difficulty or discrepancies have been reported; the further integration in ATC systems is expected to occur with limited risk. However, it needs to be noted that these control centres will have implemented locally defined parameters to trigger the display and warnings on a CWP when a divergence is observed between the ground system trajectory and that downlinked via ADS-C/EPP, in the absence of a standard defining display and warning parameters for the upper airspace, see paragraph 3.2.4.

#### 4.1.3 ADS-C/EPP ground distribution

The ground distribution of ADS-C/EPP data has only been demonstrated in accordance with the conditions established by the SESAR PJ38 research project and undertaken in a “controlled” environment. The resulting standards for the ADS-C Common Service and the distribution and sharing of data in accordance with the standard hasn’t been implemented. Without a representative implementation for the ADS-C common service and a corresponding ATS unit verifying the published standards interoperability and operational risks cannot yet be ruled out.

### 4.2 ADS-C Common service

A single commonly procured ADS-C common service has been proposed as the best option to support the implementation of CP1 AF6 obligations although not required by CP1 regulation. The NM and SDM are working towards achieving this goal through the procurement of an ATS common datalink service (ACDLS). The ACDLS is intended to provide the ADS-C/EPP distribution service in conjunction with the envisaged logon and CPDLC services to the participating ANSPs. A call for tender was issued in December 2023 by EUROCONTROL, as the contracting agent, with operations envisaged to commence in 2026/2027. The majority of European ANSPs have already agreed to participate and subscribe to the agreement.



The ACDLS, although not required by the CP1 regulation, is the preferred implementation as opposed to the alternative where each ANSPs connects to the aircraft and distributes the data via multiple connections. Such an alternative implementation would induce a risk of not achieving a fully harmonised implementation, it would complicate data sharing and leads to an operational risk. Furthermore, the existing data exchange protocols (e.g., AHMS and OLDI) are not yet adapted for the exchange of ADS-C/EPP data. Thus ADS-C/EPP data should be based on the standard - Specification for Data Link Ground Distribution SWIM Services and in accordance with the DS to be published by EASA.

Although EASA consider the implementation, operation, and participation of all ANPS is the preferred method, with the potential side-effect of a more efficient use of the VDLM2 link, such an implementation has a risk for compliance post 1 January 2028, due to its non-availability at this point in time, for which no mitigation actions are evident. Should the ACDLS provider be late in establishing the services, ANSPs would be unable to have access to ADS-C/EPP data and will need to reconfigure, and possible re-attest their own systems accordingly, resulting in delayed operating, increase logon requests and VDLM2 usage, see paragraph 4.4.3 for additional information with respect to VDLM2.

The use of an ADS-C common service requires a unique address (Ground Facility Designator (GFD) and ATN CM application) that will provide access to all datalink services in use (i.e., CPDLC and ADS-C/EPP. These addresses are listed in ICAO EUR Doc.028 - EUR NSAP Address Registry, which will require an update, to incorporate the new address. Although this is not a requirement to meet the industrialisation objectives as per point ii of paragraph 3.1, the lack of a published logon address has a potential impact on the successful use and operation of the ADS-C common service. The logon addresses are currently included in the aircraft systems databases and should be available before the end 2024 to be integrated in the initial production. Updating of the database is often expensive and time-consuming, thus limiting the effectiveness of the ADS-C common service. Furthermore, flight crew procedures and training will need to be adapted to reflect the new Logon and ADS-C common services which implement the CM and ADS-C ATN applications. Such common procedures to ensure a harmonised application need to be published.



### 4.3 Operational Benefits

The update of the original CP1 proposal Cost Benefit Analysis (CBA) prepared by the SDM dated 4<sup>th</sup> November 2020, indicated that the benefits from implementing AF6 where zero, as shown Table 1<sup>9</sup>.

This CBA was predicated on the understanding that AF6 was an infrastructure implementation only for which no specific operations or data use would be predicated. However, paragraph 6.1.1 of the CP1 regulation stipulates the specific data to be transmitted and the use of the data.

Millions €	Cost		Benefit		NPV
	Undiscounted	Discounted	Undiscounted	Discounted	Discounted
AF1	131	85	941	397	312
AF2	1037	747	709	325	-422
AF3	1011	746	9821	4101	3355
AF4	98	73	4268	1845	1772
AF5	1332	881	0	0	-881
AF6	176	77	0	0	-77
Total	3785	2608	15739	6668	4059

*Table 1 - Updated CP1 CBA costs, benefits and NPV per ATM functionality*

Table 1: CP1 CBA results

<sup>9</sup>

SDM report [2020-cp1-cba-update.pdf \(europa.eu\)](https://easa.europa.eu/media/1000222/2020-cp1-cba-update.pdf)



The requirement for aircraft is to automatically down-link trajectory information using ADS-C/EPP as part of the ATS-B2 services. This statement is vague as the specific EPP data has not been defined, however, as the operational intent is to display the route (i.e. 2D track) resulting from the downlinked trajectory, thus it has been understood to require only the way point sequence data as define by ED-228A/ED-229A and none of the optional data, which is only required when available, see Table 2.

```

ExtendedProjectedProfile ::= SEQUENCE
{
  computation-time      [0] DateTimeGroup,
  way-point-sequence    [1] SEQUENCE SIZE (1..128) OF SEQUENCE
  {
    latitude             [0] Latitude,
    longitude            [1] Longitude,
    level                [2] EPPLLevel OPTIONAL,
    name                 [3] WaypointName OPTIONAL,
    estimated-time       [4] ETA OPTIONAL,
    estimated-speed      [5] SpeedIASMach OPTIONAL,
    vertical-type        [6] VerticalType OPTIONAL,
    lateral-type         [7] LateralType OPTIONAL,
    level-constraint     [8] LevelConstraint OPTIONAL,
    speed-constraint     [9] SpeedConstraint OPTIONAL,
    time-constraint      [10] RTA OPTIONAL,
    ...
  },
  current-gross-mass    [2] GrossMass OPTIONAL,
  trajectory-intent-status [3] TrajectoryIntentStatus OPTIONAL,

```

Table 2: ADS-C/EPP data

The AF6 Benefits Overview report prepared by the S3JU presented an overview of the benefits of ADS-C/EPP validated to date in the SESAR programme as of December 2023. While there are some potential minor benefits from increasing controller situational awareness resulting from the CP1 regulation, most of the benefits demonstrated are for operations within the TMA or include the use of optional data or are associated with the use of additional CPDLC messages that are not mandated in the CP1 regulation or required by the airborne and ground specifications, in particular CS-ACNS and the DS developed in accordance with Regulation( EU)



2023/1770<sup>10</sup>. These assessments based on approximately 20.000 revenue flights are using the data derived from A320's which are capable of downlinking the optional data and could not be extrapolated to a full implementation of the CP1 mandate. Although the specific quantified benefits required additional verification, EASA concurs that the potential benefits in term of airspace capacity, environmental and safety of using ADS-C/EPP can only be materialised when ADS-C/EPP optional data is available and is combined with the additional CPLDC messages as defined in ATS-B2 standard (e.g., ED-228B), however these cannot be achieved in accordance with requirements as specified in the CP1 regulation. The implementation of "full" ATS-B2 is not required by the CP1 nor in the Detailed Specification recently published for ATM/ANS equipment<sup>11</sup>.

Several airlines in support of future Trajectory Bases Operation (TBO) have confirmed their readiness to equip new aircraft with ADS-C/EPP technology, this refers primarily to aircraft types that are capable and able to downlink most of the optional ADS-C/EPP data and is based on the benefits that have been demonstrated by MUAC. The use of this optional data and hence the benefits are dependent upon the ground implementations. Given, that the minimum requirement is only to display the 2D track it is unlikely that the benefits potentially available from ADS-C/EPP equipage will all be materialised from the very beginning on a pan European basis just based on the CP1 mandate. This uncertainty on the overall benefits from CP1 implementation might also have a negative impact on any voluntary retrofit. Although no specific assessment related to retrofit has been undertaken the initial findings and industry feedback clearly suggest that retrofitting aircraft from the current ATN-B1 CPDLC only, to the ATS-B2 incorporating CPDLC and the majority of ADS-C/EPP optional data would not be possible for all affected aircraft in the CP1 timeframe.

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<sup>10</sup> Regulation 2023/1770 replaces the repealed DLS Regulation (EC) No 29/2009.

<sup>11</sup> [ED Decision 2023/015/R - Conformity assessment of ATM/ANS equipment | DS-GE.CER/DEC — Issue 1 and DS-GE.SoC — Issue 1 | EASA \(europa.eu\)](#)





In addition, aircraft operators have noted, from experience, that the operational use and associated ground infrastructure tends to be late compared to the majority of aircraft, consequently, they are sceptical if any benefits would become evident for EU operations and would prefer the ANSPs to be equipped and ready for operations slightly in advance of aircraft to ensure the amortisation of their investments in fleet equipage.

Furthermore, if the operational benefits that are foreseen by the S3JU are to be materialised through the use of ADS-C/EPP data, the aircraft systems must be operational and the aircraft must logon to the applicable networks, currently the VDLM2. This is not facilitated by the current requirement in the CP1 mandate, which is for equipage only and not requiring an operational use. In general, for datalink, it is observed that only MUAC, Karlsruhe UAC, Cyprus and France are currently requiring aircraft to logon.

## 4.4 Implementation Considerations

### 4.4.1 Airborne Implementation

As indicated in paragraph 3.3.1, EASA undertook an additional investigation with regards to the possibility to add additional functionality to the CS-ACNS, in response to comments received. The additions, where with respect to the use of CPDLC message sets defined in the ATS-B2 standard instead of those in ATN B1 standard, as already implemented in accordance with the repealed regulation (EC) No 29/2009. This was a possible intermediate step towards the implementation of “full” ATS-B2, see below.

This additional investigation revealed that most of the equipment manufacturers and OEMs have already commenced development work on the assumption the certification requirements would only reflect the addition of ADS-C/EPP to an already certified system, if required by 31 December 2027. There are indications that not all equipment manufacturers can meet this date, regardless of the requirements included in the amendment to CS-ACSN . This is a risk to the airborne compliance by the AF6 implementation date and requires addition monitoring.



To obtain the envisaged benefits foreseen in the S3JU report, some stakeholders have recommended that CS-ACNS should include “full” ATS-B2 capability only. As already indicated in paragraph 3.3.1, EASA is currently not planning such an extensive revision to CS-ACNS. The ATS-B2 standards contain several ATS services supported by 3 data link applications in support of ATM operations, with EPP being a subset on the of the ADS-C applications, see table 3. These applications, both CPDLC and ADS-C, as per EPP, contain optional data items, see above, in support the ATM operations. The required ATM operations, and hence the optional data items, have yet to been defined for the Single European Sky airspace. A significant number of aircraft types, primarily business, and general aviation, required to operate above FL285, currently are unable to incorporate all the required and optional data items without high costs associated with a new FMS. Furthermore, even though the complexity of the design, testing and certification actions of an ADS-C/EPP system with CPDLC as per ATN-B1 versus an ADS-C/EPP system with CPDLC as per ATS-B2 is of a similar order of magnitude when compared side by side, the additional effort is significant and adds further complications to the design and investments already made, and therefore it would be difficult to include ATS-B2 along the AF.6 mandate.



ATS Services	Data Link Applications			ATM Operations Supported by Data Link										
	CM	CPCLC	ADS-C	Departure Clearance	Taxi Clearance	ATC Comm	Separation Assurance <sub>1</sub>	Separation Assurance <sub>2</sub>	Climb Decent Procedure	ITP	IM-AACD	4DTBO	DRNP	IM-PTM
DLIC	√													
ACM		√				√								
CRD		√				√	√	√	√					
AMC		√				√								
DCL		√		√										
D-TAXI		√			√									
IER		√	√			√	√	√						
PR			√				√	√	√					
4DTRA D		√	√									√		
ITP		√								√				
IM		√	√								√			√
OCL		√				√								
DRNP		√	√										√	

Table 3: ATS-B2 services

There is a high degree of consensus between equipment manufacturers to design and build ATS-B2 datalink equipment to revision B which was published 12<sup>th</sup> October 2023 by EUROCAE over revision A. It is also generally accepted that revision B is the evolution path of the data communications capabilities over the next decade. EASA has only recognised revision A as the applicable standard in CS-ACNS as this was the published version available prior to consultation and recognised by EUROCAE as the minimum required for CP1. It has been noted by the equipment manufacturers that supplying equipment to revision A for some OEMs and revision B for others, or revision A now and revision B at a future point, will increase costs, complexity, development time, and integration challenges for operators, OEMs, and ANSPs. In addition, although addressed by the standards, the interoperability between the different revisions of the standard and varying ADS-C and CPDLC application version requires to be demonstrated.



#### 4.4.2 ANPS Implementation

No implementation issues have been reported by ANSPs, or the ground equipment manufactures to date. The probable reason being that they are awaiting the industrialisation decision prior to planning, nor are they fully aware yet of the DS recently published. Such late planning may mean that some ANSPs might fail to modify their system prior to the required date.

#### 4.4.3 Air/Ground Communications

A reliable, fast, and efficient air/ground communication infrastructure is required to have an effective data link supporting both CPDLC and ADS-C/EPP based ATM operations. The currently available air/ground infrastructure available is based on VDLM2 technology, which stems from the 1990's and was initially standardised in the early 2000's. Although this is providing the CPDLC data to support limited CPDLC operational use, it continually performs below requirements as demonstrated by the latest performance data from Collins, see Figure 1 and Figure 2.

These performance issues will continue to exist within the VDLM2 infrastructure, and the introduction of ADS-C/EPP data on the bases of ATS-B2 standards will not address the fundamental limitations of VDLM2. It is therefore highly likely that additional issues will arise with the variety of existing aircraft systems introduced to support ADS-C/EPP. In addition, the SESAR project PJ38, has not been able to determine the reduction of the frequency load from the application of the ADS-C common service. Therefore, dependent upon the extent of the data downlinked the performance of the VDLM2 infrastructure would be expected to degrade further as the number of equipped aircraft increases post 2028. It should be further noted that the ability for EASA to rectify performance issues related to interoperability deficiencies and errors via the use of directives based on article 76 of the Basic Regulation<sup>12</sup> is limited as this regulatory provision refers only to urgent safety issues.

It should also be recognised that the available additional frequencies should be allocated as en-route frequencies; this additional capacity will face additional data requests, in particular, from aircraft operating in the non-mandated datalink airspace.



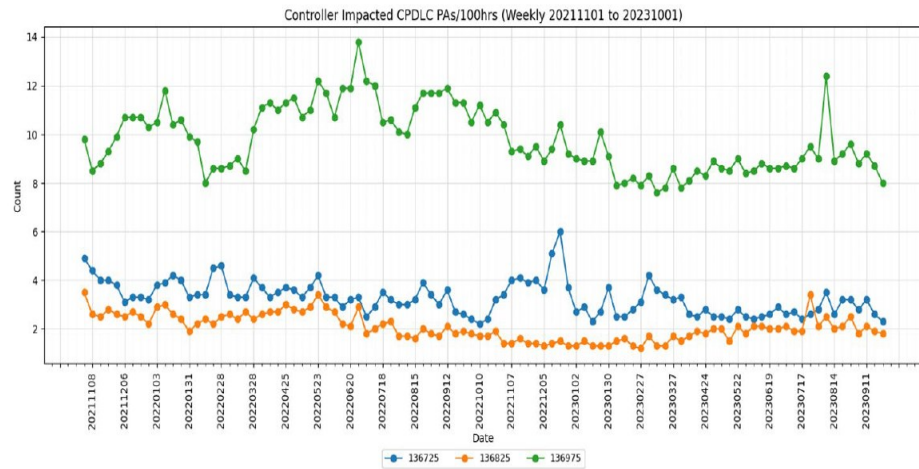


Figure 1: Provider Abort (OA) rate

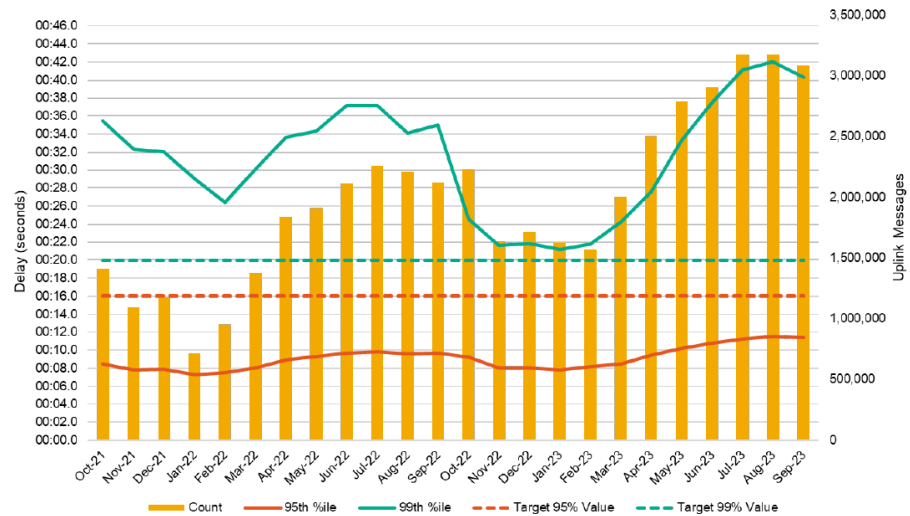


Figure 2: Technical round trip delay



In order to improve and provide an alternative to the VDLM2 infrastructure roadmaps are being developed that include the existing technologies and those envisaged by the ATM Master Plan, together with a possible deployment schedule as shown in Figure 3.

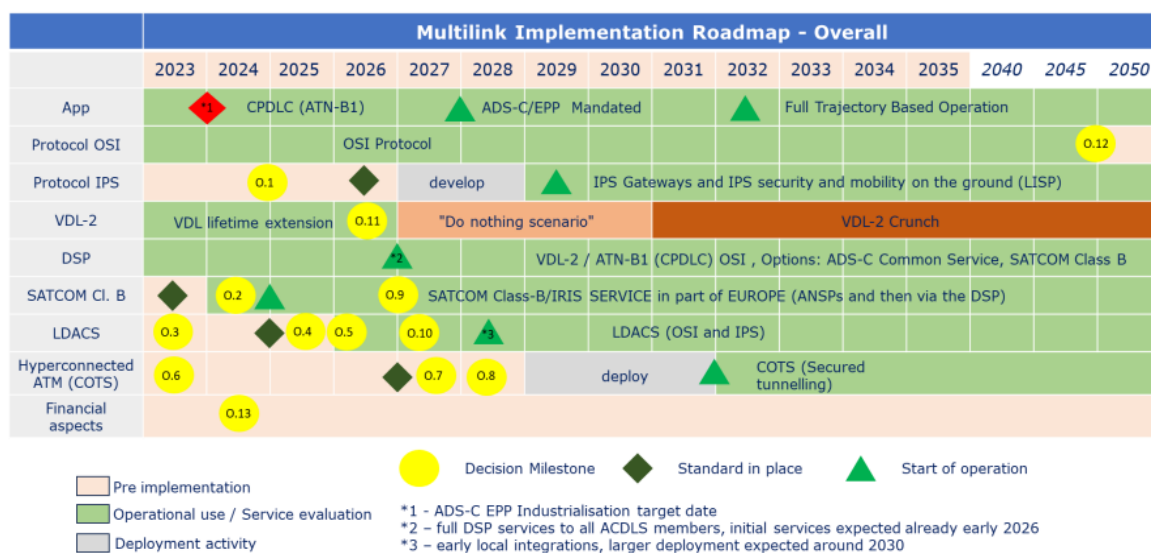


Figure 3: SDM Multilink Implementation Roadmap

Currently the only alternative link that is near to be implemented is SATCOM using the IRIS datalink service for which the service provider, ESSP SAS, was certified by EASA in July 2023. Initial operations, called Pre-Commercial Flights (PCF), are planned in the frame of the European Space Agency (ESA) IRIS project, with between 2 and 14 EasyJet aircraft equipped with SATCOM equipment capable for IRIS datalink services. Delays in signing the required Iris Working Agreement (IWA)(a Regulation (EU) 2017/373 requirement) with the 14 participating ANSPs, (allowing a continuous coverage of the IRIS services for the planned EasyJet routes), have resulted in a postponement of the start of the Pre-Commercial Flights and that initially only 2 aircraft will be upgraded.

These considerations for the IRIS transition into service, can serve as an illustration of the relevance of an appropriate and coordinated deployment roadmap, properly identifying all necessary enablers.



An implementation roadmap should identify all milestones and deployment obligations for industry, aircraft operators, ANSPs and national aviation authorities, to ensure consistency between the airborne and ground domains implementations.

In addition, the current roadmaps still contain all the possibilities as foreseen by the ATM MP, without prioritisation to define the minimum required communications infrastructure in support of the anticipated operations nor does it recognise the Future Connectivity for Aviation (FCAV) White Paper.

Without an implementation roadmap properly identifying milestones for all decisions yet to be taken and agreed by stakeholders and institutions, and appropriately considering all necessary enablers it is unlikely that the needed improvement in the communications infrastructure performance to enable further operations supported by data link will materialise in a timely manner.

#### 4.4.3.1 Application of logon list

To maintain VDLM2 performance at an acceptable level, several ANSPs (MUAC, Skyguide, and DFS) have implemented a logon list that restricts access to the CPDLC service to those aircraft that have shown appropriate performance, independently of their certification status. As indicated in paragraph 4.4.1, the aircraft equipment manufacturer intends to integrate ADS-C/EPP into the existing systems. If the aircraft with these existing systems are not on the logon list, ADS-C/EPP data will not be provided to these ANSPs, this will continue to result in mandated aircraft equipage requirement costs not providing any tangible benefit for aircraft operator nor the air traffic service.

The use of a logon list, approved by the National Competent Authorities, needs to be reviewed with the aim to optimise situational awareness benefits and remove uncertainties for aircraft equipage.



## 5 AIRSPACE USER ASSESSMENT

Using the EASA consultative framework, aircraft operator representatives were requested to provide an opinion with respect to ADS-C/EPP implementation and to provide a response to the following questions:

1. Have all actions been taken by your members (airlines/operators) to ensure equipage of the fleet (new aircraft\*) with ADS-C EPP-capable avionics after 31 Dec 2027?
  - Have your members (airlines/operators) ordered aircraft with ADS-C EPP-capable avionics? Could you provide projections of the fleet percentage that will be equipped by 31 Dec 2027 and beyond?
  - Have your members faced any challenge to order aircraft with ADS-C EPP-capable avionics by 31 Dec 2027?
  - What are the anticipated benefits for your members?

*\*Aircraft with a Certificate of Registration issued after the 1 January 2028.*

2. Do your members see a need for flexibility measures being considered? e.g.
  - for EU aircraft operators that fail to be equipped with ADS-C EPP capable avionics, due to external factors.
  - for single operations into the SES airspace.
3. Do you have additional recommendations for achieving the objectives of CP1/AF6 and subsequent steps towards the ATS-B2 standards?

Aircraft operators indicated that:

- airlines are ready to invest, some have already made the investment, while others are waiting.
- some flexibility due to the availability of different OEMs solutions could be beneficial.

All commercial operators, re-iterated that based on benefits that are currently being demonstrates as part of the MUAC implementation, see paragraph 4.3, the implementation of ADS-C/EPP as per CP1, although challenging should be maintained. In addition, the operators reported that the removal of ADS-C/EPP from the CP1 regulation has the potential to jeopardise investments, the transition to





Trajectory Based Operations (TBO), and that ADS-C/EPP implementation should be coupled with the use of ATS-B2 CPDLC messages to assist in fulfilling the environmental goals.

The business aircraft operators indicated that as no avionics roadmaps nor cost information are available for business aircraft, the requirement to equip all aircraft is penalising as there is not a positive CBA for implementation of ADS-C/EPP only. It was also recognised positive benefits could only be achieved following an implementation including the use of the ATS-B2 CPDLC messages. Business aircraft operators support the use of datalink, but the current implementation is not considered an efficient step, and the priority should be to implement modern IP protocol, and further work in terms of the links, as VDLM2 alone is not the solution.



## 6 REGULATORY OBLIGATIONS ON AIRCRAFT OPERATION

The CP1 regulation states that all flights with aircraft that have an individual certificate of airworthiness first issued on or after 31 December 2027 operating as general air traffic in accordance with instrument flight rules within the airspace above flight level 285 within the Single European Sky airspace must be equipped with ADS-C/EPP as part of ATS-B2 capability. Therefore, after this date no newly built aircraft can operate above FL285 without the ADS-C/EPP function being installed. There are several reasons that operators may wish to operate aircraft above FL285 without ADS-C/EPP, the main reasons being aircraft delivery, maintenance, and testing. Although such operations can be conducted below FL285, it will impose operation limitations such as range through increased fuel burn and therefore are not compatible with the environmental objectives of the Single European Sky. Such considerations have been previously discussed with respect to the former interoperability regulation. The Common Project framework has no provisions that would allow exemptions, nor can member states use article 71 of the Basic Regulation in relation to CP1 requirements.



## 7 CONCLUSIONS

### 7.1 Industrialisation

To pass the industrial target date, the required specifications, standards and means to implement the initial trajectory sharing functions are to be available. These functions can be summarised as:

- i. Air - ground exchange, display and alerting of trajectory information.
- ii. Enhancement of the trajectory by the Network Manager.
- iii. Ground – ground exchange of trajectory information.

To achieve these functions the following must have been achieved.

- i. All research validation activities have been completed.
- ii. All documentation (i.e., certification and detailed specifications and supporting industrial standards) to permit the design and certification/declaration of a systems are available.

It needs to be recognised that a large volume of activities has been undertaken by S3JU, NM, SDM and ATM stakeholders during 2023 to finalise the activities that support the implementation of datalink operation of the basis of the ATS-B2 using ADS-C/EPP data. These activities were, but not limited, to the completion of the SESAR PJ38 research project, leading to demonstrating the ADS-C Common service, the update of the EUROCAE standards to reflect additional capability, beyond the scope of AF6, and that of EUROCONTROL as part of the Operational Excellence Programme, in the development of the ADS-C common service standards.

For **Air - ground exchange, display and alerting of trajectory information** required industry standards and EASA specifications are or will very soon be published. The specifications and standards which were required to be published are:

- Industry standards.
  - Industry standards defining the ADS-C/EPP data exchange<sup>13</sup> are available, latest issue published in October 2023.

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<sup>13</sup>

EUROCAE ED-228B



- Industry standards related to the ADS-C Common service<sup>14</sup> are available published in December 2023.
- Industry standards addressing the alerting conditions are not envisaged, the intent is for guidance material<sup>15</sup> published in December 2023. EASA considers that guidance material only will not guarantee harmonised and safe implementation, such a standard should be required.
- EASA specifications.
  - Airborne certification requirements (CS-ACNS) have not been published. The amendment of CS-ACNS is ready to be published. The formal publication is on hold, pending EC formal decision with regards to the continuation of AF6.
  - Ground detailed specification (DS-GE.CER/DEC), basic requirements for datalink system published in October 2023 however, they do not contain yet requirements for:
    - processing and alerting.
    - ADS-C common service.

Publication of a revision to DS-GE.CER/DEC is planned end 2024.

**For Enhancement of the trajectory by the Network Manager:**

- The research activities undertaken in PJ 18-06b1 - NM profile improvement using ADS-C, has not yet been completed to the required TRL. The required additional work is already planned and should be accelerated.
- NM indicates that the iNM system will be enhanced once the research activities are finalised. The planning to integrate ADS-C/EPP system is now required.

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<sup>14</sup> EUROCONTROL - SPEC – 192

<sup>15</sup> EUROCONTROL-GUID-194



For **Ground – ground exchange of trajectory information** publication of required industry standards and EASA specifications has been done or confirmed to be planned.

- Industry standard.
  - Industry standard related to the SWIM distribution<sup>16</sup> is available published in December 2023.
  - Additional SWIM Service Definition specification published for consultation October 2023; publication anticipated Q2/2024.
- EASA specifications.
  - Ground detailed specification (DS-GE.CER/DEC), basic requirements for ground-ground communication published October 2022; requirements for specific SWIM requirements for ADS-C/EPP are planned for a revision planned for publication end 2024.

The non availability of the EASA detailed specification for the ground systems could be mitigated via a dedicate NPA, when the supporting validated standards can be directly referred. The non-completion of the required research and the non-availability of a standard addressing the alerting parameters would need to be taken into account.

## 7.2 Readiness

A few risks with respect to the readiness for deployment have been identified to accompany the launch of the next phase:

- ADS-C common service:
  - scheduled for operation 2026/2027, a mitigation action plan for ground-ground distribution would be required in case of delay.
  - A unique logon address (Ground Facility Designator) is required.
- Operational benefits:
  - The identification of benefits of airborne implementation following the CP1 minimum requirement, require attention.

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<sup>16</sup>

EUROCONTROL - SPEC – 193



- Potential benefits have been demonstrate based on optional ADS-C/EPP data items; integration of optional data requires the assessment of the certification requirements.
- For the realisation of these potential benefits operational use of ADS-C/EPP and logon are necessary, currently not required.
- Other risks:
  - Aircraft equipment manufacturers would need to offer capable avionics before the 31 Dec 2027 deadline.
  - There are performance and interoperability issues with the VDL Mode 2 infrastructure to be further addressed to support connectivity.
  - A roadmap towards the future pan European data link connectivity is required to maximise data link connectivity.
  - Mitigations options for operators of aircraft that fail to be equipped with ADS-C/EPP capable avionics on time and for aircraft undertaking delivery, maintenance, and testing flights in SES airspace may need to be made available.
  - Implementation of the minimum ADS-C/EPP functionality as required by the CP1 regulation followed by a requirement to implement “full” ATS-B2 will significantly increase equipment manufacturers investment and prolong the development cycle.

Furthermore, airline operators have indicated that they are ready to invest in ADS-C/EPP.

### 7.3 Overall conclusion

Recognising on one side all efforts performed to meet the deadline of 31 December 2023, an on the other side the written commitments received from the corresponding actors, EASA concludes that:

- (i) the industrialisation phase is complete, and
- (ii) accompanying measures to mitigated risks for the next phase are required to ensure a successful deployment; those measures are listed in paragraph 8.



## 8 RECOMMENDATIONS

It is to be stressed that operational benefits can be achieved on a pan European basis through the effective use of downlinked aircraft data and the use of expanded CPDLC messages at all flight levels, however, these aspects are not fully addressed by the CP1 regulation. In this regard, some accompanying activities should be launched to further define the operational use and the minimum data set required.

EASA recommends that:

With respect to industrialisation.

- a) EASCG (European ATM Standards Coordination Group) to review the sufficiency of EUROCONTROL - SPEC – 192 and if needed to coordinate the publication of its evolution as soon as feasible possible.
- b) EASCG to coordinate the development of a standard defining the processing and parameters to trigger the warnings on the CWP in case of a discrepancy between the downlinked aircraft trajectory and the ground system trajectory and its publication as soon as feasible possible.
- c) S3JU to complete SESAR project PJ 18-06b1 - NM profile improvement using ADS-C research to readiness level TRL6 as soon as feasible possible.
- d) NM to publish iNM system technical requirements fully consolidated and specified in a publicly available document as soon as feasible possible.
  - a. EASA to publish the resulting Detailed Specification as soon as feasible possible.

*Note: points a) and b) relate to Air - ground exchange, display and alerting of trajectory information and Ground – ground exchange of trajectory information (. sub-functionality 6.1.1 and 6.1.3) and points c) and d) relate to Enhancement of the trajectory by the Network Manager (sub-functionality 6.1.2).*

With respect to readiness.

- a) NM to provide a detailed implementation plan for a change to the iNM by 30 June 2024 demonstrating effective integration of ADS-C/EPP data in the NM derive trajectory.



- b) SDM to establish by 30 June 2024 an effective means to monitor equipment manufacturers and aircraft manufactures progress in developing and delivering complainant systems.
- c) SDM/NM/S3JU in conjunction with EASA to determine a realistic roadmap for VDLM2 improvements by 30 June 2024.
- d) EU ICAO coordination to be triggered for the establishment of a unique logon address by 30 June 2024.
- e) National competent authorities to discuss with the ANSP under their oversight the need for the application of the logon list by 31 December 2024, with the aim of limiting its use to properly justified circumstances, considering its negative impact on the DL performance.

*Note: failure to meet the above actions would result in additional stakeholder confusion with regards to the technical and operational requirements and further delay a harmonised implementation*

and

- i. EASA oversight activities should be expanded to effectively monitor the above actions, and ADS-C and CPDLC implementation.
- ii. Further activities to detail the use of expanded CPDLC, downlinked aircraft data (ADS-C data) and the required minimum data set taking into consideration the recommendations of the EASA Future Connectivity for Aviation (FCAV) White Paper issued in conjunction with the Federal Aviation Administration, Airbus and Boeing, establishing the roadmap for the transition to operation based on ATS-B2 and the ongoing developments undertaken by the SDM in support of Trajectory Based Operations (TBO) should be undertaken. The transition to ATS-B2 operations should be reflected in the updated ATM Master Plan.





To undertake these activities, a work programme should be established to support the transition to operations based on ATS-B2. EASA is ready to establish such a work programme, which may include the issuance of an Opinion early 2026 with the required regulatory packages. EASA can also prepare an implementation plan to ensure the harmonised, coordinated, consistent, and synchronisation of airborne and ground capabilities. These deliverables to be prepared in conjunction with Competent National Authorities, European institutional actors, ANSPs, aircraft operators, manufacturers, and standard developing organisations, taking due account of ICAO and relevant international partner developments.



## 9 REFERENCE DOCUMENTS

- Assessment of AF6 fitness-for-purpose D3-3121 issue 3.0
- CP1 Industrialisation Forum intermediate report D6.1.3192 issue 1.0
- CP1 industrialisation forum ToR V2.0
- Table of items - final



## ANNEX 1

# CP1 Industrialisation Forum

## TERMS OF REFERENCE

In the context of the implementation of the European ATM Master Plan, and having regards to:

*Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and in particular Article 93 thereof,*

*Commission Implementing Regulation (EU) No 409/2013 of 3 May 2013 on the definition of common projects, the establishment of governance and the identification of incentives supporting the implementation of the European Air Traffic Management Master Plan, and in particular Articles 4.3 and 4.5 thereof,*

*Commission Implementing Regulation (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan provided for in Regulation (EC) No 550/2004 of the European Parliament and of the Council, and in particular paragraph 6 of the Annex thereof,*

A 'CP1 Industrialisation Forum' is hereby established.

## Scope

The objective of the forum is to ensure consistent and coordinated actions with respect to the industrialisation activities and readiness for implementation, in relation with the ATM functionalities included in the Common Project One regulation, aiming at improving the overall performance of the European ATM system and supporting the digital transformation of the Single European Sky.

The forum should agree on the conditions, actions, and their owner/s, and the planning to meet the timely completion of the industrialisation activities.



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These actions should aim at, as a minimum, the completion of the industrialisation of AF6.

### ***Members of the CP1 Industrialisation Forum***

The CP1 Industrialisation Forum shall consist of a maximum of two representatives from the following organisations:

- EASA<sup>17</sup>;
- Deployment Manager.
- SESAR Joint Undertaking.
- Designated Network Manager.
- EUROCAE.

In addition, the EASCG Chair shall be invited to ensure information exchange with the European ATM Standards coordination and related industry representation in that forum.

The European Commission will receive reports from the Forum and may join the deliberations of the forum as observer when deemed relevant.

The CP1 Industrialisation Forum shall include representatives from the manufacturing industry (Airbus Boeing, Dassault, and ASD) on an ad-hoc basis and may invite other manufacturer and subject matter experts for the discussion of specific items relating to CP1 ATM Functionalities. The Chair shall invite those representatives and experts based on the anticipated agenda for each meeting.

### ***Chair and secretary***

The CP1 Industrialisation Forum shall be chaired by EASA.

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<sup>17</sup> Only 1 representative.



EASA shall also provide the secretary.

### ***Meetings***

The CP1 industrialisation forum shall meet regularly. The meetings shall be scheduled in a way allowing for an active cooperation and information sharing among the members.

Notes shall be established for each meeting, recording at least the main actions and achievements. Ad-hoc meetings may be convened at any time on request of the Chairperson.

### ***Timeline***

The CP1 Industrialisation Forum may cease its activities upon expiration of the last target implementation date in CP1.



## ANNEX 2

The following table represents the status reported to the CP1 Industrialisation Forum on the 20<sup>th</sup> November 2023.

### Elements to assess<sup>18</sup> if AF6 is ready for implementation at the industrialisation target date.

Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
1	6.1.1	CS-ACNS	EASA	Q4/2023	<ul style="list-style-type: none"><li>Airborne standards to be recognised in CS-ACNS. The publication of an amendment to EASA CS-</li></ul>	<b>PROGRESSING to plan:</b>

<sup>18</sup> Reg 409/2013 Art 4.4: At the expiry of the industrialisation target date, the Commission, with the support of the European Union Aviation Safety Agency, shall verify that the ATM functionalities or sub-functionalities referred to in paragraph 3 have been standardised and that they are ready for implementation. Where they are found not to be ready for implementation, they shall be withdrawn from the common project regulation.

‘industrialisation’ of ATM functionalities means the activities and processes, following their validation that include standardisation, certification, and production by the manufacturing industry (ground and airborne equipment manufacturers)

‘industrialisation target date’ means a date by when the standards and specifications are to be available for the ATM functionality or sub-functionality to enable its implementation.

<sup>19</sup> **ALL** items must be met by the industrialisation target date.



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
					<p>ACNS required to permit the OEMS to design and integrate suitable systems in their aircraft.</p> <ul style="list-style-type: none"> <li>• RMT.0524 refers.</li> <li>• Dependency on item #6 and #7</li> </ul>	<ul style="list-style-type: none"> <li>• NPA 2023/07 published 07-07-2023. <ul style="list-style-type: none"> <li>○ EASA proposed option 1 (minimal change to accommodate EPP).</li> <li>○ Significant number of comments received indicated relevant reservations against option 1.</li> </ul> </li> <li>• ED decision planned for November 2023.</li> </ul>
2	6.1.3	Detailed Specification for ADS-C	EASA	Q4/2023	<ul style="list-style-type: none"> <li>• Technical aspects of ADS-C Common Services subject to declaration in the new conformity assessment framework against detailed specs published by EASA that lists supporting industry standards as means of compliance.</li> <li>• Eurocontrol Specs required for <ul style="list-style-type: none"> <li>○ Common Service</li> <li>○ ANSP systems incl. display and warnings</li> <li>○ NM systems</li> </ul> </li> <li>• RMT.0161 subtask 3 refers - scheduled Sept 2023</li> </ul>	<p><b>PROGRESSING to plan:</b></p> <ul style="list-style-type: none"> <li>• NPA 2023/05 published 14-06-2023.</li> <li>• ED decision published 26<sup>th</sup> October 2023. <ul style="list-style-type: none"> <li>○ <i>EASA detailed specs currently do not contain specific standards for ADSC</i></li> </ul> </li> </ul>



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
					<ul style="list-style-type: none"> <li>• Dependency on item #3, #4, #5 and #9</li> </ul>	<i>common service equipment.</i>
3	6.1.3	Specification for ADS-C Ground Distribution Service	EUROCONTROL	<i>Scheduled Q4/2023</i>	<ul style="list-style-type: none"> <li>• ECTL will list actual standards prepared and any resulting difference and will provide evidence of consultation and validation with stakeholders. Standards required for ADS-C distribution: <ul style="list-style-type: none"> <li>○ within the Common service</li> <li>○ external to Common service</li> </ul> </li> <li>• Dependency item #9</li> <li>• Input to item #2</li> </ul>	<b>PROGRESSING to plan:</b> <ul style="list-style-type: none"> <li>• Drafting completed under the OEP workstream 12.2.</li> <li>• SWIM specifications for ground distribution in formal public consultation since July and planned to be published by December 2023.</li> <li>• SDM and NM confirmed that all ANSPs participating in ACDLS will follow the ADS-C Common Service approach.</li> </ul>





Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
4	6.1.1 6.1.3	Specification for Datalink Common Service for the ATN	EUROCONTROL	<i>Scheduled Q4/2023</i>	<ul style="list-style-type: none"> <li>• NM will list actual standards prepared and any resulting difference and will provide evidence of consultation and validation with stakeholders.</li> <li>• Dependency on #9</li> <li>• Input to item #2</li> </ul>	<b>PROGRESSING to plan:</b> <ul style="list-style-type: none"> <li>• Drafting completed under the OEP workstream 12.2.</li> <li>• Datalink common service specification in formal public consultation since July and planned to be published by December 2023.</li> </ul>
5	6.1.3	Guidelines for initial trajectory information sharing	EUROCONTROL	<i>Scheduled Q4/2023</i>	<ul style="list-style-type: none"> <li>• Operational standard for a harmonised application of EPP display and warning on CWP and resolutions applied by ATCOs. <ul style="list-style-type: none"> <li>○ Eurocontrol is working on guidelines. It is EASA opinion that such operational considerations would be better covered in a standard.</li> <li>○ The operational use of the data needs to be harmonised to ensure operational interoperability, for example, the time to alert of a deviation, and the magnitude of error before alerting should be specified to ensure</li> </ul> </li> </ul>	<b>PROGRESSING with comments:</b> <ul style="list-style-type: none"> <li>• Drafting of the Guidance Material is progressing under the OEP workstream 12.2 and planned to be published by December 2023.</li> <li>• S3JU and NM confirmed the position: <ul style="list-style-type: none"> <li>○ no need for a standardised display and warnings.</li> </ul> </li> </ul>



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
					<p>that aircraft operators are provided with a consistent and seamless service.</p> <ul style="list-style-type: none"> <li>• Dependency on #9</li> </ul>	<ul style="list-style-type: none"> <li>○ During the implementation phase, the need of standardization to enhance safety can be identified.</li> <li>• EASA identifies that operational specification defining a minimum set of parameters for data processing and use would be required to materialise safety and the benefits expected from AF6.</li> </ul>
6	6.1.1 6.1.3	Safety and Performance Requirements Standard for Baseline 2 ATS data	EUROCAE	Q1/2023	<ul style="list-style-type: none"> <li>• To be determined suitability of Rev A or Rev B as the minimum requirement.</li> <li>• Request EUROCAE to undertake a review of the work and determine impact of the foreseen amendments to ED228A by Q1 2023 <ul style="list-style-type: none"> <li>○ EASA may elect to recognise Rev B in CS-ACNS and Detailed Specs - the objectives of the EASA</li> </ul> </li> </ul>	<p><b>CLOSED:</b></p> <ul style="list-style-type: none"> <li>• EUROCAE indicated that Rev. A is sufficient to be considered the minimum requirement.</li> </ul>



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
		communications (ED-228RevA or rev B)			<p>system to reflect the 'state of the art', ED228B would be considered the 'state of the art'.</p> <ul style="list-style-type: none"> <li>• Dependency on item #9</li> <li>• Input to item #1 and #2</li> </ul>	<p>(EUROCAE Letter REF. EUR 37-23 / SECR-141)</p> <p>Note: ED 228B published 12-10-2023.</p>
7	6.1.1 6.1.3	ED-229A, ED-231A	EUROCAE	Q2/2023	<ul style="list-style-type: none"> <li>• Confirmation required that no changes required to these standards.</li> <li>• Dependency on item #9</li> <li>• Input to Specification #1and #2</li> </ul>	<p><b>CLOSED:</b></p> <ul style="list-style-type: none"> <li>• EUROCAE indicated that amendments to standards were managed in parallel to the amendment of ED-228.</li> </ul> <p>(EUROCAE Letter REF. EUR 37-23 / SECR-141)</p> <p>Note: ED 229B published 12-10-2023.</p>



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
8	6.1.2	Specification from NM on the use of EPP	EUROCONTROL	Q4/2023	<ul style="list-style-type: none"> <li>• Standard on how to enhance NM systems with EPP data.</li> <li>• Dependency on item #9 and #10</li> <li>• Input to item #2</li> </ul>	<b>CLOSED with comments:</b> <ul style="list-style-type: none"> <li>• SJU confirmed Sol. 18.06b1 only achieved TRL4.</li> <li>• SESAR3 Network TBO project-solution 3 intends to validate (TRL6) the integration of portion of EPP data within the NM trajectory. The Validation results are expected in 2026.</li> <li>• EASA considers that iNM user/service and technical requirements should be specified.</li> </ul>
9	6.1.1 6.1.2 6.1.3	Complete Project PJ38	S3JU	Q2/2023	<ul style="list-style-type: none"> <li>• Publication of final report, technical requirements, validation report reaching a minimum of TRL6. <ul style="list-style-type: none"> <li>○ PJ38 must be completed. Any additional industrialisation activities and consequent</li> </ul> </li> </ul>	<b>CLOSED:</b> <ul style="list-style-type: none"> <li>• DEMOR final version has been circulated and discussed in the Forum.</li> </ul>



Item <sup>19</sup>	Reference Sub-functionalities	Deliverable	Responsible	Date required	Description	Status
					<p>risks for the ITD will be expressed clearly in the Contextual Notes.</p> <ul style="list-style-type: none"> <li>○ PJ38 to include validation of harmonised distribution of data on ground and bandwidth capacity of datalink VDL Mode 2 network to support EPP (not addressed in PJ31).</li> <li>● Input to item #3, #4, #5, #6 and #8</li> </ul>	<ul style="list-style-type: none"> <li>● PJ38 has validated the ADS-C common service solution to TRL7.</li> </ul>
10	6.1.2	Complete and validate Solution #18-06b1	S3JU	Q2/2023	<ul style="list-style-type: none"> <li>● Addresses NM use of EPP data.</li> <li>● Publication of Final report, technical requirements, validation report reaching minimum of TRL6.</li> <li>● Input to item #8</li> </ul>	<p><b>CLOSED with comments:</b></p> <ul style="list-style-type: none"> <li>● SJU confirmed Sol. 18.06b1 only achieved TRL4.</li> <li>● SESAR3 Network TBO project-solution 3 intends to validate (TRL6) the integration of portion of EPP data within the NM trajectory. The Validation results are expected in 2026.</li> </ul>





Elements to de-risk ADS-C/EPP implementation after 1 January 2028. Including further operations based on datalink.

Item	Reference Sub-functionalities	Deliverable	Responsible	Date required	Comments	Status	Risk level
1	6.1.1 6.1.2 6.1.3	Review the operational benefits of 'initial trajectory information sharing'	S3JU/SDM	Q3/2023	<ul style="list-style-type: none"> <li>There is a need to define how the ATCO will be requested to use this new information on the CWP and what are the safety and capacity impacts.</li> </ul>	<b>CLOSED with comments:</b> <ul style="list-style-type: none"> <li>S3JU AF6 Benefits documents demonstrates benefits associated with future operational concepts still under research and comprising additional ATS-B2 applications.</li> <li>It demonstrates benefits associated to use cases of EPP not mandated by CP1.</li> <li>EASA notes that additional ATS-B2 applications are out of the CP1 mandated scope.</li> </ul>	High
2	6.1.1	Develop deployment roadmaps of	Aircraft Manufacturers	Q4/2023	<ul style="list-style-type: none"> <li>Airbus has defined plans for deployment on A220/A320/A330/A350 based on ATN/OSI. Other</li> </ul>	<b>PROGRESSING:</b> <ul style="list-style-type: none"> <li>AIRBUS provided an update on projected fleet equipage.</li> </ul>	High



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		aircraft manufacturers other than Airbus			manufacturers (e.g., Boeing, Embraer, and business aircraft) have no plans yet.	<ul style="list-style-type: none"> <li>• BOEING stated they are prepared to meet implementation date subject to a successful industrialisation gate.</li> <li>• DASSAULT stated to have some difficulties to be certified on time.</li> </ul>	
<b>3</b>	6.1.1 6.1.3	Agree the transition to the IPS protocol with US counterparts. (Convergence with FAA approach)	All		Out of the scope of the CP1 industrialisation forum. The Forum to be advised and updates about the progress to be provided.	<b>CLOSED</b>	
<b>4</b>	6.1.1 6.1.3	Establish an organisation that is responsible to	ANSPs	Q4/2024	Out of the scope of ITD <ul style="list-style-type: none"> <li>• EASA has estimated that 3 years would be needed for procuring a system and a DPO</li> </ul>	<b>PROGRESSING:</b> <ul style="list-style-type: none"> <li>• Call for tender publication foreseen November 2023.</li> </ul>	<b>Medium</b>





		procure the system and operate the ADS-C Common service, after being certified as service provider.			develop the system, from which 1.5 years could be required for the organisation approval.  Plans and commitment to be established by Q4/2023	<ul style="list-style-type: none"> <li>NM indicates that ACDLS operations are due in 2026.</li> </ul>	
5		Ability to deploy and stakeholder buy-in assessment	All	Q4/2023		<b>OUTSTANDING</b> <ul style="list-style-type: none"> <li>In view of a potential priority of AF6 in the CEF Call 2023, SDM together with ACDLS ANSPs, prepared an implementation project to deploy the ADS-C common service. These ANSPs showed great commitment to deploy AF6.</li> </ul>	High
6	6.1.1	Meet the prerequisite of a reliable, fast,	NM/SDM	Q4/2027	<ul style="list-style-type: none"> <li>The current VDL Mode 2 infrastructure, supporting CPDLC seems to be performing properly in the</li> </ul>	<b>PROGRESSING with comments:</b> <ul style="list-style-type: none"> <li>EU Roadmap for the future aviation connectivity being</li> </ul>	High



		and efficient air/ground communication infrastructure			<p>case of MUAC's implementation. The results of next implementations are expected to contribute to clarifying the following aspects:</p> <ul style="list-style-type: none"> <li>○ Sufficiency of the forecasted capacity of the VDL Mode 2 network to support both the existing CPDLC and ADS-C/EPP.</li> <li>○ the impact of the current interoperability issues associated with CPDCL operations over the VDL Mode 2 network, on ADS-C/EPP data air ground data transfer.</li> <li>○ the replacement technologies are not yet available.</li> <li>• EUROCONTROL will analyse the results of the abovementioned implementation, supporting the identification and resolution of the VDL Mode 2</li> </ul>	<p>developed, building on EASA's FCAV and SDM's Multilink Implementation Roadmap</p> <ul style="list-style-type: none"> <li>• Decision on the suitability of the communication infrastructure post 2027 pending.</li> </ul>	
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operational issues and reporting to EASA for rectification action.

It should be confirmed that the existing link is sufficiently fast and efficient. Otherwise, roadmaps to fulfil that prerequisite should be defined (either fix current issues and/or alternative connectivity solutions in a multilink environment) by Q4/2023.

