

COMMON PROJECT 2 (CP2) PROPOSAL

Draft for consultation

May 2026



EUROPEAN PARTNERSHIP



Co-funded by
the European Union

CP2 proposal draft for consultation

This document is a draft CP2 proposal prepared for the purpose of stakeholder consultation. It reflects the consolidated state of play at the time of publication and is intended to support structured feedback from stakeholders.

It does not constitute the final CP2 proposal and should not be interpreted as a final position of the SESAR 3 Joint Undertaking, the SESAR Deployment Manager, EASA or the European Commission or any other stakeholder involved in the proposal development process. The content remains subject to further review, including the integration of consultation feedback, maturity assessment and legal and regulatory checks before submission to the European Commission

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DRAFT

This document contains a draft proposal for a new Common Project, as a deployment instrument to be established under Commission Implementing Regulation (EU) 2013/409 providing the legal framework for the coordinated and timely implementation of ATM functionalities (AFs), as defined in the European ATM Master Plan.

The proposal is organised around seven ATM Functionalities (AFs), with each of them carrying a letter (A to F) rather than a number (which was the taxonomy used for CP1). Each AF corresponds directly to one Strategic Deployment Objective (SDO) as defined in the ATM Master Plan. Where an SDO contains multiple Deployment Actions or where deemed relevant for the effective coordination of deployment, these are reflected as sub-AFs.

The AF on “Transition towards high performance of air-ground connectivity (multilink)” and the one on the “Service-oriented delivery model (Data-driven and cloud-based)” have been grouped into the ‘Digitalisation and data service enhancements’ chapter.

The other AFs have been grouped into the ‘Operational integration and service enhancements’ chapter.

The document is structured as follows:

- Chapter 1 provides an executive summary.
- Chapter 2 describes the content and the used methodology.
- Chapter 3 covers the digitalisation and data service enhancements requirements.
- Chapter 4 covers the operational integration and service enhancements requirements.
- Chapter 5 contains the Cost-Benefit Analysis.
- Chapter 6 describes the conditions for the successful implementation of CP2.

The content of the proposal is further supported by a set of Appendices covering:

- A. References
- B. Glossary
- C. Maturity Assessment (to be completed in the final version as maturity assessment is still on-going)
- D. Details of CBA
- E. Industrialisation Plan
- F. Suggested updates to Regulation 409 (to be included in the final version, not included here)
- G. Technical annexes

1 EXECUTIVE SUMMARY

Europe's air traffic management system is approaching the limits of what can be achieved through the Common Project 1 (CP1) or through purely voluntary, incremental, local optimisation. Traffic growth, evolving security conditions and workforce constraints are converging to create structural pressures on performance, resilience, and cost efficiency across the European network. In this context, inaction is not a neutral option: without coordinated action, network performance will progressively degrade over the next decade, even where individual actors continue to optimise locally.

This Common Project 2 (CP2) proposal provides a selective, performance-driven instrument for European-level coordination. It targets elements of the European ATM Master Plan where fragmented deployment, misaligned timelines, or slow system evolution would otherwise undermine sector-wide progress. CP2 does not mandate technology for its own sake, nor does it replace local or regulatory action where these remain effective. Instead, CP2 focuses on EU-level coordination only where it is strictly necessary to preserve and enhance the performance, resilience, and competitiveness of the European ATM sector over the coming decade

CP2 explicitly builds on the lessons learned from CP1. While CP1 achieved satisfactory results in the coordinated implementation of its content, experience has shown that the coordination of implementation activities alone is insufficient where industrialisation prerequisites, such as standards or technical regulatory frameworks, are not available at the right time. In several cases, this disconnect resulted in implementation delays, increased costs, uneven deployment, and delayed performance gains at network level.

Therefore, CP2 adopts a more integrated and robust approach, explicitly covering both the industrialisation and implementation activities. CP2 coordinates not only when stakeholders are expected to deploy, but also under which conditions deployment can realistically and safely occur. This approach is intended to reduce deployment risk, accelerate effective uptake, and avoid the shortcomings observed under CP1.

CP2 is anchored around a coherent digitalisation spine, combining:

- the transformation towards data-centric Trajectory-Based Operations (SDO 5),
- the deployment of future-proof air-ground connectivity supported by a resilient, IP-based backbone (SDO 7), and
- the evolution towards a new Service Delivery Model for ATM in Europe (SDO 8).

These elements are mutually dependent and cannot be treated as isolated initiatives. Their effectiveness relies on coordinated industrialisation, aligned implementation timelines, and clear regulatory and operational interfaces.

The successful delivery of CP2 therefore depends on a set of explicit conditions for success, which are integral to the proposal. These include:

- timely availability of standards, certification specifications and guidance material;

- close alignment between CP2 obligations, EASA regulatory frameworks, and Network Manager services;
- coordinated planning of industrialisation and deployment across stakeholders;
- the availability of adequate *ad hoc* EU funding to accelerate deployment, supporting both the industrialisation phase and implementation activities;
- proportionate and predictable incentives under the performance and charging scheme;
- effective governance, monitoring, and reporting mechanisms to track progress, support operational stakeholders, and manage risks;
- Appropriate change management to strengthen the human factor linked to the envisaged pathway to modernisation.

By explicitly recognising and addressing these conditions, CP2 is designed not only as a deployment mandate, but as a managed transformation framework for European ATM starting on day one of its entry into force.

In parallel, CP2 addresses key operational integration challenges, including dynamic airspace configuration, trajectory-based operations, virtualisation of operations, airport–network integration, and the safe integration of IFR remotely piloted aircraft (RPAS). For each area, CP2 defines clear and enforceable service requirements, identifies the stakeholders expected to invest, specifies geographical applicability, and establishes timeframes that link industrial readiness to implementation obligations.

CP2 represents a shift from a predominantly technology-driven mandate towards a performance-oriented, service-based transformation of European ATM, explicitly designed to bridge the gap between innovation, certification, and deployment. By doing so, CP2 aims to ensure that Europe can absorb future traffic demand safely and sustainably, strengthen the resilience of its airspace, and maintain global competitiveness in an increasingly digital and interconnected aviation ecosystem.

Taken together, these elements make CP2 a cornerstone legislative action for the next phase of European ATM modernisation. Although SDO 4, Increased automation support, is not included as a dedicated ATM functionality in the scope of CP2, the proposal makes a significant contribution to the automation pathway set out in the European ATM Master Plan. SDO 5 directly advances automation by enabling richer trajectory data exchange, extended ATS B2 services, improved use of ADS-C data, and more dynamic trajectory management. SDO 8 provides the architectural enabler for future automation by moving ATM towards modular, service-oriented, interoperable and data-driven systems. Together with SDO 7 connectivity, these elements create the trusted digital foundations on which higher levels of automation, including AI-enabled automation, can be safely industrialised, certified and deployed over time. CP2 is therefore a decisive step towards an intelligent transport system for aviation in Europe, where operational data, services, systems and actors can interact in a more connected, resilient and performance-driven network.

The cost-benefit analysis confirms that CP2 requires a significant but proportionate investment effort to unlock the next phase of ATM performance. Total CP2 costs are estimated at approximately €3.1 billion by 2035. These investments are front-loaded in RP5 and are therefore directly relevant for the next performance and charging cycle.

The CBA also makes visible the industrialisation investment needed to make CP2 implementable. For SDO 8 (AF G) alone, initial input from major European ATM system manufacturers indicates an industrialisation effort of approximately €1 billion over the period 2028 to 2032. This figure does not yet include the industrialisation effort expected for SDO 7 (AF F), which will be consolidated in the final version and is also expected to be substantial. CP2 therefore cannot be assessed only as an implementation mandate for operational stakeholders. It also requires a significant upstream industrialisation effort by industry, which must be recognised, planned and coordinated if implementation obligations are to become credible.

At the same time, significant benefits are already at stake by 2035. By that horizon, cumulative benefits are estimated at approximately €5.7 billion, exceeding cumulative costs and generating a positive net impact of around €2.6 billion. This shows that CP2 is not only a long-term transformation instrument: it already creates a positive economic case within the next decade, while preparing the ground for further benefits beyond 2035.

This provides a clearer bridge between the performance and investment impact assessment performed at Master Plan level and the concrete regulatory, industrialisation and implementation measures proposed under CP2. It also confirms one of the central lessons from CP1: implementation obligations are only credible if the industrialisation effort is visible, sequenced and economically recognised from the outset.

2 CONTEXT AND METHODOLOGY

2.1 Policy context

This Common Project 2 (CP2) proposal has been developed in a policy context marked by increasing pressure on the European air traffic management (ATM) system and by a growing recognition that SES instruments, working in silos, are insufficient to address the challenges ahead; they need to work together.

From a network performance perspective, traffic demand is expected to continue to grow unevenly across Europe, while structural capacity constraints, environmental objectives, and operational complexity increase simultaneously. Traditional mechanisms for absorbing growth - such as local capacity enhancements, incremental procedural changes, or isolated system upgrades - are reaching their limits. In this environment, uncoordinated or uneven modernisation can gradually degrade overall network performance, even if individual operators continue to optimise their own systems.

From a competitiveness and industrial perspective, the European ATM ecosystem faces increasing difficulty in sustaining long system evolution cycles, fragmented engineering effort, and high certification and training costs. These factors slow down the effective uptake of innovation, delay performance benefits, and reduce Europe's ability to industrialise ATM solutions at scale. Without stronger coordination, investment decisions taken in isolation risk locking the system into legacy architectures and limiting future flexibility.

From a security and resilience perspective, recent geopolitical developments and ATM's increasing reliance on digital technologies highlight the need for more robust, resilient, and adaptable service architectures. Ensuring continuity of operations, protection against cyber and spectrum-related threats, and the ability to recover rapidly from disruptions requires system-level solutions that go beyond national or organisational boundaries.

The adoption of the SES2+ framework provides an updated regulatory foundation for addressing these challenges, notably by recognising new roles such as ATM Data Service Providers (ADSP). However, regulation alone cannot ensure timely and coherent transformation where industrialisation and deployment dependencies span multiple stakeholders and jurisdictions.

In this context, CP2 is conceived as a regulatory instrument, which enables targeted European-level coordination where it is strictly necessary to achieve network-wide outcomes. CP2 focuses on those elements of the European ATM Master Plan where:

- fragmented deployment would undermine performance or resilience,
- synchronised investment and readiness across stakeholders are required, or
- standardisation and the evolution of an enabling EASA regulatory framework must progress in a coordinated manner to enable effective implementation.

CP2 supports the Union's broader policy objectives - competitiveness, sustainability, resilience, and strategic autonomy - while respecting subsidiarity by restricting EU-level intervention to areas where it clearly adds value. By aligning policy intent, industrial readiness, and operational implementation,

CP2 aims to create the conditions for a controlled and effective transformation of the European ATM system over the coming decade.

2.2 Lessons learned from CP1 and how they helped shape CP2

The experience gained from the implementation of Common Project 1 (CP1) has been instrumental in shaping the design and scope of this Common Project 2 (CP2) proposal.

CP1 has represented an important step in establishing coordinated deployment obligations at European level and contributed to the implementation of several key ATM capabilities. However, its implementation has also highlighted some structural limitations, which were considered while formulating this CP2 proposal.

A fundamental lesson is that – traditionally – ATM modernisation was largely built on the legacy ATM system architecture, characterised by vertically integrated, site-specific ATC systems with long lifecycle horizons.

Within this architecture, major ATC system upgrades typically follow planning and renewal cycles of 10 to 15 years, with limited flexibility once investment decisions have been taken. As a result, synchronising deployment timelines across States and ANSPs has proved particularly challenging, even where there was alignment on high-level objectives.

This architectural context often limited the ability to pool resources, share capabilities, or scale solutions at the European level. This led to fragmented engineering effort, limited economies of scale, and in some cases to uneven uptake of capabilities across the network.

In addition, CP1 demonstrated that coordinated implementation alone is insufficient when industrialisation prerequisites are not available and/or aligned across stakeholders. In several cases, implementation obligations were introduced before essential conditions enabling industrialisation were fully in place. These essential conditions ranged from the availability of standards to the enabling EASA technical regulatory framework, or the market availability of a deployment-ready product or data service. This resulted in implementation delays for specific CP1 functionalities such as SWIM and Initial Trajectory Information Sharing, despite substantial effort by all actors involved

These lessons have directly informed the design of CP2. In a decisive evolution from CP1, CP2 is deliberately conceived to support a progressive/transition away from the legacy system-centric architecture towards a more modular, service-oriented, and data-centric ATM architecture. This shift is essential to enable greater flexibility, scalability, and resource pooling, and to reduce dependency on long, inflexible system renewal cycles.

Accordingly, CP2 adopts a more integrated approach, explicitly covering both the industrialisation and implementation activities. CP2 therefore considers not only when stakeholders are expected to implement specific capabilities, but also under which industrial conditions implementation can occur effectively and safely.

This includes, in particular:

- the explicit identification of industrialisation activities with associated target timeframes which should be achieved before the mandatory implementation timeframes are triggered.
- a clearer articulation of stakeholder roles and responsibilities in line with SES2+; and
- the recognition of cross-border and cross-functional dependencies that require European-level coordination to avoid fragmentation.

By addressing the architectural and industrial constraints observed so far, CP2 aims to reduce deployment risk, improve predictability for investors and operators, and enable more effective pooling of resources and capabilities across Europe. By making the above improvements in approach, CP2 reflects a shift from a predominantly technology- and system-driven deployment mandate towards a managed service delivery transformation, designed to deliver even more tangible network performance benefits at European level.

2.3 The starting point: the European ATM Master Plan 2025

All 10 Strategic Deployment Objectives (SDOs) in the European ATM Master Plan remain essential to long-term ATM transformation. The selective scope of CP2 does not represent a prioritisation of some SDOs over others, nor a reduction of ambition with respect to the Master Plan. Rather, the inclusion of specific SDOs in this CP2 proposal reflects an assessment of the most effective regulatory instrument to support their deployment. Some SDOs benefit from existing or planned activities and regulatory actions, such as those led by EASA or by the Network Manager through CDM processes or can be deployed at local level. Others, however, create coordination needs that these instruments alone cannot address efficiently. For these SDOs, coordinated European-level deployment under CP2 is considered necessary to avoid fragmentation, misaligned investment, or delayed performance benefits.

CP2 is therefore conceived as a complementary instrument within the broader SES framework, applied only where EU-level coordination of industrialisation and implementation is demonstrably required. This approach ensures coherence with the European ATM Master Plan while respecting the principle of subsidiarity and making optimal use of the full range of available SES instruments to support the deployment of all SDOs.



Figure 1: 10 Strategic Deployment Objectives of the ATM Master Plan

2.4 Criteria for inclusion in CP2

In line with the workplan described in Section 2.5, the SESAR JU prepared an initial proposal identifying the content to be considered for CP2. This proposal was developed following the inclusion and eligibility criteria approved by the SESAR JU Governing Board in June 2025 and submitted to the CP2 Steering Group in September 2025 for assessment. The criteria matching Article 47 criteria of SES2+, are presented below:

SES2+ Article 47 CRITERIA	APPLIED INCLUSION CRITERIA
<u>*EOCs identified in the MP</u>	CP2 will be built on the SDOs defined in the ATM Master Plan.
<u>* Network-wide impact</u>	SDOs critical to avoid network performance degradation over the next decade as shown by NM simulations.
<u>* Needs synchronisation amongst stakeholders</u>	Inclusion will be based on a clear need for EU-level coordination, demonstrated by 1) the absence of essential standards or means of compliance and/or 2) cross-border implementation dependencies and/or 3) the need for significant restructuring in the way services are delivered.
<u>* Are sufficiently mature</u>	Candidate SDOs must have reached at least TRL6 by submission of the proposal to the

	Commission (i.e. October 2026). An exceptional maturity gate clause should be considered only at a very late stage.
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Table 1: Inclusion/Eligibility criteria approved by the SESAR JU GB

2.4.1 Application of the inclusion criteria

This scope is therefore selective by design: it identifies where CP2 is the appropriate instrument for coordinated industrialisation and implementation, while leaving other Master Plan objectives to be advanced through EASA rulemaking, Network Manager processes, local implementation, or other SES instruments.

ATM Master Plan 2025 Strategic Deployment Objectives (SDOs) **fully in scope**:

- SDO 3 - DYNAMIC AIRSPACE CONFIGURATION
- SDO 5 - TRANSFORMATION TO TRAJECTORY-BASED OPERATIONS (TBO)
- SDO 6 - VIRTUALISATION OF OPERATIONS
- SDO 7 - TRANSITION TOWARDS HIGH PERFORMANCE OF AIR-GROUND CONNECTIVITY (MULTILINK)
- SDO 8 - SERVICE-ORIENTED DELIVERY MODEL (DATA-DRIVEN AND CLOUD-BASED)

For the SDOs above, all the relevant Deployment Actions were considered as potential CP2 candidates.

ATM Master Plan 2025 Strategic Deployment Objectives **partially in scope**:

- SDO 2 - OPTIMISING AIRPORT AND TMA ENVIRONMENTAL FOOTPRINT
 - Deployment actions in scope:
 - 2.1
 - 2.2
 - 2.4
 - Deployment actions not in scope
 - 2.3 (local implementation)
 - 2.5 (local implementation)
 - 2.6 (local implementation)
- SDO 10 - ENABLE INNOVATIVE AIR MOBILITY (IAM) & DRONE OPERATIONS
 - Deployment action in scope:
 - 10.1
 - Deployment actions not in scope
 - 10.2 (U-space IR)
 - 10.3 (U-space IR)
 - 10.4 (local implementation)

ATM Master Plan 2025 Strategic Deployment Objectives (SDOs) **not in scope**:

- SDO 1 - ALERTS FOR REDUCTION OF COLLISION RISKS ON TAXIWAYS & RUNWAYS (handled via EASA safety framework)
- SDO 4 - INCREASED AUTOMATION SUPPORT (not included as a dedicated CP2 ATM functionality, as the corresponding automation capabilities do not require a separate synchronised deployment mandate under this proposal; the automation pathway is nevertheless supported through the SDO5 trajectory-based operations requirements and the SDO8 service-oriented, data-driven architecture)
- SDO 9 - CNS OPTIMISATION, MODERNISATION AND RESILIENCE (handled via the CNS Programme Manager).

The exclusion of an SDO from the dedicated scope of CP2 does not mean that the objective is not less important for the implementation of the Master Plan. In particular, although SDO 4 is not included as a dedicated ATM functionality, CP2 contributes materially to the automation pathway of the European ATM Master Plan through SDO 5, which increases the availability and operational use of trajectory data, and through SDO 8, which provides the modular, service-oriented and data-driven architecture required for future automation.

During the proposal development, the Steering Group has refined the scope, as described in the following chapter 3 and chapter 4.

2.5 Development, governance and applicability area of this Common Project (CP2) proposal

This section describes how the proposal has been developed, its proposed scope and structure.

2.5.1 Development of the proposal

The SESAR JU will submit this CP2 proposal to the European Commission (DG MOVE) for adoption into EU regulation. By identifying those SDOs that require strong EU-level coordination, this proposal aims to enable a harmonised and service-based transformation of ATM, with clear accountability and improved returns. Therefore, the following key elements were considered:

- the relevant performance/service requirements: “the what”;
- the definition of the geographical scope: the “where” in the CP2 applicability area (e.g. 27 EU Member States plus Norway and Switzerland);
- the definition of the stakeholders expected to invest: the “who”;
- the definition of deadlines for both industrialisation and implementation dates: “the when”;
- the demonstration of a positive CBA (with breakdown per AF/SDO);
- an assessment of the impact in particular on RP5;
- the assessment of the maturity of the elements included in the proposal;
- an Industrialisation Plan defining essential actions for standardisation and for EASA to be completed before the regulated implementation timeframes can be triggered.

2.5.2 CP2 proposal development governance

A dedicated governance structure for CP2 proposal development was endorsed by the SESAR JU Governing Board in June 2025. The CP2 governance comprises a Steering Group (CP2 SG) chaired by the SJU, a Proposal Development Team (PDT), and six Reference Groups (RGs). Together, these bodies ensure that operational, regulatory, industrial, economic and civil-military considerations are fully reflected.

The Steering Group provides strategic direction and validates the key milestones throughout the process. The Proposal Development Team drafts the proposal and integrates inputs from the Steering Group, the Reference Groups, and stakeholders participating in the May-July 2026 open consultation.

The Steering Group defined the following five milestones:

- M#1 (September 2025): definition of the maximum potential scope based on SJU analysis;
- M#2 (November 2025): confirmation of the targeted scope, pending cost-benefit and final maturity outcomes expected in Q2 2026;
- M#3 (May 2026): agreement on the proposed scope for consultation, including CBA, pending final maturity outcomes expected in Q2 2026;
- M#4 (September 2026): integration of consultation feedback and final trade-offs, possibly still pending final maturity outcomes;
- M#5 (October 2026): final sign-off of the proposal, including final maturity confirmation, transmission to the Commission for further processing.

To ensure broad technical and operational coverage, six Reference Groups (RGs) support the PDT

- RG#1: Airport (Chair: Airport) - SDO 2 & SDO 10
- RG#2: En Route (Chair: ANSP) - SDO 3, SDO 5 and SDO 6
- RG#3 : CNS (Chair: CNS PM) - SDO 7
- RG#4: CIV-MIL (Chair: EDA) transversal
- RG#5: Service Delivery Model (Chair: Ground Industry) - SDO 8
- RG#6: CBA (Chair: AUs) transversal

2.5.3 Applicability area

The applicability of this proposal covers the EU Member States, plus Norway and Switzerland, as presented in the following figure 2.



Figure 2: Applicability area of the proposal

2.6 Industrialisation and implementation sequencing

The deployment of the ATM functionalities and sub-functionalities covered by this proposal is structured as a continuum from industrialisation to implementation, with the Industrialisation Notice acting as the formal readiness gate between the two, in line with the logic introduced by SES2+. The industrialisation phase establishes the conditions under which the relevant products, services, standards and regulatory enablers are sufficiently mature to support implementation.

The implementation phase starts only once those pre-defined conditions have been verified, except in the limited cases where this proposal provides that implementation provisions apply without an Industrialisation Notice.

The link between these two phases is the **Industrialisation Notice**. The Industrialisation Notice is the formal act by which the entity entrusted to coordinate deployment confirms that the conditions

prescribed in this proposal for the relevant ATM functionality or sub-functionality have been met. It is issued, as a default rule, at the level of each ATM functionality or sub-functionality. Where the activation of the regulated implementation timeframes of one ATM functionality or sub-functionality explicitly depends on the prior industrialisation of another, the issuance of the relevant Industrialisation Notice is made conditional upon the prior issuance of the Industrialisation Notice for the upstream functionality or sub functionality.

The Industrialisation Notice is issued only once 3 cumulative conditions have been verified.

First, the standardisation prerequisites identified in the CP2 Industrialisation Plan for the relevant ATM functionality or sub-functionality have been completed, including the required standards, specifications or equivalent technical artefacts. These artefacts must be sufficiently stable to support harmonised implementation and to avoid placing implementation obligations on stakeholders against an evolving technical baseline.

Second, the enabling regulatory actions identified in the CP2 Industrialisation Plan, including those assigned to EASA or other competent regulatory actors, have been completed where relevant. These actions may include certification specifications, acceptable means of compliance, guidance material, rulemaking inputs or other regulatory instruments required to enable safe and consistent implementation.

Third, the entity entrusted to coordinate deployment has verified that there is a credible path to market availability within the regulated implementation timeframe. This verification is based on formal implementation commitments covering at least 30% of a representative early mover footprint for the relevant ATM functionality or sub-functionality, defined as a percentage of the applicability area set out in this proposal, and supported by documented procurement, transition or service entry plans. The purpose of this third condition is to confirm that the products, services or operational capabilities required for implementation can realistically become available within the timeframe during which implementing stakeholders would be required to comply.

The timing structure of this proposal is therefore expressed through maximum durations, not through fixed implementation dates. The first maximum duration concerns the industrialisation phase, namely the period within which the three conditions for issuing the Industrialisation Notice must be met. As a default rule, and except where specific provisions apply for SDO 8 and SDO 6, the Industrialisation Notice is issued no later than three years after the entry into force of this CP, provided that the three cumulative conditions have been met. This maximum duration does not prevent earlier issuance where the conditions are fulfilled earlier.

Where the Industrialisation Notice is not issued within the maximum duration provided for in this proposal, the corresponding implementation provisions do not take effect. Implementing stakeholders are therefore not subject to the related regulated implementation obligations unless and until the European Commission initiates a revision of this Common Project to address the situation. This mechanism protects implementing stakeholders from obligations that would otherwise arise without the required industrialisation conditions having been fulfilled.

The second maximum duration concerns the implementation phase. Once the Industrialisation Notice has been issued, the regulated implementation timeframe opens for the relevant ATM functionality or sub functionality. Unless otherwise provided, this timeframe does not exceed five years from the issuance of the Industrialisation Notice. During that period, the implementation provisions set out in

this proposal become enforceable in accordance with the implementation approach specified for the relevant ATM functionality or sub-functionality.

Two implementation approaches are used. Under the classical implementation approach, the stakeholders concerned must complete implementation within the regulated implementation timeframe opened by the Industrialisation Notice.

Under the forward fit approach, the relevant CP2 requirements apply to new investments, major upgrades, new service entries or equivalent trigger points defined in the relevant provisions, so that the transition is aligned with investment and system renewal cycles. The forward fit approach is used where implementation is closely dependent on foundational industrialisation or major system upgrade cycles, notably for SDO 8 and SDO 6 on the ground, and for the airborne elements of SDO 5 and SDO 7. Where SDO 8 is concerned, the forward fit logic is complemented by the principle that, from RP5 onwards, new major ATC system upgrades are not eligible for recovery through en-route charges unless they support the SDO 8 transition, while allowing the continued operation and maintenance of non-compliant architectures under the transitional arrangements provided for in this proposal.

There are limited cases where specific obligations apply without being triggered by an Industrialisation Notice. These cases have been identified in the relevant ATM functionality or sub-functionality provisions and are justified by the maturity, nature or implementation logic of the concerned obligation.

The first case concerns ATM sub-functionality F.1, relating to SATCOM L-band connectivity. Since no additional standardisation or enabling EASA action is required, the implementation timeframe is triggered directly by the entry into force of this Common Project.

The second case concerns the obligation of the CNS Programme Manager under ATM sub-functionality F.3 to publish an updated datalink capacity study for the period 2035+ by the date specified in the relevant provisions. This is a preparatory obligation supporting the industrialisation logic. It does not trigger or replace the regulated implementation timeframe for ATSPs, which remains subject to the relevant Industrialisation Notice.

The third case concerns the economic and transition-planning measures under ATM functionality G.1. These measures apply from RP5 onwards, or sufficiently in advance of the preparation of RP5 performance plans where expressly provided, to align transition plans, major ATC system upgrade decisions, cost-recovery eligibility and restructuring measures with the SDO8 transition. This does not affect the certification-linked forward-fit obligations, which remain subject to the Industrialisation Notice and the corresponding maximum implementation timeframe.

All other ATM functionalities and sub-functionalities remain subject to the Industrialisation Notice logic set out in this section.

In the cases above, the applicable maximum durations and trigger points are set out directly in the relevant provisions of this proposal.

This sequencing model ensures that CP2 does not impose implementation obligations before the necessary industrialisation conditions exist, while also preventing open ended delay once those conditions have been met. It gives implementing stakeholders a clear protection mechanism, gives industry and service providers a credible path to market and service entry, and gives the entity

entrusted to coordinate deployment a concrete confirmation point for moving from preparation to enforceable implementation.

Finally, this model also derisks the timely adaptation of the technical regulatory framework, that is why the timely issuance of the Industrialisation Notice of each AF under this Common Project shall rely on the availability of a CONOPS that describes for EASA what the system or operation is intended to achieve and how it will function from the perspective of its users and stakeholders to allow the rulemaking activities to be carried out effectively and in time.

The specificities of this requirement for industrialisation will be further clarified with EASA in time for the finalisation of the CP2 proposal.

2.7 Inter-SDO dependencies

The deployment sequencing proposed in this proposal reflects the main dependencies identified between the ATM functionalities and sub-functionalities in scope of CP2. These dependencies have been considered in defining the sequencing of Industrialisation Notices, the choice between classical implementation and forward-fit approaches, and the alignment with major ATM system upgrade cycles.

Two SDOs play a foundational role in the CP2 architecture. SDO7 provides the future air-ground and ground-ground connectivity environment needed to support higher volumes of data exchange, multilink resilience and the progressive transition towards IPS. SDO8 provides the service-oriented and data-driven architecture needed to support modularity, interoperability, portability, interchangeability and future ATM service evolution. Together, SDO7 and SDO8 form the digital foundation on which the next phases of ATM modernisation will progressively build.

These dependencies do not all have the same effect. A direct dependency exists where the activation of the implementation timeframe for one ATM functionality or sub-functionality is made conditional on the prior industrialisation of another. An indirect dependency exists where a functionality can be implemented under its own timeframe, while its full performance benefits, scalability or future evolution are supported by the progressive deployment of another SDO.

The identified dependencies are illustrated in the figure 3 below.

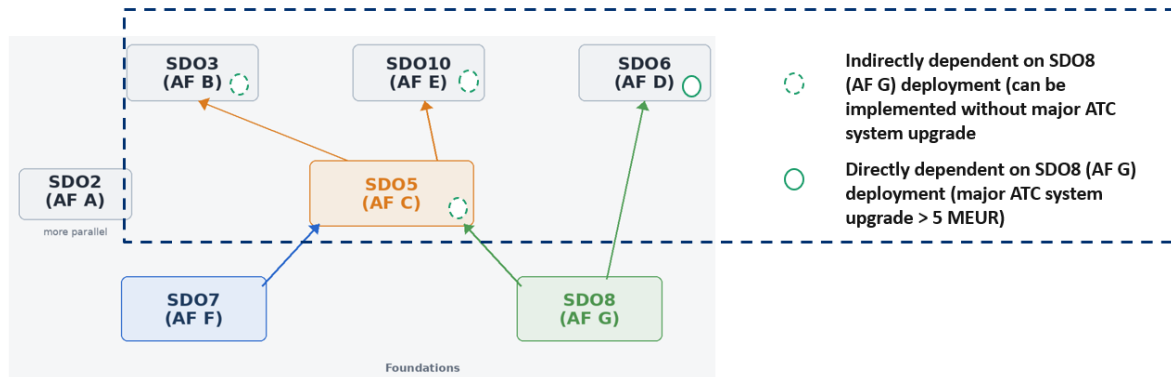


Figure 3: Inter-SDO dependencies

Figure 3 illustrates the distinction made in this proposal between direct and indirect dependencies. The main direct dependency identified concerns SDO 6 which depends on SDO 8. For this reason, the Industrialisation Notice for SDO 6 is conditional upon the prior issuance of the Industrialisation Notice for SDO 8.

SDO 5 has an indirect link with SDO 8, because some air traffic data services and ATM software functions relevant to TBO will progressively be implemented also within the service-oriented delivery model. This link does not prevent SDO 5 from being implemented under its own regulated timeframe. It means that the implementation of SDO 5 is framed so as to remain technically and operationally consistent with the progressive transition towards SDO 8.

SDO 5 also has a performance dependency on SDO 7. The deployment of ATS B2 services can start under SDO 5, but the full range of TBO benefits is supported by the availability of the future high-performance air-ground connectivity environment under SDO 7. In particular, SDO 7 supports the resilience, throughput and multilink capability needed to unlock the full operational value of TBO

The illustration below presents the deployment sequencing approach described in 2.6 for the two tracks identified, namely the one dependent on SDO 8 and the one not dependent on SDO 8.

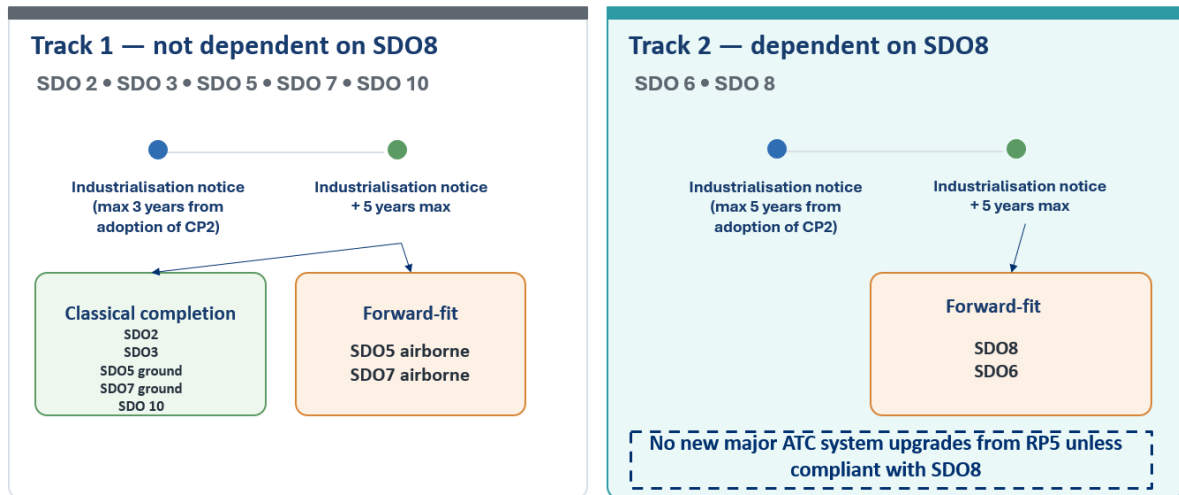


Figure 4: Deployment tracks

Figure 4 shows how this dependency analysis has been translated into two deployment tracks. The first track covers ATM functionalities that are not directly dependent on SDO 8 for the activation of their implementation timeframe. These functionalities may have links with SDO 7 or SDO 8 or may need to remain compatible with the target architecture, but their implementation is not made conditional on the prior issuance of the SDO 8 Industrialisation Notice unless expressly provided. The second track covers ATM functionalities directly linked to the SDO 8 transition. For SDO 8, the forward-fit logic applies to DPOs and ADSPs through certification-linked obligations, complemented by ANSP economic and transition-planning measures from RP5 onwards. SDO 6 is aligned with this track because its implementation depends on the relevant SDO 8-compliant technical capabilities, while its own operational obligations apply to ATSPs and the Network Manager under the specific provisions of ATM Functionality D.

2.8 Consultation process

The activities to develop the CP2 proposal include an open stakeholder consultation, scheduled from mid-May to mid-July 2026. It allows all stakeholders, including those not directly involved in drafting the proposal, to familiarise themselves with CP2 and provide feedback.

The SESAR JU will leverage existing SDM, EUROCONTROL and EASA consultation processes to engage the broadest possible range of stakeholders and regulators. In addition, the SESAR JU liaises with its Governing Board and its States Representatives' Group and at the request of the Commission with Member States in the Single Sky Committee.

Following the closure of the consultation period and the consolidation of feedback received, the Proposal Development Team (PDT), and subsequently the Steering Group, will assess and discuss the input in preparation for final trade-offs, before finalising the CP2 proposal and submitting it to the Commission.

During the consultation period, the SJU will organise a workshop on the **Common Project 2 (CP2)**. The workshop will be an opportunity for stakeholders and regulators to:

- Help shape the content of the CP2 proposal: define priorities, investments and standards for the decade ahead.
- Explore the enablers of tomorrow's digital sky: discover how the new service delivery model, future air-ground connectivity, and Trajectory-Based Operations (TBO) will transform the way air traffic services are provided.
- Join the dialogue on how CP2 can help position Europe at the forefront of a safe, sustainable and secure connected global airspace.

The event will be open to Industry, Member States and institutional partners involved in the implementation of the European ATM Master Plan.

2.9 The military dimension

This proposal builds also on the contribution provided by the military stakeholders, represented at all levels of the CP2 governance. As stated in the ATM Master Plan, close civil-military collaboration is essential in delivering the Digital European Sky to the EU's future security and defence strategy in the air domain, ensuring the protection and effective use of the airspace.

In fact, while highlighting the importance to maintain this proposal at the right level of technology-agnostic scope, in order to facilitate interoperability with military systems, the military stakeholders consider the Member States responsible for ensuring that operations of aircraft referred to in Article 2(3), point (a), of EASA Basic Regulation (EU) 2018/1139 have due regard for the safety of navigation of all other aircraft. Member States may, however, decide to apply EASA Basic Regulation (EU) 2018/1139 to those aircraft.

The military expect to incur substantial indirect costs linked to technological evolution of civil ATM systems, to ensure appropriate civil-military cooperation as well as their security and defence missions. Those costs are related to military roles as Air Navigation Service Provider (ANSP), Airport Operator, Airspace Users and ATC connection with Air Defence Command and Control.

Also, the military acknowledge that, particularly in the current geopolitical context, the ATM modernisation envisaged through this proposal represents an opportunity to support military air mobility and resilience.

The following two accommodations apply to all the AFs/sub-AFs where military are involved:

1. Without prejudice to art. 2.3 of EASA Basic Regulation (EU) 2018/1139, Member States may decide to apply all or part of this proposal to those subject to article 2.3.
2. However, as a condition for the implementation of the SESAR solutions, Air Traffic Service Providers and other relevant civil stakeholders shall ensure that the operational environment, systems, and procedures in scope of this proposal retain the capability to safely and efficiently accommodate State aircraft, not affected by this proposal in accordance with EASA Basic Regulation (EU) 2018/1139.

3 DIGITALISATION AND DATA SERVICE ENHANCEMENTS

This chapter describes the “Technological ATM Functionalities” contained in this CP2 proposal.

3.1 ATM Functionality F Transition towards high performance of air-ground connectivity (multilink) [SDO 7]

This ATM functionality aims to implement the future European air-ground communication environment, built around a common European backbone, to enable performance-driven datalink communications in support of ATS performance requirements and, in particular, the additional data exchanges needed for TBO (SDO 5). It builds on the datalink framework already established under Commission Implementing Regulation (EU) 2023/1770 and defines the additional coordinated industrialisation and implementation measures required to support the transition from the current VDL M2 / ATN B1 environment towards ATS B2 service provision, the managed transition from ATN/OSI to ATN/IPS, and a high-performance multilink environment.

In practical terms, this functionality is structured around six sub-functionalities:

- **F.1**, covering the availability of SATCOM B services in the relevant airspace for equipped aircraft.
- **F.2**, covering the common European backbone as the shared ground communication layer for ATS B2 and multilink operations.
- **F.3**, covering the future deployment of LDACS as a new terrestrial safety sub-network.
- **F.4**, covering HYCON as a means to use commercial non-safety links in combination with qualified safety links.
- **F.5**, covering aircraft connectivity requirements for multilink operations.
- **F.6**, covering the managed transition from ATN/OSI to ATN/IPS.

Existing air-ground datalink communications rely primarily on VDL M2. While this remains sufficient for non-TBO airspace, it is likely not to provide the quality of service, throughput or redundancy required to support future TBO implementation and air traffic increase in the European area. In addition, the need for end-to-end security, service mobility and scalability requires a transition towards IPS, which is the ICAO-agreed protocol for future air-ground data exchange.

The SDO 7 (AF F) architecture is therefore based on multilink orchestration. Within that architecture, HYCON supports the use of non-safety links in combination with qualified safety links, through administrative and/or performance-based policies, without compromising safety or performance. This architecture shall support a progressive transition towards multilink operations, including SATCOM B services for equipped aircraft, the future deployment of LDACS once the relevant industrialisation conditions are met, the related aircraft connectivity arrangements, and the managed transition towards ATN/IPS. Except for **F.1**, for which the implementation timeframe is triggered directly by the entry into force of this Common Project, the start of the regulated implementation timeframes under this functionality shall remain conditional upon the relevant Industrialisation Notice being issued. In addition, **F.3** includes a directly applicable preparatory obligation for the CNS Programme Manager to update the data link capacity study, as further specified in the corresponding sub-functionality. The aircraft forward-fit requirements under **F.5** shall not be activated unless at least one of the multilink enablers under **F.3** or **F.4** has passed the relevant Industrialisation Notice, so as to avoid a dual-link

transition based solely on VDL M2 and SATCOM that would not be consistent with the Master Plan. In addition, the progression towards the terrestrial transition under **F.3** requires that the CNS Programme Manager shall publish, no later than 31 December 2029 and update of the data link capacity study so as to confirm whether, in the post 2035 horizon, the required service conditions can still credibly be sustained through VDL M2 with a satisfactory level of performance at peak traffic times, or whether the transition to a new terrestrial layer becomes necessary to support the timely implementation of the European ATM Master Plan. Three types of service providers are considered:

- ADSPs providing ATS B2 datalink applications and services to ATSPs.
- CSPs providing the network ground infrastructure for A/G multilink communications (the backbone).
- CSPs providing the A/G subnetwork services connecting the aircraft with the backbone.

Both ADSPs and CSPs providing backbone or A/G subnetwork services over a protected sub-network need to be certified in accordance with Commission Implementing Regulation (EU) 2017/373. By contrast, CSPs providing A/G subnetwork communications over a non-protected frequency do not need to be certified.

The AF F (SDO 7) proposal has been developed to remain compatible with the FCAV White Paper, notably by supporting the transition towards B2 over IPS, and introducing the Hyperconnected ATM logic whereby commercial links may complement safety links.

Since the transition from ATN/OSI to ATN/IPS (**F.6**) represents a major industrial effort for Europe, undertaken primarily in the interest of long-term global interoperability, it would be disproportionate to trigger regulated implementation of that transition without credible commitment by at least one other major world region to implement a compatible transition. Specific safeguards are therefore included in this CP2 proposal to ensure that provisions under (**F.6**) remain subject to strict conditions of maturity, security and international convergence.

The following terminology used in this section:

- A/G sub-networks that operate over the AM(R)S or AMS(R)S spectrum, referred to as safety sub-networks.
- A/G sub-networks that operate outside the AM(R)S or AMS(R)S, referred to as commercial sub-networks.

3.1.1 ATM sub-functionality F.1 Transition towards high performance of air-ground connectivity (multilink) – A/G SATCOM over the L-band subnetwork component [DA 7.2]

3.1.1.1 Mandatory service requirements (for implementation)

Air Traffic Service Providers (ATSPs)

- ATSPs services shall establish contractual arrangements with one or more A/G subnetwork CSPs to ensure the availability, in the relevant airspace within the area of applicability where it provides ATC services, of SATCOM L-band connectivity capable of supporting the ATN B1 and ATS B2 services they provide for aircraft equipped to use that sub-network.

3.1.1.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

- None (SATCOM L-band technology is already standardised).

Actions for EASA

- None

3.1.1.3 Implementation target dates

<i>ATM sub-functionality F.1</i>	<i>Stakeholder</i>	<i>Target Implementation date</i>
	ATSPs	Entry into force of CP2 regulation + 1 year

Table 2: Implementation Timeline for Stakeholders under ATM Sub-Functionality F.1

3.1.1.4 Implementation applicability area

The ATSP managing the following ACCs: Karlsruhe, Munich, Maastricht, Reims, Marseille, Paris, Bordeaux, Brest, Geneva, Zurich, Rome and Milan.

3.1.1.5 Interdependencies with other CP2 functionalities

This sub-AF has no dependencies with other CP2 functionalities.

3.1.2 ATM sub-functionality F.2 Transition towards high performance of air-ground connectivity (multilink) – common European backbone [DA 7.1]

3.1.2.1 Mandatory service requirements (for implementation)

Air Traffic Service Provider (ATSPs)

- ATSPs shall make contractual arrangements with one or more ADSPs for the provision of ATS B2 services.
- ATSPs providing ATC services in the area of applicability shall, through a common procurement process, designate a single Common European ATN Backbone CSP (referred to hereinafter as the backbone CSP) in accordance with the requirements in the technical annex (Appendix G), depending on the availability of a compliant CSP.
- ATSPs shall establish a contractual arrangement with one or more A/G subnetwork CSPs to ensure the continued availability of the VDL M2 connectivity necessary to support the transition from the current datalink environment towards ATS B2 service provision through the common European backbone, including support for legacy and transition aircraft configurations where required.

ATM Data Service Provider (ADSP)

The following obligations are linked to AF G (SDO 8) level 2 services called “datalink services” and “datalink communications”.

- ADSPs providing ATS B2 datalink services shall establish contractual arrangements with the designated backbone CSP, depending on its availability.
- ADSPs providing ATS B2 datalink services shall ensure backward compatibility to ATN B1 datalink services.

Backbone CSP

- The backbone CSP shall allow the connection of all certified A/G subnetwork CSPs providing ATN B1 connectivity in the applicability area.
- The backbone CSP shall allow the connectivity of all certified A/G subnetwork CSPs providing ATS B2 services over the protected spectrum and support multilink data traffic routing through administrative and performance-based policies.
- The backbone CSP shall provide ATSPs and Network Manager with timely operational visibility of datalink communication status in real time including the datalink communication logs for communications between ADSPs and the backbone and data traffic from backbone and the A/G sub-networks.
- The backbone CSP shall support multilink data traffic routing through administrative and performance-based policies across the available links.
- The administrative and performance-based routing policies referred to in point e) shall be applied in accordance with the applicable standard and the relevant regulatory material.

- The backbone CSP shall ensure that HYCON supports the controlled use of the available links in accordance with the required performance, security and operational conditions laid down in the technical annex.

3.1.2.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

The following standards and technical artefacts shall be available and stable for the common European backbone:

- A European standard for the administrative and performance-based routing policies to be applied across the common European backbone and the associated air-ground communication environment, including the associated policy logic, performance inputs and operational application principles, subject to endorsement or recognition by EASA.
- Technical specifications for operational visibility, monitoring and logging functions necessary to support service monitoring, incident management and network oversight through the backbone.

Actions for EASA

- Develop or update the regulatory material required under Commission Implementing Regulation (EU) 2017/373 for the certification and oversight of backbone CSPs and other protected service providers involved in the common European backbone, as well as the regulation of ATS B2 ADSPs in Part-ADS.
- Clarify, through the relevant regulatory material, the respective roles, responsibilities and interfaces of ADSPs, backbone CSPs and certified A/G subnetwork CSPs operating over protected spectrum in the provision of ATS B2 services through the common European backbone.
- Develop or update the material required to support the coexistence of OSI and IPS configurations during the transition period, including the associated gateway and interoperability functions.
- Endorse or recognise the proposed standard for the administrative and performance-based routing policies to be applied across the common European backbone and the associated air-ground communication environment, including the related policy logic, performance inputs and operational application principles, and reflect it as appropriate in the relevant regulatory material.
- Prepare the regulatory and certification material necessary to support the transition towards the future backbone-based architecture, including any consequential updates required to maintain consistency with Commission Implementing Regulation (EU) 2023/1770 and the applicable certification framework.

3.1.2.3 Implementation target dates

Stakeholders that are required to implement this sub-functionality are the Air Traffic Service Providers, the ATM Data Service Providers, the Backbone CSP and the A/G subnetwork CSPs.

<i>ATM sub-functionality</i> F.2	<i>Stakeholder</i>	<i>Target Implementation date</i>
	Air Traffic Service Providers, ATM Data Service Providers, Backbone CSP and A/G subnetwork CSPs	Date of issuance of the Industrialisation Notice + 5 years

Table 3: Implementation Timeline for Stakeholders under ATM Sub-Functionality F.2

3.1.2.4 Implementation applicability area

Area of applicability of AF C.1.

3.1.2.5 Interdependencies with other CP2 functionalities

Dependencies with AF C.1 and AF G.1.

3.1.3 ATM sub-functionality F.3 Transition towards high performance of air-ground connectivity (multilink) – A/G subnetwork component LDACS [DA 7.3]

3.1.3.1 Mandatory service requirements (for implementation)

CNS Programme Manager

- The CNS programme manager shall publish, no later than 31 December 2029, an updated data link capacity study assessing whether, in the post 2035 horizon, the service requirements laid down in the technical annex can still credibly be sustained exclusively through VDL M2 with a satisfactory level of performance, or whether the new terrestrial sub-network becomes necessary to support the target multilink resilience architecture.

ATSPs

- ATSPs shall establish a contractual arrangement with one or more CSPs to ensure the availability of the new terrestrial datalink over the L-band (LDACS) in the airspace of that ATSU within the area of applicability where they provide ATC services

3.1.3.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

The following standards and technical artefacts shall be available and stable:

- The LDACS communication technical standards and ICAO standards required for ground and airborne implementation of the terrestrial safety sub-network.
- The standards and technical artefacts required for integration of LDACS into the multilink architecture.
- The standards required for the LDACS airborne antenna and related interfaces, and where relevant including compatibility with future hybrid terrestrial-satellite evolutions where applicable.

Actions for EASA

EASA shall:

- Develop the regulatory material required for the certification and oversight of A/G subnetwork service provision over LDACS.

3.1.3.3 Implementation target dates

ATM sub-functionality F.3	Stakeholder	Target Implementation date
	CNS Programme Manager	Capacity Study update published no later than 31 December 2029
	ATSPs	Date of issuance of the Industrialisation Notice + 5 years

Table 4: Implementation Timeline for Stakeholders under ATM Sub-Functionality F.3

3.1.3.4 Implementation applicability area

The ATSP managing the following ACCs: Karlsruhe, Munich, Maastricht, Reims, Marseille, Paris, Bordeaux, Brest, Geneva, Zurich, Rome and Milan.

Where the updated study published by the CNS Programme Manager concludes that a broader geographical scope is necessary to meet the service requirements laid down in the technical annex, the European Commission may consider a revision of the implementation applicability area for this sub-functionality

3.1.3.5 Interdependencies with other CP2 functionalities

Dependencies with AF F.2 and C.1.

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3.1.4 ATM sub-functionality F.4 Transition towards high performance of air-ground connectivity (multilink) –A/G subnetwork component HYCON [DA 7.3]

3.1.4.1 Mandatory service requirements (for implementation)

Backbone CSP

- The backbone CSP shall allow the connectivity of all subnetwork CSPs providing ATS B2 services through the Hybrid Communications Network technology (HYCON) using A/G commercial sub-networks.

3.1.4.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

The following standards and technical artefacts shall be available and stable:

- The HYCON communication technical standards and ICAO standards required for the ground and airborne implementation of HYCON.
- The standards and technical artifacts required for the integration of HYCON into the multilink architecture.

Actions for EASA

EASA shall:

- Develop the regulatory material required for the certification and oversight of A/G subnetwork service provision over HYCON.

3.1.4.3 Implementation target dates

ATM sub-functionality F.4	Stakeholder	Target Implementation date
	Backbone CSP	Date of issuance of the Industrialisation Notice + 5 years

Table 5: Implementation Timeline for Stakeholders under ATM Sub-Functionality F.4

3.1.4.4 Implementation applicability area

Same as AF C.1.

3.1.4.5 Interdependencies with other CP2 functionalities

Dependencies with AF F.2 and C.1.

3.1.5 ATM sub-functionality F.5 Transition towards high performance of air-ground connectivity (multilink) –Aircraft multilink connectivity [DA 7.3]

3.1.5.1 Mandatory service requirements (for implementation)

The following obligations define the additional aircraft connectivity requirements necessary to support the multilink environment under SDO 7 and are without prejudice to the aircraft equipment and operating rules already applicable under Commission Implementing Regulation (EU) 2023/1770.

The regulated implementation timeframe for this sub-functionality shall not be activated unless at least one of the multilink enablers under F.3 or F.4 has passed the relevant Industrialisation Notice.

Airspace Users (AU)

- Aircraft filing an IFR flight plan to operate in the area of applicability above FL 245 shall be equipped with at least two A/G subnetwork technologies, of which at least one shall be a terrestrial sub-network over the protected spectrum.
- For the duration of the flight in the area of applicability of AF C.1, ATS B2-equipped IFR aircraft shall maintain the following active A/G sub-networks connections:
 - i. Aircraft equipped with only one A/G subnetwork technology shall maintain one active connection.
 - ii. Aircraft equipped with two or more A/G subnetwork technologies shall maintain at least two active connections.
- Aircraft with individual certificate of airworthiness issued on or after the target implementation date shall be equipped with a radio and airborne router capable of supporting administrative and performance-based prioritisation policies for link selection, as well as capability to monitor link health and manage multilink operations. ATS B2 data traffic shall be prioritised over any other data traffic.
- State aircraft are exempt from the equipage requirements laid down in this sub-functionality.
- Equipped state aircraft shall be subject to the same connection requirements as non-state aircraft when flying GAT, unless an exemption is justified by the security requirements of the mission.

3.1.5.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

The following standards and technical artefacts shall be available and stable:

- The standards and technical artefacts required for airborne multilink connectivity supporting the SDO 7 architecture.
- The standards and technical artefacts required for the airborne router, including link-health monitoring and multilink management functions.

- The standards and technical artefacts required for implementation in aircraft of the applicable administrative and performance-based prioritisation policies for link selection.

Actions for EASA

EASA shall:

- Develop or update the certification material required to support the implementation of the multilink architecture and corresponding administrative and performance-based routing policies.

3.1.5.3 Implementation target dates

ATM sub-functionality F.5	Stakeholder	Target Implementation date
	AU	Date of issuance of the Industrialisation Notice + 5 years (forward fit) <i>Note, the Industrialisation Notice for this sub-AF shall not be issued unless the Industrialisation Notice for either F.3 or F.4 has been issued.</i>

Table 6: Implementation Timeline under ATM Sub-Functionality F.5

3.1.5.4 Implementation applicability area

Area of applicability of AF C.1 above FL 245.

3.1.5.5 Interdependencies with other CP2 functionalities

Dependencies with AF F.2, F.3, F.4 and C.1.

3.1.6 ATM sub-functionality F.6 Transition towards high performance of air-ground connectivity (multilink) – transition to IPS

3.1.6.1 Mandatory service requirements (for implementation)

Backbone CSP

- The backbone shall support connectivity to both IPS and OSI aircraft and to the corresponding ATS B2 ADSP configurations for as long as OSI-equipped aircraft remain in operation within the applicability area.

A/G subnetwork CSPs

- A/G subnetwork CSPs shall provide connectivity to both OSI and IPS aircraft, where relevant to the sub-network concerned, for as long as OSI-equipped aircraft remain in operation within the applicability area.

Airspace Users

- Aircraft with first type certificate on or after the target implementation date shall be equipped to support ATN/IPS for ATS B2 data traffic.

3.1.6.2 Performance and technical harmonisation requirements (for industrialisation)

Actions for standardisation

The following standards and technical artefacts shall be available and stable:

- The aviation IPS profiles required to support ATS B2 communications.
- The standards and technical artefacts required for ATN/IPS end to end interoperability.
- The standards and technical artefacts required for OSI to IPS gateway interoperability and coexistence.
- The technical artefacts required to ensure that the ground architecture can continue to accommodate OSI-equipped aircraft while enabling forward-fit transition to IPS for new aircraft.

Existing standards requiring completion or update include in particular:

- EUROCAE ED-262A “Technical Standard of Aviation Profiles for Internet Protocol Suite”.
- EUROCAE ED-315 MASPS on ATN-IPS end-to-end interoperability and certification.
- The standard for IPS-OSI gateway (e.g. AEEC 858 Part 2).

Actions for EASA

EASA shall:

- Develop or update the regulatory and certification material required to support the transition from ATN/OSI to ATN/IPS.
- Develop or update the material required to support coexistence of OSI and IPS configurations, including the associated gateway and interoperability functions.

- Confirm, through the relevant regulatory material, that the transition to ATN/IPS can be implemented without introducing unacceptable cyber-security vulnerabilities and without degradation of the required service performance laid down in the technical annex.
- Develop or update the regulatory and certification material required to ensure that the transition from ATN/OSI to ATN/IPS does not introduce unacceptable cyber-security vulnerabilities, including as regards gateway functions, coexistence arrangements, authentication, integrity protection and the relevant security architecture of the transition environment.
- Confirm, through the relevant regulatory material, the conditions under which the transition to ATN/IPS remains compatible with the objective of global interoperability.
- Prepare the regulatory and certification material necessary to support any consequential updates to the applicable aircraft, airspace use and service provision framework required for the transition to ATN/IPS.

CP2 supports the long-term direction of global interoperability, while ensuring that the transition remains proportionate, preserves backward accommodation of OSI-equipped aircraft already in service, and is implemented through forward-fit requirements for new aircraft. It is therefore essential that the Industrialisation Notice for this sub-functionality may only be issued once credible commitment by at least one other major world region to implement a compatible transition towards ATN/IPS within comparable timeframes has been confirmed, so as to ensure that the resulting effort remains proportionate in light of the expected global interoperability benefits.

3.1.6.3 Implementation target dates

ATM sub-functionality F.6	Stakeholders	Target Implementation date
	Backbone CSP A/G Subnetwork CSPs AU	Date of issuance of the Industrialisation Notice + 5 years

Table 7: Implementation Timeline for Stakeholders under ATM Sub-Functionality F.6

3.1.6.4 Implementation applicability area

Area of applicability of AF C.1.

3.1.6.5 Interdependencies with other CP2 functionalities

Dependencies with AF F.1, AF F.2, AF F.3, AF F.4, AF F.5 and AF C.1.

3.2 ATM Functionality G Service-oriented delivery model (Data-driven and cloud-based) [SDO 8]

3.2.1 ATM sub-functionality G.1 Service-oriented delivery model (Data-driven and cloud-based) [DA 8.1]

Note: The distinction between ATSP and ADSP is introduced in this proposal because SES2+ already provides the regulatory foundation for these roles, and CP2 simply carries this logic into the operational and technical reality of the new service delivery model. This distinction is not intended to separate organisations. SES2+ does not require structural separation (unbundling) and CP2 does not change this. An ANSP may choose to act only as an ATSP, to provide both air traffic services and Air Traffic Data services within one organisation or also provide Air Traffic Data services to other ATSPs, provided it meets the applicable safety and regulatory requirements, as well as the requirements set out in CP2.

The illustrations and supporting text below clarify key definitions and context for the obligations set out in this sub-functionality. In the final proposal, this explanatory material may be relocated or streamlined to ensure a more harmonised presentation across ATM functionalities.

The new service delivery model

The new service delivery model shall progressively enhance flexibility, scalability, resilience and innovation through a service-oriented design, with open and standardised interfaces of ATM technical services, and of the ATM software functions implemented within, based on platform agnostic application programming interface technologies and virtualisation.

This architecture shall enable faster innovation, a higher degree of automation and seamless integration of new services.

The architectural approach underpinning this Regulation aims to support increased modularity, interoperability and scalability of ATM/ANS systems, thereby facilitating the integration of new functionalities and technological evolution over time. The architectural approach, at the level of the ATM software functions, is technology-neutral and does not prescribe specific implementation solutions or operational configurations. The operational and technical arrangements for the implementation of ATM/ANS functionalities shall be defined and implemented by the relevant ATM/ANS provider as part of the ATM/ANS functional system, in accordance with the applicable regulatory requirements and supported by appropriate safety assessments.

For the purpose of this Regulation, the implementation of a service-oriented architecture in ATM/ANS shall rely on the identification and progressive deployment of modular software-based constituents, hereafter referred to as ATM technical services operating within ATM/ANS computing environments defined by appropriate technical characteristics and execution conditions, supporting the realisation of ATM/ANS functionalities.

ATM technical services represent architectural building blocks that implement specific elements of ATM/ANS functionalities through defined interfaces and associated non-functional characteristics

(including performance, interoperability, cybersecurity and scalability). They are intended to support modularity, reuse and controlled evolution of ATM/ANS systems.

An ATM technical service may implement one or more ATM software functions. An ATM software function (Level 2) is a technology-neutral functional building block of the target ATM/ANS architecture, representing a defined set of operational or support capabilities contributing to the execution of ATM/ANS functionalities. ATM software functions form part of the logical decomposition maintained under the UADSF coordination process and may be refined over time through standardisation and industrial development.

ATM technical services do not constitute ATM/ANS services in the regulatory sense, nor do they represent complete operational functions. In accordance with Commission Implementing Regulation (EU) 2023/1768 and the applicable conformity assessment framework, ATM/ANS functions are realised through the integration of hardware and software constituents, forming part of an ATM/ANS functional system.

Accordingly, ATM technical services shall be understood as software elements that contribute to such functions, and which are always deployed and used in combination with other system components within a complete operational environment.

In accordance with Commission Implementing Regulation (EU) 2023/1768, the applicable compliance mechanism (including certification, declaration or other applicable procedures) shall be determined based on the characteristics and intended use of the equipment, as defined in the Regulation and its associated Detailed Specifications, Acceptable Means of Compliance and guidance material.

ATM technical services, as software-based constituents, do not constitute regulated items on a standalone basis, but may contribute to functions implemented within ATM/ANS equipment subject to the applicable regulatory requirements.

Nothing in this Regulation shall be interpreted as modifying the scope of Commission Implementing Regulation (EU) 2023/1768 or Commission Implementing Regulation (EU) 2023/1769, the applicable conformity assessment processes.

In the new service-oriented delivery model, ATM technical services are treated as service-oriented software services with service contracts. This includes interfaces, behaviour, functional extendibility¹ and non-functional properties. ATM technical services can be hosted in virtual machines and/or containerised in ATM/ANS computing platforms compliant with the COTS cloud platform profile.

¹ Extendibility is the capability of an L2 ATM software function to evolve by adding new functional features, data attributes, message elements (e.g. optional fields in structured schemas such as XML), or interface operations through controlled, versioned mechanisms, while preserving backward compatibility, contractual stability, and deterministic behaviour for existing consuming services.

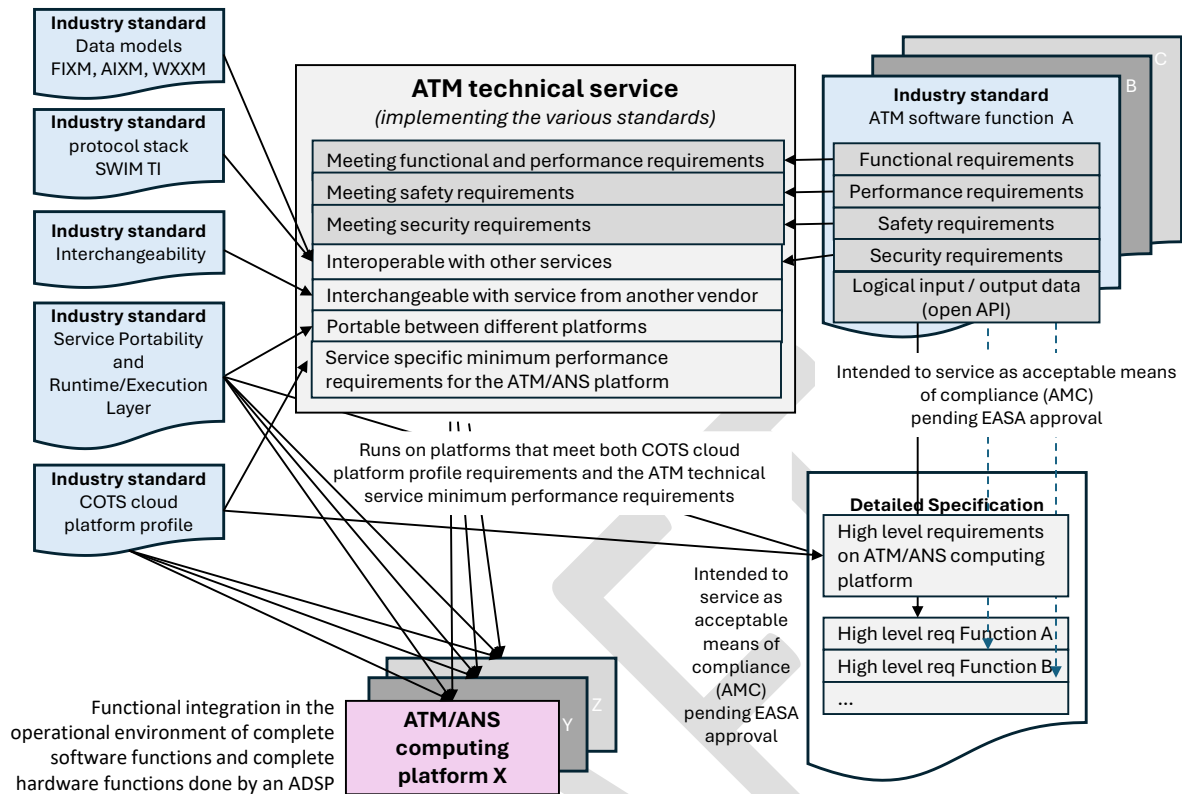


Figure 5: Relationship between an ATM technical service implementation and the industry standards

Interoperability, portability and interchangeability concern properties of ATM technical services and ATM software functions that are essential to enable multi-vendor deployment, progressive industrialisation, and safe and efficient operation across heterogeneous ATM/ANS computing environments. The definitions below establish the common understanding of these properties for the purposes of CP2.

- **Interoperability** of an **ATM software function** (within the ATM technical service), is the ability to seamlessly exchange data and to enable the sharing of information and knowledge with another ATM software function (either within the same ATM technical service or with an ATM software function in another ATM technical service), including one provided by another vendor. This is achieved by platform agnostic interoperability through open and standardised interfaces, for example by building on SWIM standards and/or application programming interfaces (API).
To balance stability with innovation, interoperability shall be achieved through a dual-principle interface strategy:
 - The “Core” (mandatory): All services must implement the standardised core interface, which defines the essential data elements required for safety-critical operations (as defined by the applicable industry standard, e.g., FIXM Core). Compliance with the Core Layer is binary (pass/fail) to ensure guaranteed minimum connectivity.
 - The “Extension” (flexible & optional): Services are permitted to implement extensions to exchange additional, advanced data that exceeds the core standard. The interface design must ensure that if a receiving service does not support a specific extension, it

can still process the core data without failure (backward compatibility). Any interface used in an extension must be documented and made available.

- **Portability of an ATM technical service** is the degree to which an ATM technical service, understood as a software-based constituent of an ATM/ANS system, can be transferred from one execution environment to another and continue to operate as intended without requiring redesign. Portability is achieved through the use of standardised interfaces, data models, packaging and deployment specifications, configuration rules, and clearly defined execution conditions, enabling adaptation to different technical and organisational contexts primarily through configuration rather than redevelopment. Such execution conditions shall include, where relevant, the characteristics of the computing environment in which the ATM technical service is intended to operate, including operating systems, middleware, hardware and network resources. Portability should support deployment across different compliant computing environments and, where applicable, across different organisational environments. The concept of portability is a technical property and does not in itself determine the regulatory treatment of a transfer or change, which remains subject to the applicable regulatory framework.
- **Interchangeability of an ATM software function** (within the ATM technical service) in a multi-vendor context, means that an ATM software function can be replaced by another ATM software function, from another vendor without requiring significant changes to the surrounding system's architecture, interfaces, configuration, or business logic. In case an ATM technical service covers more than one ATM software functions, it means that any ATM software function within that technical service can be replaced by the same ATM software function from another vendor without requiring significant changes to the ATM technical service and its surrounding system's architecture, interfaces, configuration, or business logic. Interchangeability requires the preservation of functional behaviour as well as relevant non-functional properties, including performance, safety, security and resilience, and is supported by common standards for interoperability and portability. This includes the interfaces between ATM software functions within one ATM technical service in case an ATM technical service covers more than one ATM software functions. Interchangeability does not imply "zero-integration" replacement from a (EU) 373 perspective. The replacement of an ATM software function within an ATM technical service remains subject to the applicable verification, validation and regulatory compliance processes, which are determined within the EASA framework.

Foundational industry standards shall be developed in a joint effort from manufacturing industry, ANSPs and the applicable standardisation organisation, that define how interoperability (data models and protocol stack), portability and interchangeability are to be achieved. These standards provide a technical reference for the design and implementation of ATM technical services. The use of such standards for regulatory compliance or attestation purposes remains subject to acceptance by EASA.

In the context of SDO8, certification and oversight shall be applied in a layered manner reflecting the respective responsibilities of DPOs, ADSPs and ATSPs. Compliance of the ATM technical service with the applicable SDO8 requirements shall be demonstrated through the applicable attestation framework, while compliance of the integrated operational deployment shall be demonstrated through the corresponding provider oversight framework.

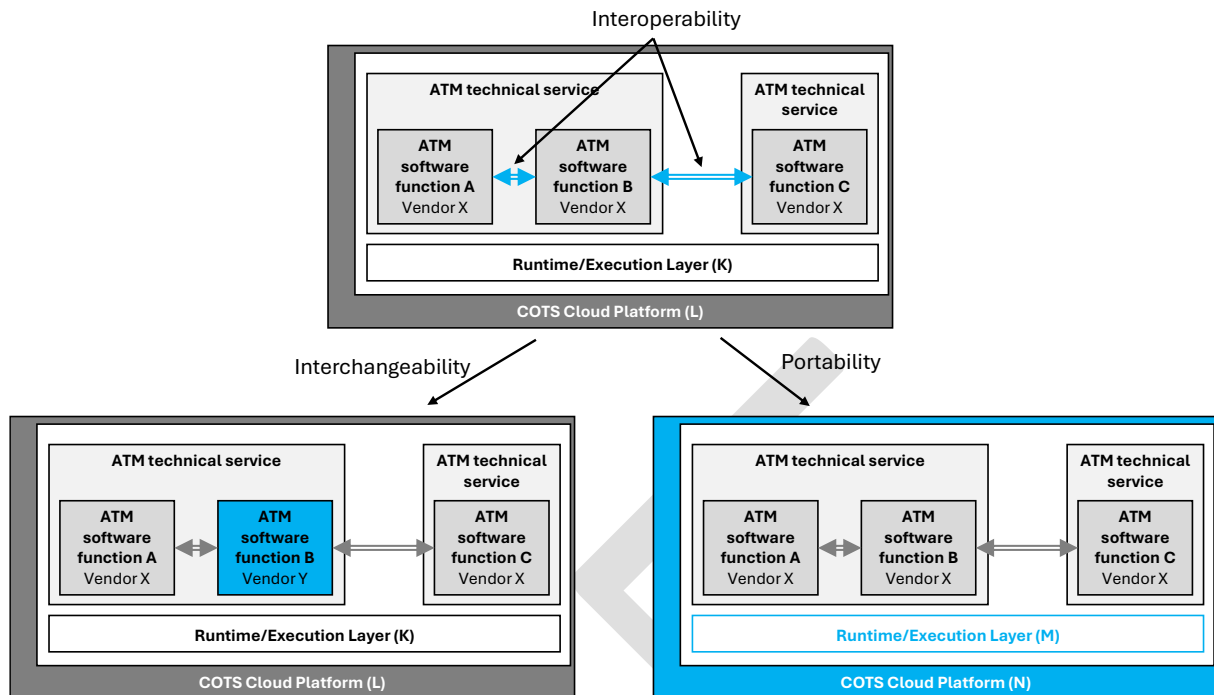


Figure 6: The notions of interoperability, interchangeability and portability

Mapping of ATM technical service and ATM software function (L2) to the EASA regulatory framework

When mapped against the EASA Detailed Specifications, an **ATM software function (L2)** can be either a DS complete software function, or a DS incomplete software sub-function.

During the evolution of the standard of an ATM software function (L2), it may initially be assessed by EASA as an Acceptable Means of Compliance (AMC) to a DS incomplete sub-function. However, as the ATM software function (L2) standard matures over time, the DS incomplete sub-function may be promoted to become a DS complete function with the standard as AMC, should it be acceptable to EASA.

Technical integration of incomplete DS software sub-functions is to be done by a DPO for the targeted environment (within the existing framework of 2023/1768), while functional integration in the operational environment of **DS complete software functions** and **DS complete hardware functions** shall be done by an ADSP. The latter may require an update of (EU) 2017/373 into a new Part ADS to address this.

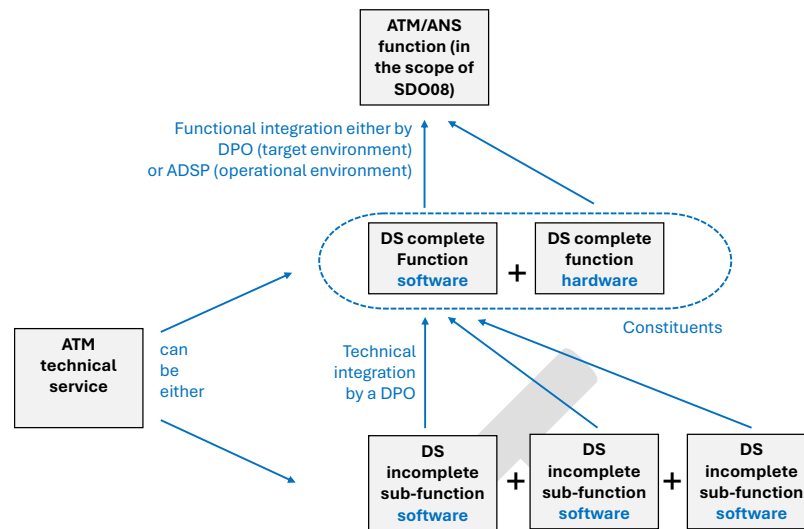


Figure 7: Mapping to the EASA regulatory framework

Where ATM technical services are implemented as part of ATM/ANS equipment within the scope of Commission Implementing Regulation (EU) 2023/1768, the applicable conformity assessment provisions shall apply to the equipment, including its hardware and software constituents.

Note that there is no one-to-one mapping between the L1/L2 services on the one hand and the DS functions/subfunctions on the other hand. The reason lies in the fact that the functional breakdown into L1/L2 services is governed by Industry for standardisation purposes, and the acceptance of the industry standards as Acceptable Means of Compliance to the Detailed Specifications is a decision to be made by EASA. Timing and criteria for the two breakdowns may differ.

Air traffic data service provider

The new service delivery model builds upon the notion of air traffic data service providers (ADSPs) as per Commission Implementing Regulation (EU) 2024/2803, where air traffic data service (ADS) are defined as services consisting in the collection, aggregation and integration of operational data from providers of surveillance, meteorological and aeronautical information services and network functions, and from other relevant entities generating operational data, and the provision of processed data for air traffic control and air traffic management purposes.

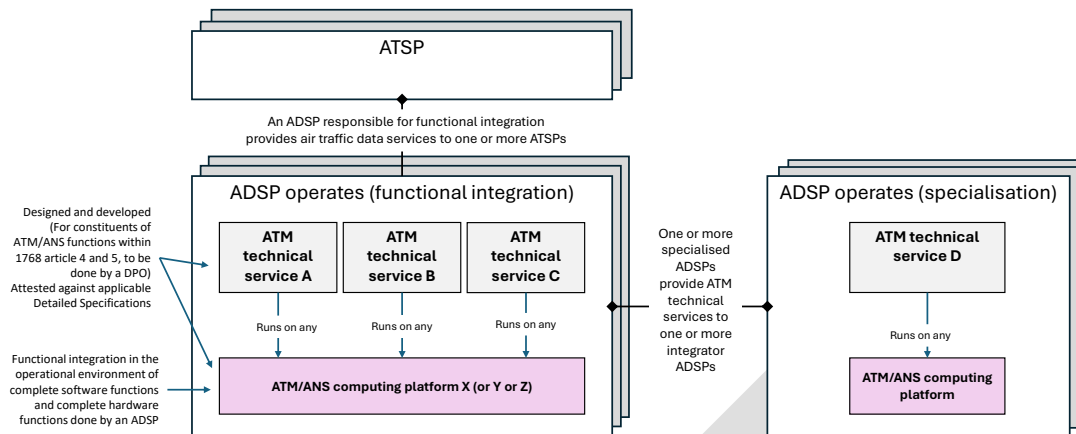


Figure 8: Relationship between ADSPs and ATSPs

An ADSP is therefore an organisation that provides one or more air traffic data services. The technical implementation of these air traffic data services shall comply with the principles of the new service delivery model.

ADSPs shall obtain and maintain certification under the Union certification framework established pursuant to Commission Implementing Regulation (EU) 2024/2803 and its implementing provisions.

A Coordination and Facilitation Framework for an evolving reference architecture

Within the entity entrusted with the coordination of the deployment of CP2 (including maintenance of the deployment programme which shall include the planning and monitoring of industrialisation and implementation milestones), a Union-level coordination and facilitation framework for air traffic data services - hereinafter referred to as the **Union Air Traffic Data Services Framework, UADSF** - shall be established to support structured collaboration between all relevant stakeholders.

The UADSF shall operate on the basis of a consensus driven approach and shall organise, with a leading technical role for DPOs with contribution from ADSPs and ATSPs, the preparation and regular maintenance of both the target (e.g. the targeted decomposition into ATM software functions) and the reference (e.g. the actual status of service decomposition at any given moment) framework for the new service-oriented delivery model. The UADSF shall maintain and adapt the target range of services over time as the shared target for industrialisation and implementation.

In doing so, the UADSF shall support convergence on ATM software functions, the promotion of a competitive multi-vendor market and reduced time to deployment, and their standardisation implications, their interdependencies and associated (safety) criticality, and shall provide references to the applicable foundational industry standards. This shall also include common data structures and metadata, and, where necessary for interoperability and portability, a catalogue of standardised Application Programming Interfaces (API). The UADSF shall also facilitate the integration and delivery of deployment activities in support of compliance with CP2 obligations.

The UADSF shall not replace or prejudice the design authority of DPOs with regard to the systems and constituents they design and produce, nor extend to product specific design choices or detailed

implementation solutions and shall not duplicate existing regulatory or standardisation coordination mechanisms, including those for CP1.

The targeted decomposition into ATM software functions (L2) is provided in the Appendix G (see Technical Annex

Figure 18: Target L2 breakdown (target framework) and their initial assessment of criticality) and is to be maintained through the UADSF coordination process.

This breakdown is technology-neutral and does not distinguish between hardware and software elements. It shall not be interpreted as defining standalone software artefacts or as limiting the implementation of functions to their software components.

The elements identified in the breakdown represent functional building blocks at different levels of granularity, which may be combined and implemented as part of ATM/ANS equipment in accordance with the applicable EASA regulatory framework.

Where relevant, multiple elements of the breakdown may be integrated into a single functional system or equipment item to form a meaningful and compliant attestation perimeter.

The breakdown is evolutive in nature and may be refined over time, in particular through standardisation activities and industry developments, while ensuring continued consistency with the applicable regulatory requirements and Design Specifications.

Translation into requirements

This ATM Functionality does not impose standalone requirements on communication, navigation or surveillance infrastructure. The communication domain is addressed under SDO 7, while navigation and surveillance shall evolve progressively in line with the transition to data centric and service-oriented architectures under SDO 8.

The allocation of requirements to DPOs, ADSPs and ATSPs is based on the following key principles:

- Full ATM system certification shall apply only to safety-critical ATM technical services falling within the scope of Article 4 of Commission Implementing Regulation (EU) 2023/1768, under the responsibility and oversight of EASA, in accordance with applicable detailed specifications, AMC and guidance material
- Identification of applicable performance requirements on ATM/ANS computing platforms compliant with the standard on the COTS cloud platform profile and compliant with the standard on Service Portability and Runtime/Execution Layer, that host safety-critical ATM technical services, including those related to their intended execution conditions (such as performance, resource usage, management and monitoring capabilities), shall be performed and taken into account as part of the design and development of the service.
- ATM technical services, that are compliant with the industry standard on Service Portability and Runtime/Execution Layer, can be installed on different ATM/ANS computing platforms compliant with the COTS cloud platform profile, including runtime/execution environments, without re-development, provided that certified interfaces, service boundaries and verified

non-functional constraints remain unchanged. Such deployment remains subject to attestation in accordance with the applicable regulatory framework.

- ATM technical services, being modular and replaceable, can be upgraded or replaced if the compatibility with the platform is ensured via standardised interfaces and data models together with defined execution conditions that remain unchanged. Any modification or replacement remains subject to attestation in accordance with the applicable regulatory framework, considering the characteristics and impact of the change on the ATM/ANS system.
- Changes to ATM/ANS computing platforms compliant with the standard on the COTS cloud platform profile and compliant with the standard on Service Portability and Runtime/Execution Layer, used to host ATM technical services, shall be subject to attestation in accordance with the relevant regulatory framework. The impact of such changes on the ATM/ANS system, shall be evaluated as part of the applicable change management and compliance processes.
- ADSP responsibilities shall include accountability for performance, quality, integrity, authenticity, security of the provided ATM technical services (incl. processing chain up to service interfaces). This includes verification of performance requirements of ATM/ANS computing platforms compliant with the standard on the COTS cloud platform profile and compliant with the standard on Service Portability and Runtime/Execution Layer, that are hosting safety- services, by an ADSP.
- Pan-European and/or cross-national-border service provision of air traffic data services shall be ensured in compliance with national and Union data sovereignty requirements, while enabling competent authorities to retain the necessary oversight and access in accordance with Union law.
- Harmonisation of FHA/Safety guidance to ensure a coherent approach between (EU) 2023/1768 and (EU) 2017/373. This is needed to ensure consistency and avoid overlap regarding the safety assurance provided by DPOs and ADSPs/ATSPs and assessed by NCAs and EASA.
- Pending adoption and applicability of a future Part-ADS under (EU) 2017/373, oversight of ADSP activities continues under existing 2017/373 provisions as determined by the national competent authority. Upon adoption of Part-ADS, transition will follow the EC/EASA decision ensuring continuity of approvals.

Certification-linked forward fit obligation for DPOs and ADSPs

- The issuance of the Industrialisation Notice for SDO 8 no later than five years after the entry into force of this CP shall trigger a forward fit implementation period for ATM technical services and air traffic data services falling within the scope of SDO8. Within that period, and in any event no later than 5 years from the date of issuance of the Industrialisation Notice, compliance with the applicable SDO 8 requirements shall become a condition as applicable under Union law for the certification, declaration, approval, continued certification, continued approval, or continued oversight acceptance of:
 - a) ATM technical services and related major new baselines subject to Commission Implementing Regulation (EU) 2023/1768; and
 - b) air traffic data services and associated service integration arrangements subject to the Union certification framework established pursuant to Commission Implementing Regulation (EU) 2024/2803 and its implementing provisions.

- For the purposes of this Common Project, applicable SDO 8 requirements shall mean the relevant CP2 obligations, together with the technical artefacts, certification specifications, detailed specifications, acceptable means of compliance, guidance material, and recognised industry standards referenced or adopted under the applicable Union certification and oversight framework.
- For the avoidance of doubt, the forward fit obligation shall apply not only to first certification, declaration, approval or entry into service, but also to any major new release, substantial upgrade, material renewal, significant change, or sequence of related changes that, taken together, alter the functional scope, service baseline, certification basis, deployment architecture, or continued operational use of the relevant ATM technical service or air traffic data service arrangement.
- For air traffic data services and associated service integration arrangements, the application of the forward fit obligation to ADSPs shall take due account of the availability, for the relevant scope, of the pre-requisites identified in the relevant Industrialization notice. The assessment of ADSP compliance shall take account of the transition plan of the ANSP concerned and the applicable industrialisation status under CP2. This shall not extend the forward fit implementation period.
- Accordingly, after the expiry of that forward fit implementation period, no new ATM technical service, no major new release or substantially upgraded baseline thereof, and no new or materially renewed air traffic data service arrangement falling within the scope of SDO 8 shall be placed on the market, certified, approved, integrated into operational use, or maintained in certified service unless it complies with the applicable SDO8 requirements.

3.2.1.1 Mandatory requirements (for implementation)

ANSP economic and transition-planning obligations:

- a) Each ANSP concerned shall prepare, maintain and update annually its own transition plan for the progressive withdrawal of non SDO 8 compliant systems and functionalities covered by SDO 8, aligned with its procurement cycle, investment cycle and major upgrade opportunities. The first version of that transition plan shall be made available sufficiently in advance of the preparation of RP5 performance plans, and no later than 2028. The transition plan shall be submitted to the entity entrusted with the coordination of CP2 deployment for review of its consistency with the CP2 Deployment Programme, including the planning and monitoring of industrialisation and implementation milestones. Annual updates shall not be used to defer measures already identified in the transition plan, except where such deferral is duly justified on grounds of safety, service continuity, cybersecurity, availability of standards, legal compliance, or demonstrated lack of industrial availability.
- b) The transition plan shall aim at the earliest feasible completion of the SDO 8 transition. Without prejudice to the applicability and enforceability of the relevant CP2 provisions the transition to SDO 8 shall in all cases be completed by each ANSP no later than date of issuance of the Industrialisation Notice + 10 years.
- c) The transition plan shall also specify, for each relevant scope of service, whether the ANSP intends to act only as an ATSP, or also as an ADSP, and where relevant whether it intends to

rely on another certified ADSP, and shall set out the corresponding sequencing of certification, service integration, procurement, migration and withdrawal steps.

- d) From the beginning of RP5, no new major ATC system upgrade falling within the scope of SDO 8 shall be eligible for recovery through en-route charges unless it demonstrably supports the SDO 8 transition. For the purposes of this sub functionality, a major ATC system upgrade shall be deemed to support the SDO8 transition only where it is identified in, and consistent with, the transition plan of the ANSP concerned, where that transition plan has been positively reviewed by the entity entrusted with the coordination of CP2 deployment for consistency with the CP2 Deployment Programme, and where the investment either: a) directly enables the deployment, integration, migration or safe entry into service of SDO 8 compliant ATM technical services or air traffic data services; or b) is strictly necessary to preserve safety, service continuity, cybersecurity or legal compliance pending compliant migration, replacement or integration, provided that it is limited to what is necessary for that purpose, that no less extensive compliant or transition-enabling measure was reasonably available at the time of the investment decision, and that it does not create new long term dependency on non-compliant architecture beyond what is foreseen in that transition plan. During the period ending 5 years after the date of issuance of the Industrialisation Notice, any major ATC system upgrade relating to systems and functionalities within the scope of SDO 8 shall be permitted only as part of the transition path defined in the transition plan of the ANSP concerned and subject to the conditions set out in this paragraph.
- e) Major ATC system upgrade shall mean an acquisition, development, replacement, upgrade or leasing of fixed assets with a lifetime value greater than EUR 5 million in real terms. Functionally linked or sequential interventions forming part of a single upgrade strategy shall be assessed together.
- f) In preparing performance plans from RP5 onwards, ANSPs should identify in the transition plan of the ANSP concerned the restructuring measures necessary for the orderly withdrawal, replacement or migration of SDO 8 non-compliant systems and functionalities covered by SDO 8. Where ANSPs seek recovery of the associated costs through charges, they should reflect those costs in their performance plans under the applicable Union performance and charging framework, with a clear justification of their link to that transition plan, the assets concerned, the timing of withdrawal or replacement, and the resulting migration path. Such restructuring costs may include, where applicable, asset write offs linked to the implementation of that transition plan. The residual book value of non-compliant legacy systems should not, in itself, constitute sufficient justification for delaying restructuring measures necessary for the timely transition to SDO 8. Any residual book value linked to non-compliant legacy systems that are to be withdrawn under the transition plan should be dealt with by the time the SDO 8 transition is completed, and in any event no later than the date of issuance of the Industrialisation Notice + 10 years.

Design and Production Organisations (DPOs)

- g) ATM technical services shall be interoperable with other ATM technical services, including those provided by other vendors and/or operated by an ADSP, by complying with the applicable interoperability standard.

- h) ATM technical services implementing one or more ATM software functions shall be designed and produced to support interchangeability of an ATM software function with an ATM software function of another DPO implementing the same core functionality of the ATM software function, by complying with the applicable standards on interoperability, portability and interchangeability, including implementation of open and standardised interfaces between ATM software functions within an ATM technical service.
- i) The portability of ATM technical services across ATM/ANS computing platforms shall be demonstrated against the applicable industry standard on the COTS cloud platform profile and the standard on Service Portability and Runtime/Execution Layer.
- j) ATM technical services shall meet the minimum requirements defined in the industry standard for the corresponding ATM software function. This includes minimal functional, minimal performance, safety, security and logical input/output requirements.
- k) Where ATM technical services are used as part of a certified safety-critical system, the associated safety assurance material provided by the DPO shall be compliant with the standard on the European harmonised safety assurance.
- l) A DPO shall demonstrate that for those ATM technical services for which corresponding standards on software functions are endorsed by EASA as Acceptable Means of Compliance to the Detailed Specifications, these services comply with those standards as part of the attestation process.
- m) A DPO shall demonstrate that the ATM/ANS computing platform shall comply with the standard on COTS cloud platform profile and the standard on Service Portability and Runtime/Execution Layer whilst also complying with the applicable safety regulatory framework.

ATM Data Service Providers (ADSP)

- n) ADSPs shall obtain and maintain certification under the Union certification framework established pursuant to Commission Implementing Regulation (EU) 2024/2803.
- o) Each ADSP shall be accountable for the performance, quality, integrity, authenticity and security of the air traffic data services it provides including the processing of operational data and the software that renders information for ATSPs.
- p) ADSPs shall provide their air traffic data services in a modular and replaceable manner using ATM technical services, provided that at least two such ATM Technical services are available, ensuring that those services can be upgraded or extended without requiring changes to other ATM technical services it interfaces with, provided interfaces and performance requirements remain unchanged. ADSPs shall operate their ATM technical services on ATM/ANS computing platforms that are compliant with the standard on COTS cloud platform profile and the standard on Service Portability and Runtime/Execution Layer.
- q) Operating the ATM/ANS computing platform is the responsibility of the ADSP. ADSPs shall ensure the deployment of portable, interoperable and interchangeable ATM technical services

provided within the Union, including the ability to migrate ATM technical services, and exchange operational data without dependency on specific vendors, technologies or hosting locations, while preserving data integrity and security.

- r) ADSPs shall maintain continuous compliance with the applicable certification specifications and oversight mechanisms and shall implement the relevant service integration, migration, renewal and withdrawal steps in accordance with the transition plan of the ANSP concerned. For air traffic data services and associated service integration arrangements falling within the scope of SDO 8, implementation shall take due account of the availability, for the relevant scope, of compliant ATM technical services made available under the applicable Union certification and attestation framework.
- s) For systems and functionalities within the scope of SDO 8, ADSPs shall ensure that, from 5 years after the date of issuance of the Industrialisation Notice, any new service integration or major new baseline is based on compliant ATM technical services.
- t) ADSPs shall make available to ATSPs, as end-users of the service, and to competent authorities, specifications of the operational capabilities for the ATSP, including technical performance levels, service boundaries, applicable service level agreements and corresponding safety assurance material.
- u) ADSPs providing cross border services shall ensure that the processing, storage and exchange of operational data comply with applicable national and Union data sovereignty requirements, and that competent authorities retain oversight and access in accordance with Union law. For state-sensitive/confidential information, data exchange across borders shall require bilateral arrangements per TEU Art 4(2) and shall be controlled via contractual data classification, storage location, access control and audit provisions.

Air Traffic Service Providers (ATSP)

- v) Air traffic service providers shall ensure that ATM systems and supporting services are used in accordance with approved operational procedures, including those related to human-machine interaction, and in compliance with the applicable regulatory framework. The data stored, processed, provided and displayed, and the hardware and software used to process that data, including technical performance, shall fall under the responsibility of the certified ADSP.
- w) ATSPs shall ensure that the air traffic data services they rely on are delivered under the responsibility of one ADSP responsible for functional integration holding a valid ADSP certificate issued under the Union framework established pursuant to Commission Implementing Regulation 2024/2803. An ANSP may meet this requirement by providing these services itself as a certified ADSP or by relying on one ADSP responsible for functional integration, supported, where relevant, by other certified providers.
- x) Sovereignty and data-protection provisions shall apply. Cross-border sourcing of air traffic data services shall be permitted where compliant with Union certification and national data-sovereignty requirements.

- y) ATSPs shall assess, and where operationally and legally feasible, pursue coordination with at least one other ATSP in the sourcing of one or more air traffic data services², with the aim of establishing shared or federated arrangements that enhance interoperability, efficiency and resilience. Such cooperation shall comply with Union certification requirements and national data-sovereignty provisions.
- z) ATSPs shall implement the relevant migration, withdrawal and operational transition measures in accordance with the transition plan of the ANSP.
- aa) For systems and functionalities within the scope of SDO 8, ATSPs shall ensure that, from 5 years after the date of issuance of the Industrialisation Notice, any new system entry into operational use or major new baseline is compliant with the applicable SDO 8 requirements.

3.2.1.2 Performance and technical harmonisation requirements (for industrialisation)

The enablement of SDO 8 under this Common Project shall rely on a structured combination of standardisation, rulemaking support and regulatory instruments. In the near term, harmonisation and enablement shall be primarily supported through instruments such as standards, certification specifications, guidance material, and a dedicated SDO 8 rulemaking support concept of operations (CONOPS). These instruments are intended to provide early regulatory clarity support demonstration activities and enable the progressive adaptation of the EASA regulatory framework without requiring immediate changes to binding regulation.

For the purpose of SDO 8, the CONOPS as rulemaking support shall provide a structured description of how the target service delivery model is intended to operate in practice, including the roles of the actors, the main service interactions, the expected deployment configurations, focusing at the assumptions and constraints strictly relevant for safety, interoperability and oversight. At the same time, the extent to which these instruments alone can support the full service-oriented delivery model shall be explicitly assessed. Where limitations are identified, the need for regulatory evolution, including potential updates to Commission Implementing Regulation (EU) 2017/373, shall be examined in order to ensure long term legal certainty, clarity of responsibilities, and consistency with SES2+.

Standards development to establish the foundations for the new service delivery model

Service Portability and Runtime/Execution Layer (of ATM technical services):

Relevant Standards Development Organisations, in coordination with the European ATM Standards Coordination Group and in consultation with industry stakeholders and EASA shall develop a standard and technical specifications for the Service Portability and Runtime/Execution Layer in a service-oriented architecture for ATM/ANS systems that complies with the EASA DS requirements on ATM/ANS computing platforms. These standards and corresponding specifications aim to enable ATM technical services, understood as software-based constituents of ATM/ANS systems, to be packaged,

² This could be either by two ATSPs sharing one ADSP responsible for functional integration, or their ADSP(s), responsible for functional integration, sharing one or more ADSPs specialised in specific air traffic data services.

deployed, integrated and operated consistently across different execution environments. In this context, ATM technical services shall be designed to be:

- Packaged, deployed and executed in a consistent manner across different compliant computing environments
- Integrated and migrated between development, testing and operational environments
- Operated and maintained in a predictable and controlled manner throughout their lifecycle

Such a standard and corresponding specifications may include, and for the standardisation body to elaborate and complement as needed:

- Service packaging and deployment specifications,
- Interface definitions and interoperability provisions,
- Configuration and dependency management rules,
- ATM technical services management and monitoring capabilities
- Execution conditions describing the technical characteristics and constraints of the target environments,
- Operational and lifecycle management considerations.

These elements support the ability of ATM technical services to operate across different computing and organisational environments primarily through configuration rather than redevelopment.

The use of such a standard and corresponding specifications for regulatory compliance purposes remains subject to their assessment and acceptance within EASA regulatory framework.

COTS cloud platform profile:

Relevant Standards Development Organisations, in coordination with the European ATM Standards Coordination Group and in consultation with industry stakeholders and EASA shall develop a standard and corresponding technical specifications on functional and performance requirements for a COTS and cloud-technology based capability in a service-oriented architecture that complies with the EASA DS requirements on ATM/ANS computing platforms.

The COTS cloud platform profile denotes a set of defined technical characteristics, interfaces and execution conditions describing the computing environments in which ATM technical services are intended to operate. It may include, and for the standardisation body to elaborate and complement as needed:

- Characteristics of computing platforms and supporting platform services as well as specific runtime environments,
- Interface specifications and interoperability provisions between platform and Runtime/Execution Layer,

- Configuration constraints and dependency management conditions relevant to the execution of ATM technical services
- Operational and lifecycle considerations related to the use of the platform environment.

The COTS cloud platform profile provides a common technical reference that shall be used:

- By design organisations when developing and testing ATM technical services
- By service providers when integrating and operating such services within their target environments

The COTS cloud platform profile supports consistency of implementation across different computing environments, both in the target environment and operational environment, and may facilitate the portability of ATM technical services, when combined with standardised interfaces and defined execution conditions. It is a technical construct and does not in itself determine regulatory classification, certification or the acceptability of changes, which remain subject to the applicable regulatory framework.

The use of such a standard for regulatory compliance purposes remains subject to their assessment and acceptance within the applicable EASA regulatory framework.

Network:

Relevant Standards Development Organisations (SDO), coordinated with the EASCG, together with DPOs, ADSPs/ATSPs and EASA to develop appropriate guidance for safety assurance for non-functional network requirements, in a safety critical environment. This includes ATSP-ADSP and ADSP-ADSP connectivity.

European harmonised safety/software assurance (for an ATM software function):

Relevant Standards Development Organisations (SDO), coordinated with the EASCG, together with DPOs, ADSPs/ATSPs to develop an industry standard for European harmonised safety/software assurance, including for the development of ATM software functions, in consultation with and with the involvement of EASA to ensure its suitability for use as an Acceptable Means of Compliance (AMC) within the applicable regulatory framework.

It shall ensure a European harmonised safety risk management and investigate the need to apply FDAL/SWAL methodology: Varying the levels of safety assurance and function/software design, depending on the safety criticality (e.g. FDAL), the use of a common model, differentiating core functionality and local variability, define cross-platform validation methodology.

Interoperability (of an ATM software function):

Relevant Standards Development Organisations (SDO), coordinated with the EASCG, together with DPOs, ADSPs/ATSPs and EASA to develop/adopt an industry standard on platform agnostic interoperability through open and standardised SWIM-compliant interfaces for ATM software functions, ATM technical services and ATM industry products, that can be referred in the reference architecture, that prescribes how interoperability at the level of an ATM software function is to be achieved. Separate standards shall be adopted for data models (e.g. AIXM, FIXM, WXXM) and technical protocol stacks (e.g. SWIM TI).

Interchangeability (of an ATM software function):

Relevant Standards Development Organisations (SDO), coordinated with the EASCG, together with DPOs, ADSPs/ATSPs and EASA to develop an industry standard on interchangeability for the development of ATM software functions, that can be referred in the reference architecture, that prescribes how interchangeability is to be achieved. The standard shall be coherent with the standard on COTS cloud platform profile and the standard on Service Portability and Runtime/Execution Layer and the standard on Interoperability.

Iterative standards development of ATM software functions:

Relevant Standards Development Organisations (SDO), coordinated with the EASCG, together with DPOs and ADSPs/ATSPs to develop an industry standard for each of the ATM software functions (L2), in accordance with the service prioritisation roadmap, governed under the UADSF. The initial target standardisation roadmap is provided in the Technical Annex.

Standards development shall be done in consultation with and with the involvement of EASA to ensure its suitability for use as an Acceptable Means of Compliance (AMC) within the applicable regulatory framework.

An industry standard for an ATM software function shall define:

- A minimum viable core standard: the strict data model required for basic service substitution (Interchangeability).
- An extensibility mechanism: a standard protocol for declaring and discovering optional capabilities (e.g., a "service capability statement").

Note that an ATM technical service will have to

- Comply with the standard(s) for the implemented ATM software function(s) (functional, performance, safety, security)
- Comply with the standards for Interoperability, Interchangeability and Service Portability and Runtime/Execution Layer that applies to all ATM software functions.
- Be operable on any platform that complies with the standard on the COTS cloud platform profile.

Actions for EASA

Harmonisation of FHA/Safety guidance to ensure a coherent approach between (EU) 2023/1768 and (EU) 2017/373. This is needed to ensure consistency and avoid overlap regarding the safety assurance provided by DPOs and ADSPs/ATSPs and assessed by NCAs and EASA.

Update of (EU) 2017/373

- Development of a new Part-ADS in the regulatory framework of Commission Implementing Regulation (EU) 2017/373, and common performance and safety requirements for ADSPs consistent with the SES2+ Basic Regulation Implementation and the provisions in CP2.

Update of Detailed Specifications

- Define high-level requirements about the ATM/ANS computing platform and include in an update of the Detailed Specifications, once approved by EASA as Acceptable Means of Compliance (AMC), the standard on COTS cloud platform profile and the standard on Service Portability and Runtime/Execution Layer as AMC.
- Iterative update of the functions identified in the Detailed Specifications to include as Acceptable Means of Compliance (AMC) the industry standards for the corresponding ATM software functions (and consequently for the ATM technical services implementing these functions) as they become available and have been approved by EASA as AMC.

3.2.1.3 Timeframes (covering both industrialisation and implementation)

Implementation target dates:

ATM sub-functionality G.1	Stakeholder	Target Implementation date
	DPOs and ADSPs / certification-linked forward fit consequences under the applicable Union framework	No later than the date of issuance of the Industrialisation Notice + 5 years
	ATSPs and ADSPs	Forward fit logic applies from the date of issuance of the Industrialisation Notice + 5 years onwards
	ANSP economic and transition-planning obligations	From RP5 onwards; transition to be completed no later than the date of issuance of the Industrialisation Notice + 10 years

Table 8: Implementation Timeline for Stakeholders under ATM Sub-Functionality G.1

3.2.1.4 Implementation applicability area

The requirements shall apply to ANSPs, ATSPs and ADSPs providing, and to DPOs placing on the market or making available, systems and services for en-route services in the airspace under the responsibility of the EU Member States. Last resort systems, used to clear the skies, are excluded from the requirements on the new service delivery model.

3.2.1.5 Interdependencies with other CP2 functionalities

SDO 8 provides the service-oriented architectural framework within which air traffic data services supporting SDO 5, SDO 6 and SDO 7 may progressively be implemented. This creates an architectural and service-integration dependency, without preventing those SDOs from progressing under their own implementation logic, except where a direct dependency is expressly identified in the relevant provisions, as for SDO 6.

DRAFT

4 OPERATIONAL INTEGRATION AND SERVICE ENHANCEMENTS

This chapter describes the ‘Operational integration and service enhancements’ ATM functionalities contained in this CP2 proposal.

They are:

- ATM Functionality A - Airport data services and integration with the network [SDO 2]
- ATM Functionality B - Dynamic airspace configuration [SDO 3]
- ATM Functionality C - Transformation to trajectory-based operations (TBO) [SDO 5]
- ATM Functionality D - Virtualisation of operation [SDO 6]
- ATM Functionality E - Enable innovative air mobility (IAM) and drone operations [SDO 10]

4.1 ATM Functionality A - Airport data services and integration with the network [SDO 2]

The ATM functionality A, “Airport data services and integration with the network”, aims to improve the integration of airport operational data into network planning and execution. It supports improved network predictability, more continuous capacity delivery at airports, safe and resilient operations, the accommodation of military and emerging operational needs, and the reduction of network-wide delays.

This functionality is structured around three sub-functionalities:

- **A.1**, covering the provision by European airports of predicted take-off times to the Network Manager for its use in slot allocation with the objective of improving traffic predictability and reducing the calculated take-off time (CTOT) volatility produced by late estimated (flight plan) off-block time (EOBT) updates.
- **A.2**, covering a direct airport-to-airport coordination process between the airport of destination (ADES) and the airport of departure (ADEP) to update (if possible) the target time of arrival (TTA) / target time over (TTO) of a related ATFM regulation and solve at the airport level a demand capacity balancing (DCB) issue.
- **A.3**, covering an earlier and improved information exchange between airport stakeholders and with the network manager.

4.1.1 ATM sub-functionality A.1 Connected regional airports [DA 2.1]

The ATM sub-functionality A.1 “Connected regional airports” aims to improve the connectivity between European airports with ATC service and the Network Manager (NM) thanks to the provision of departure planning information (DPI) messages based on target take-off times and a reduced set of

turnaround milestones compared to a full airport collaborative decision making (A-CDM) implementation.

Integrating European airports with ATC service into the network will enhance network predictability. It will enable reductions in en-route capacity buffers and the number of calculated take-off times (CTOTs) issued, leading to reduced air traffic flow management (ATFM) delays. Ground handler workload will also be reduced due to the automated predicted off-block time (POBT) and passenger boarding status provided by the local airport system. By enhancing predictability, this ATM sub-functionality will facilitate earlier and better planning of airport resources. It will bring local benefits (flexibility) to airports where the allocation of gates, stands, de-icing equipment, ground handling services, and runways/taxiways congestion can constrain operations during traffic demand peaks.

4.1.1.1 Mandatory service requirements (for implementation)

Airport Operator (AO) / Air Traffic Service Provider (ATSP):

Note: the following requirements shall be locally apportioned to airport operators or air traffic service providers given that their responsibilities might differ in each country/location.

- (a) The airport operator / air traffic service provider shall establish a common and collaboratively agreed airport rolling plan based on a limited list of agreed-event based A-CDM milestones (ATC flight plan activation (M1), take-off from outstation (M3), actual landing time (ALDT) (M6), actual in-block time (AIBT) (M7), actual off-block time (AOBT) (M15) and actual take-off time (ATOT) (M16))
- (b) The airport operator / air traffic service provider shall make available the airport rolling plan that will form the single source of airport operations information.
- (c) The airport operator / air traffic service provider shall calculate for each flight the estimated taxi-in time (EXIT), the estimated taxi-out time (EXOT) and the expected turnaround time.
- (d) The airport operator / air traffic service provider shall automatically calculate a predicted off-block time (POBT) based on aircraft event-based milestones defined in item (a) above and allow for manual updates of POBT by Airspace Users and Ground Handlers.
- (e) The airport operator / air traffic service provider shall calculate the target take-off time (TTOT) based on the POBT.
- (f) The airport operator / air traffic service provider shall distribute the target take-off time (TTOT) in a departure planning information (DPI) message to the network manager via NM B2B interfaces to increase the predictability of traffic demand.

Network Manager (NM):

- (g) The Network Manager shall be able to integrate validated departure planning information (DPI) from airport operators / air traffic service providers to update the respective flight trajectories.

4.1.1.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

The sub functionality requires the development of a new standard (i.e., Eurocontrol specification) for the exchange of departure planning information (DPI).

Update of ED-141A “Minimum Technical Specifications for Airport CDM Systems” and EUROCONTROL Specification for Airport Collaborative Decision Making (A-CDM) to reflect the specificities for Connected Regional Network Integrated airports: reduced milestones, message sets and data exchanges.

Actions for EASA

Update of ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS.GE.SoC: to cover the requirements of the ATM sub-functionality.

4.1.1.3 Implementation target dates:

Stakeholders that are required to implement the functionalities related to this sub-functionality include: Air Traffic Service Providers, Airport Operators and the Network Manager.

ATM sub-functionality A.1	Stakeholder	Target Implementation date
	Air Traffic Service Provider Civil	Date of issuance of the Industrialisation Notice + 5 years
	Airport Operator Civil	Date of issuance of the Industrialisation Notice + 5 years
	Network Manager	Date of issuance of the Industrialisation Notice + 5 years

Table 9: Implementation Timeline for Stakeholders under ATM Sub-Functionality A.1

Note: connected regional airports shall be implemented in waves of 5 to 6 airports per annum as far as validation with the network manager is concerned.

The priority order for implementation shall be in principle as follows:

- 1. The airports identified in AF A.1 being the Connected Regional Airports with IFR movements in 2025 between 60,000 and 150,000 that have Advanced ATC tower (AAT) starting with the highest number of movements in that group.*
- 2. The airports identified in AF A.1 being the Connected Regional Airports with IFR movements in 2025 between 60,000 and 150,000 that do not have Advanced ATC tower (AAT) starting with the highest number of movements in that group.*

The next wave will be the next highest priority group, and so on, until completion. This will alleviate implementation bottlenecks and will mitigate the risk of all airports trying to implement towards the end of the regulatory period.

The order of implementation will be defined in the SESAR Deployment Programme and updated as the implementation of the sub-functionality progresses.

4.1.1.4 Implementation applicability area

The implementation applicability area for this ATM sub-functionality covers airports with less than, or equal to, 150 000 annual IFR movements and more than, or equal to, 60 000 annual IFR movements (reference year traffic 2025); and no A-CDM implemented (by the end of 2025).

This sub-functionality applies to the following airports:

ICAO code	IATA code	Short name of airport	Full name of airport	State
EBCI	CRL	Charleroi/Brussels South	Brussels South-Charleroi Airport	Belgium
EDDK	CGN	Koeln/Bonn	Köln-Bonn Airport	Germany
EDDP	LEJ	Leipzig/Halle	Flughafen Leipzig/Halle	Germany
ELLX	LUX	Luxembourg/Luxembourg	Luxembourg-Findel International Airport	Luxembourg
ENBR	BGO	Bergen/Flesland	Bergen Airport	Norway
EPKK	KRK	Krakow/Balice	The John Paul II International Airport Krakow - Balice	Poland
GCLP	LPA	Gran Canaria	Aeropuerto de Gran Canaria	Canary Islands (Spain)
GCCR	ACE	Lanzarote	Aeropuerto de Lanzarote	Canary Islands (Spain)
GCTS	TFS	Tenerife Sur/Reina Sofia	Aeropuerto de Tenerife Sur	Canary Islands (Spain)
GCXO	TFN	Tenerife Norte	Aeropuerto de Tenerife Norte	Canary Islands (Spain)
LBSF	SOF	Sofia	Sofia Airport	Bulgaria
LCLK	LCA	Larnaka/Intl	Larnaka International Airport	Cyprus
LEIB	IBZ	Ibiza	Aeropuerto de Ibiza	Spain
LEVC	VLC	Valencia	Aeropuerto de Valencia	Spain
LEZL	SVQ	Sevilla	Aeropuerto de Sevilla	Spain
LFBO	TLS	Toulouse-Blagnac	Aéroport de Toulouse-Blagnac	France
LFML	MRS	Marseille-Provence	Aéroport Marseille Provence	France
LFSB	MLH	Bale-Mulhouse	EuroAirport Basel-Mulhouse-Freiburg	France
LGIR	HER	Iraklion/Nikos Kazantzakis	Heraklion International Airport	Greece
LGTS	SKG	Thessaloniki/Makedonia	Thessaloniki International Airport	Greece
LHBP	BUD	Budapest Liszt Ferenc International Airport	Budapest Ferenc Liszt International Airport	Hungary
LICC	CTA	Catania/Fontanarossa	Catania Fontanarossa Airport	Italy

LICJ	PMO	Palermo/Punta Raisi	Falcone e Borsellino Palermo Airport	Italy
LIPE	BLQ	Bologna/Borgo Panigale	Aeroporto G. Marconi di Bologna S.p.A.	Italy
LMML	MLA	Luqa Airport	Malta International Airport	Malta
LPFR	FAO	Faro	Faro Airport	Portugal (Madeira and Azores)
LPPR	OPO	Porto	Porto Airport	Portugal (Madeira and Azores)
LROP	OTP	Bucuresti/Henri Coanda	Henri Coanda International Airport	Romania

Table 10: Airports in Scope for ATM Sub-Functionality A.1

From the list above, those airports with A-CDM implemented and integrated with NM by the implementation target date of the regulation will de facto comply with the regulation.

4.1.1.5 Interdependencies with other CP2 functionalities

There is no interdependency with another ATM sub-functionality.

4.1.2 ATM sub-functionality A.2 Enhanced airport-NOP tactical planning [DA 2.2]

ATM sub-functionality A.2 “Enhanced airport-NOP tactical planning” aims to support better integration of European airports and the network via enhanced tactical planning and the airport-to-airport collaborative planning process. The sub-functionality consists of a direct coordination process between the airport of destination (ADES) and the airport of departure (ADEP). Its purpose is to resolve demand capacity balancing (DCB) issues at the destination airport before the airport-NOP process starts, and within the existing air traffic flow and capacity management (ATFCM) framework.

ATM sub-functionality A.2 is expected to improve performance across connected airports and the wider network by increasing predictability and optimising the use of ground and airspace resources, thereby enhancing overall network efficiency.

4.1.2.1 Mandatory service requirements

Airport Operator (AO) / Air Traffic Service Provider (ATSP):

Note: the following requirements shall be locally apportioned to airport operators or air traffic service providers given that their responsibilities might differ in each country/location.

- (a) When a DCB issue is identified at the airport of destination (ADES), ADES shall have the capability to trigger a collaborative airport to airport process with the airport of departure (ADEP) to update (if possible) the Target Time of Arrival (TTA) / Target Time Over (TTO) of a related ATFM regulation.
- (b) If the collaborative airport-to-airport process is successful, the airport of destination shall provide the desired TTA / TTO to the network manager.

Note: There are no new obligations for the Network Manager as the Network Manager (NM) confirmed that their current capabilities already support the implementation of this sub-functionality.

4.1.2.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

The sub functionality requires the development of a new standard (i.e., Eurocontrol specification) for the exchange of DPI.

The sub-functionality also requires a new standard describing the data exchanges required for the airport-to-airport coordination process.

Actions for EASA

Update of ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS.GE.SoC: to cover the requirements of the ATM sub-functionality.

4.1.2.3 Implementation target dates:

Stakeholders that are required to implement the functionalities related to this sub-functionality include: Air Traffic Service Providers and Airport Operators.

ATM sub-functionality A.2	Stakeholder	Target Implementation date
	Airport Operator Civil	Date of issuance of the Industrialisation Notice + 5 years
	Air Traffic Service Providers	Date of issuance of the Industrialisation Notice + 5 years

Table 11: Implementation Timeline for Stakeholders under ATM Sub-Functionality A.2

4.1.2.4 Implementation applicability area

The A.2 sub-functionality requirements apply to the following airports (using the number of IFR movements in 2025):

- Airports with 60 000 annual IFR movements or more.
- Airports with less than 60 000 annual IFR flight movements and more than 42 000 annual IFR movements that have Advanced ATC TWR in place (if not already included in the above lists).
- Airports with less than 60 000 IFR movements and more than 42 000 annual IFR movements, that have a peak season impact on the network with an average delay per flight of at least 5 minutes per departure.

The applicable airports are identified as follows:

- 1) Airports with more than 60 000 IFR movements in 2025:

ICAO code	IATA code	Short name of airport	Full name of airport	State
EBBR	BRU	Brussels/Brussels-National	Brussels Airport	Belgium
EBCI	CRL	Charleroi/Brussels South	Brussels South-Charleroi Airport	Belgium
EDDB	SXF	Berlin-Schoenefeld	Schoenefeld Airport	Germany
EDDF	FRA	Frankfurt/Main	Flughafen Frankfurt/Main	Germany
EDDH	HAM	Hamburg	Flughafen Hamburg	Germany
EDDK	CGN	Koeln/Bonn	Köln-Bonn Airport	Germany
EDDL	DUS	Duesseldorf	Düsseldorf International Airport	Germany
EDDM	MUC	Muenchen	Munich Airport	Germany
EDDP	LEJ	Leipzig/Halle	Flughafen Leipzig/Halle	Germany
EDDS	STR	Stuttgart	Flughafen Stuttgart	Germany
EFHK	HEL	Helsinki-Vantaa	Helsinki-Vantaa Airport	Finland
EHAM	AMS	Amsterdam/Schiphol	Amsterdam Airport	Netherlands

EIDW	DUB	Dublin	Dublin Airport	Ireland
EKCH	CPH	Kobenhavn/Kastrup	Copenhagen Airport	Denmark
ELLX	LUX	Luxembourg/Luxembourg	Luxembourg-Findel International Airport	Luxembourg
ENBR	BGO	Bergen/Flesland	Bergen Airport	Norway
ENGM	OSL	Oslo/Gardermoen	Oslo-Garnemoen Airport	Norway
EPKT	KTW	Katowice/Pyrzowice	Katowice Intl Airport - GTL S.A.	Poland
EPWA	WAW	Chopina W Warszawie	Warsaw Frederic Chopin Airport	Poland
ESSA	ARN	Stockholm/Arlanda	Stockholm-Arlanda Airport	Sweden
EVRA	RIX	Riga	Riga International Airport	Latvia
GCLP	LPA	Gran Canaria	Aeropuerto de Gran Canaria	Canary Islands (Spain)
GCCR	ACE	Lanzarote	Aeropuerto de Lanzarote	Canary Islands (Spain)
GCTS	TFS	Tenerife Sur/Reina Sofia	Aeropuerto de Tenerife Sur	Canary Islands (Spain)
GCXO	TFN	Tenerife Norte	Aeropuerto de Tenerife Norte	Canary Islands (Spain)
LBSF	SOF	Sofia	Sofia Airport	Bulgaria
LCLK	LCA	Larnaka/Intl	Larnaka International Airport	Cyprus
LEAL	ALC	Alicante-Elche	Aeropuerto de Alicante-Elche	Spain
LEBL	BCN	Barcelona/El Prat	Aeropuerto de Barcelona-El Prat	Spain
LEIB	IBZ	Ibiza	Aeropuerto de Ibiza	Spain
LEMD	MAD	Madrid/Adolfo Suarez Madrid-Barajas	Aeropuerto de Adolfo Suárez Madrid-Barajas	Spain
LEMG	AGP	Malaga/Costa Del Sol	Aeropuerto de Málaga - Costa del Sol	Spain
LEPA	PMI	Palma De Mallorca	Aeropuerto de Palma de Mallorca	Spain
LEVC	VLC	Valencia	Aeropuerto de Valencia	Spain
LEZL	SVQ	Sevilla	Aeropuerto de Sevilla	Spain
LFBO	TLS	Toulouse-Blagnac	Aéroport de Toulouse-Blagnac	France
LFLI	LYS	Lyon Saint-Exupery	Aéroport de Lyon-Saint Exupéry	France
LFML	MRS	Marseille-Provence	Aéroport Marseille Provence	France
LFMN	NCE	Nice-Cote D'azur	Aéroport Nice Côte d'Azur	France
LFPG	CDG	Paris-Charles De Gaulle	Aéroport de Paris-Charles de Gaulle	France
LFPO	ORY	Paris-Orly	Aéroport de Paris-Orly	France
LFSB	MLH	Bale-Mulhouse	EuroAirport Basel-Mulhouse-Freiburg	France
LGAV	ATH	Athinai/Eleftherios Venizelos	Athens International Airport	Greece
LGIR	HER	Iraklion/Nikos Kazantzakis	Heraklion International Airport	Greece
LGTS	SKG	Thessaloniki/Makedonia	Thessaloniki International Airport	Greece
LHBP	BUD	Budapest Liszt Ferenc International Airport	Budapest Ferenc Liszt International Airport	Hungary
LICC	CTA	Catania/Fontanarossa	Catania Fontanarossa Airport	Italy
LICJ	PMO	Palermo/Punta Raisi	Falcone e Borsellino Palermo Airport	Italy
LIMC	MXP	Milano/Malpensa	Milano Malpensa	Italy
LIME	BGY	Bergamo/Orio Al Serio	Milano Orio al Serio International Airport	Italy

LIML	LIN	Milano/Linate	Milano Linate	Italy
LIPE	BLQ	Bologna/Borgo Panigale	Aeroporto G. Marconi di Bologna S.p.A.	Italy
LIPZ	VCE	Venezia/Tessera	Aeroporto di Venezia Marco Polo	Italy
LIRF	FCO	Roma/Fiumicino	Aeroporto di Roma-Fiumicino	Italy
LIRN	NAP	Napoli/Capodichino	Aeroporto Internazionale di Napoli	Italy
LKPR	PRG	Praha/Ruzyne	Prague Airport	Czech Republic
LMML	MLA	Luqa Airport	Malta International Airport	Malta
LOWW	VIE	Wien-Schwechat	Vienna International Airport	Austria
LPFR	FAO	Faro	Faro Airport	Portugal (Madeira and Azores)
LPPR	OPO	Porto	Porto Airport	Portugal (Madeira and Azores)
LPPT	LIS	Lisboa	Lisbon Airport	Portugal (Madeira and Azores)
LROP	OTP	Bucuresti/Henri Coanda	Henri Coanda International Airport	Romania
LSGG	GVA	Geneva	Genève Aéroport	Switzerland
LSZH	ZRH	Zurich	Flughafen Zürich	Switzerland

Table 12: Airports with more than 60 000 movements in Scope for ATM Sub-Functionality A.2

- 2) Airports with less than 60 000 annual IFR flight movements and more than 42 000 annual IFR movements that have Advanced ATC TWR in place:

ICAO code	IATA code	Short name of airport	Full name of airport	State
GCFV	FUE	Fuerteventura	Aeropuerto de Fuerteventura	Canary Islands (Spain)
LEBB	BIO	Bilbao	Aeropuerto de Bilbao	Spain
LGRP	RHO	Rodos/Diagoras	Rhodes International Airport	Greece

Table 13: Airports with less than 60 000 annual IFR flight movements and more than 42,000 annual IFR movements that have Advanced ATC TWR in place

- 3) Airports with less than 60 000 IFR movements and more than 42 000 annual IFR movements, that have a peak season impact on the network with an average delay per flight of at least 5 mins/dep:

ICAO code	IATA code	Short name of airport	Full name of airport	State
LFPB	LBG	Paris-Le Bourget	Paris - Le Bourget Airport	France
LIRP	PSA*	Pisa/S. Giusto (Mil)	Pisa International Airport	Italy
LIRQ	FLR	Firenze/Peretola	Aeroporto di Firenze	Italy

Table 14: Airports with less than 60 000 IFR movements and more than 42 000 annual IFR movements, that have a peak season impact on the network with an average delay per flight of at least 5 minutes per departure

**PSA airport will be removed from the list in preparation of the final proposal, as per request from the Italian MAA. It has not been removed yet to keep the coherency with the CBA outcome.*

4.1.2.5 Interdependencies with other CP2 functionalities

For airports that are also subject to A.1, implementation of A.2 relies on the availability of the A.1 connected-regional-airport data exchange capability. For the remaining airports in scope of A.2, no direct interdependency with another ATM sub-functionality has been identified.

4.1.3 ATM sub-functionality A.3 AOP-NOP data enhancement to the strategic and pre-tactical planning phases [DA 2.2]

ATM sub-functionality A.3 “AOP-NOP data enhancement to the strategic and pre-tactical planning phases” aims to improve the integration of European airports and the network by enhancing both pre-tactical and strategic planning process. Enhancing data exchange between the NOP and network-connected airports is expected to increase the predictability of operations through earlier, more accurate, and more consistent information exchange among airport stakeholders and with the network.

On the airport side, the sub-functionality aims to improve the prediction of demand for airport services and airport regulations, enabling a more efficient allocation of ground resources and smoother operations, and helping to minimise unnecessary delays. On the network side, more accurate predictions of flight demand would support improved network planning and help preventing unnecessary regulations on the day of operations. Airspace Users will benefit from improved departure punctuality.

4.1.3.1 Mandatory service requirements

Airport Operator (AO)³:

- (a) The airport operator shall implement a mechanism to predict passenger demand and determine the best possible demand forecast on the airport processes.

Airspace Users (AU):

- (b) The Airspace User shall provide the Airport Operator with up to date flight schedule information, as soon as it is available or at an agreed update frequency, regarding the latest changes to flights (including, but not limited to, aircraft type changes or flight cancellations).

Note: There are no new obligations for the Network Manager as the Network Manager (NM) confirmed that the current capabilities already support the implementation of this sub-functionality.

4.1.3.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

The sub functionality requires the development of a new standard (i.e., Eurocontrol specification) for the exchange of departure planning information (DPI).

³ These obligations are to be allocated to the airport operator or the air traffic service provider depending on the local specificities.

This sub-functionality involves the use of passenger demand predictions in the pre-tactical phase (e.g., using machine learning prediction tools). Developing a standard for passenger demand prediction could benefit airport operators.

Actions for EASA

Update of ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS.GE.SoC: to cover the requirements of the ATM sub-functionality.

4.1.3.3 Implementation target dates:

Stakeholders that are required to implement the functionalities related to this sub-functionality include: Airport Operators and Airspace Users.

ATM sub-functionality A.3	Stakeholder	Target Implementation date
	Airport Operator Civil	Date of issuance of the Industrialisation Notice + 5 years
	Airspace Users	Date of issuance of the Industrialisation Notice + 5 years

Table 15: Implementation Timeline for Stakeholders under ATM Sub-Functionality A.3

4.1.3.4 Implementation applicability area

The A.3 sub-functionality requirements apply to airports in CP1 regulation, which are requested to implement an extended AOP in CP1:

ICAO code	IATA code	Short name of airport	Full name of airport	State
EBBR	BRU	Brussels/Brussels-National	Brussels Airport	Belgium
EDDB	BER	Berlin-Brandenburg	Brandenburg Airport	Germany
EDDF	FRA	Frankfurt/Main	Flughafen Frankfurt/Main	Germany
EDDH	HAM	Hamburg	Flughafen Hamburg	Germany
EDDL	DUS	Duesseldorf	Düsseldorf International Airport	Germany
EDDM	MUC	Muenchen	Munich Airport	Germany
EDDS	STR	Stuttgart	Flughafen Stuttgart	Germany
EFHK	HEL	Helsinki-Vantaa	Helsinki-Vantaa Airport	Finland
EHAM	AMS	Amsterdam/Schiphol	Amsterdam Airport	Netherlands
EIDW	DUB	Dublin	Dublin Airport	Ireland
EKCH	CPH	Kobenhavn/Kastrup	Copenhagen Airport	Denmark
ENGM	OSL	Oslo/Gardermoen	Oslo-Garnemoen Airport	Norway

EPWA	WAW	Chopina W Warszawie	Warsaw Frederic Chopin Airport	Poland
ESSA	ARN	Stockholm/Arlanda	Stockholm-Arlanda Airport	Sweden
LEBL	BCN	Barcelona/El Prat	Aeropuerto de Barcelona-El Prat	Spain
LEMD	MAD	Madrid/Adolfo Suarez Madrid-Barajas	Aeropuerto de Adolfo Suárez Madrid-Barajas	Spain
LEMG	AGP	Malaga/Costa Del Sol	Aeropuerto de Málaga - Costa del Sol	Spain
LEPA	PMI	Palma De Mallorca	Aeropuerto de Palma de Mallorca	Spain
LFLY	LYS	Lyon Saint-Exupery	Aéroport de Lyon-Saint Exupéry	France
LFMN	NCE	Nice-Cote D'azur	Aéroport Nice Côte d'Azur	France
LFPG	CDG	Paris-Charles De Gaulle	Aéroport de Paris-Charles de Gaulle	France
LFPO	ORY	Paris-Orly	Aéroport de Paris-Orly	France
LGAV	ATH	Athinai/Eleftherios Venizelos	Athens International Airport	Greece
LIMC	MLP	Milano/Malpensa	Milano Malpensa	Italy
LIML	LIN	Milano/Linate	Milano Linate	Italy
LIRF	FCO	Roma/Fiumicino	Aeroporto di Roma-Fiumicino	Italy
LKPR	PRG	Praha/Ruzyne	Prague Airport	Czech Republic
LOWW	VIE	Wien-Schwechat	Vienna International Airport	Austria
LPPT	LIS	Lisboa	Lisbon Airport	Portugal (Madeira and Azores)
LSGG	GVA	Geneva	Genève Aéroport	Switzerland
LSZH	ZRH	Zurich	Flughafen Zürich	Switzerland

Table 16: Airports Subject to “AOP-NOP data enhancement to the strategic and pre-tactical planning phases” under ATM Sub-Functionality A.3

4.1.3.5 Interdependencies with other CP2 functionalities

No direct interdependency with another ATM sub-functionality has been identified.

4.2 ATM Functionality B Dynamic airspace configuration [SDO 3]

The objective of the air traffic management (ATM) functionality B “dynamic airspace configuration” is to transition to higher levels of granularity and dynamicity in airspace configurations than today’s. With greater dynamicity, demand and capacity balancing (DCB) can be performed more precisely by scaling airspace capacity to match the evolving complexity and density of traffic demand and military needs during the pre-tactical and tactical phases.

Based on discretised, multi-layered airspace building blocks, operational sectors and airspace configurations are designed to better adapt to 4D trajectory predictions. The functionality relies on advanced complexity assessment tools, optimisation algorithms and what-if functionalities that consider the expected traffic demand and determine the optimal sector configuration. The goal is to minimise variability in controller workload and mitigate potential bottlenecks. This reduces airspace-structure constraints on flight efficiency and provides a more scalable use of ATC capacity better aligned with the airspace users’ preferred trajectories.

4.2.1 ATM sub-functionality B.1 Dynamic airspace configuration [DA 3.1]

The dynamic airspace configurations aim to make better use of available ATC capacity and to achieve a more balanced distribution of ATC workload, thereby reducing demand–capacity imbalances. These dynamic solutions will minimise delays for Airspace Users by increasing flexibility in how sectors are organised, supporting the implementation of advanced airspace management concepts.

This ATM sub-functionality builds on CP1 AF 3, AF 4 and AF 5.

4.2.1.1 Mandatory service requirements (for implementation)

Air Traffic Service Provider (ATSP)

The following requirements shall apply in the area (either assigned by ICAO or by delegation) where an ATSP provides ATC services:

- (a) ATSPs shall provide the Network Manager with their pre-defined sector configurations in the strategic phase, as well as peak and sustain capacity values for nominal and degraded service modes. For ATSPs providing services in the area of applicability of AF C.1, degraded modes shall include the unavailability of the CP2 ATS B2 services defined in AF C.1.
- (b) ATSPs shall perform an automated what-if analysis integrating dynamic sector configurations and demand measures in support of their decision-making process in the pre-tactical and tactical phases in accordance with the requirements defined in the technical annex (see Appendix G).

Network Manager (NM)

- (a) NM shall support ATSPs in conducting the “what-if analysis” referred to in paragraph b, using existing Network Manager applications, tools and NM B2B exchanges.

4.2.1.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

There is no standardisation need associated with the scope of this sub-functionality.

Actions for EASA

None

4.2.1.3 Implementation target date:

Stakeholders that are required to implement the functionalities related to this sub-functionality are the Air Traffic Service Providers and the Network Manager.

ATM sub-functionality B.1	Stakeholder	Target Implementation date
	Air Traffic Service Provider (CIV)	Date of issuance of the Industrialisation Notice + 5 years
	Network Manager	Date of issuance of the Industrialisation Notice + 5 years

Table 17: Implementation Timeline for Air Traffic Service Providers under ATM Sub-Functionality B.1

4.2.1.4 Implementation applicability area

The implementation applicability area for this sub-functionality covers ATSPs providing ATC en-route services in the airspace of the EU Member States plus Norway and Switzerland.

4.2.1.5 Interdependencies with other CP2 functionalities

This sub-functionality has an operational link with ATM sub-functionality C.1, since degraded service modes for ATSPs in the area of applicability of C.1 shall include the unavailability of CP2 ATS B2 services. This link does not make the implementation of B.1 conditional upon the prior implementation of C.1.

4.3 ATM Functionality C Transformation to trajectory-based operations (TBO) [SDO 5]

Trajectory-based operation (TBO) is the cornerstone of the Digital European Sky, representing a significant paradigm shift in air traffic management (ATM): moving from a reactive, constraint-driven system to a proactive, performance-based environment. By leveraging 4D trajectory data, TBO enables a seamless trajectory that delivers airline cost-efficiency benefits while ensuring network-wide capacity goals. TBO enables tangible gains in operational predictability, a significant reduction in CO₂ footprints through optimised flight profiles, and the scalability required to meet future air traffic demands while maintaining the highest safety standards.

In practical terms, the ATM sub-functionality C “Transformation to trajectory-based operations (TBO)” is structured around two sub-functionalities:

- **C.1**, covering the introduction of ATS B2 CPDLC and increasing the sharing of airborne data with ATC systems, enabling a continuous and precise optimisation of flight trajectories.
- **C.2**, making flight planning in Europe more flexible and efficient by allowing for the temporary relaxation of airspace restrictions (dynamic Route Availability Document (RAD)).

In terms of air-ground data exchange, the proposal builds on the current datalink regulation (Commission Implementing Regulation (EU) 2023/1770) and CP1 regulation (Commission Implementing Regulation (EU) 2021/116) by:

- Extending downwards the volume of airspace where ADS-C and CPDLC will be used.
- Increasing the sharing of trajectory information via ADS-C with additional elements from what is required in the CP1 ATM Functionality “Initial Trajectory Information Sharing”, which is only the Extended Projected Profile (EPP).
- Mandating the transition of CPDLC from ATN B1 to ATS B2, which has operational benefits thanks to an increased set of messages and is also the convergence application for CPDLC agreed at ICAO level.
- Ensuring that the ATS B2 application is resilient to GNSS interference.

The dynamic RAD functionality is a step towards the MP objective to allow continuous and precise optimisation of flight trajectories, moving from the current situation whereby the constraints in the RAD are static and must be considered by AU for all flight plans to introduce a mechanism for ATSPs to be able to dynamically activate or deactivate RAD constraints depending on the forecast volume and complexity of air traffic. This will result in flight plans with fewer constraints, allowing AU to plan trajectories that are closer to their unconstrained desired trajectory (UDT) than is possible today.

4.3.1 ATM sub-functionality C.1 European ATS B2 Performance-Based Communications and Surveillance area [DA 5.1 & DA 5.2]

4.3.1.1 Mandatory service requirements (for implementation)

This ATM sub-functionality covers the deployment of the ADS-C and CPDLC following ATS B2 services for en-route/TMA:

- Datalink initiation service (DLIC)
- ATC communications management (ACM) service
- Clearance request and delivery (CRD) service
- ATC microphone check (AMC) service
- Information exchange and reporting (IER) service
- 4-dimensional trajectory datalink (4DTRAD) service

The above list of services is referred hereinafter on as the CP2 ATS B2 services.

Air Traffic Service Provider (ATSP)

- (a) ATSPs shall establish contractual arrangements with one or more ADSPs to provide ATS B2 logon to all equipped aircraft
- (b) ATSPs providing en-route and/or TMA ATC service, shall provide the following ATS B2 services using data communications between air and ground:
 - i. Datalink initiation service (DLIC)
 - ii. ATC communications management (ACM) service
 - iii. Clearance request and delivery (CRD) service
 - iv. ATC microphone check (AMC) service
 - v. Information exchange and reporting (IER) service
 - vi. 4-dimensional trajectory datalink (4DTRAD) service
- (c) ATSPs shall share all relevant ADS-C data downlinked from the aircraft with NM and downstream ATSPs, as well as subscribe to receive from other ATSPs all relevant ADS-C data from aircraft that will enter their area of responsibility.
- (d) ATSPs shall make use of ADS-C data received directly from aircraft or from an upstream ATSP as described in the technical annex (Appendix G).
- (e) ATSPs shall process and reply to all applicable ATS B2 CPDLC and ADS-C messages supporting the services listed in (b) received from logged-on aircraft or received from other ATSPs in accordance with the requirements in in the technical annex (Appendix G).

- (f) ATSPs shall integrate the coordination and transfer human-machine-interface in the controller working position with the ATS B2 CPDLC application, in accordance with the requirements in the technical annex (see Appendix G).
- (g) ATSPs shall provide the full set of CP2 ATS B2 services to aircraft with a first individual certificate of airworthiness issued before the AF C.1 implementation date, where those aircraft are equipped with any version of the ATS B2 standard.

Airspace Users (AU)

- (h) Airframes with first individual airworthiness certificate on or after the target implementation date shall be equipped with following applications and services:
 - i. The onboard ATS B2 application supporting the DLIC service.
 - ii. The CPDLC and ADS-C applications in the IER and 4DTRAD services.
 - iii. The CPDLC application in the CRD, AMC and ACM services
- (i) Airframes with first type certificate first issued on or after the target implementation date shall be equipped with the ADS-C application in the ACM service.
- (j) The airborne equipage for the applications and services referred to in points h) and i) above shall comply with the requirements in the technical annex (see Appendix G).
- (k) The time source of the on-board ATS B2 application shall be reliable and resilient against interference of satellite-based time updates.
- (l) Aircraft equipped with the ATS B2 application are exempt from the requirement in EC IR 2023/1770 of equipping and connecting with the ATN B1 application.
- (m) ATS B2-equipped aircraft shall connect to ATS B2 services for the duration of the GAT IFR flight in the area of applicability. The onboard ATS B2 application shall provide the technical acknowledgment and process all ATS B2 CPDLC and ADS-C messages received from ATSPs, and present all received CPDLC messages to the flight crew.
- (n) State aircraft are exempt from ATS B2 equipage requirements.

ATM Data Service Providers (ADSPs)

The following obligations are linked to SDO 8 (AF G (SDO 8) level 2 service called “datalink services”.

- (o) ADSPs providing ATS-B2 services shall ensure the confidentiality of CPDLC and ADS-C data and shall use such data only for the activities for which they are certified.

4.3.1.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

An update of the ATS B2 standards.

A new standard to support the certification of the cockpit CPDLC HMI for its use with the advanced CPDLC applications enabled by the CP2 services down to FL245, including the push-to-load functionality.

A new standard to support the certification of the ATS B2 application clock resilience to GNSS interference.

The ATS B2 standard was defined in compliance with ICAO PBCS requirements. A review of the PBCS standard shall be launched to verify full consistency and, where necessary, propose updates or improvements to the ICAO communication panel (CP), so as to ensure that the European ATS B2 PBCS area remains fully compatible with the ICAO PBCS framework.

Actions for EASA

Update SERA to ensure compatibility with the requirements in this sub-AF, specifically concerning connectivity requirements during operations of a flight in the applicability area.

Update the CS-ACNS to include the airborne certification requirements, determining which version of the ATS B2 standards is applicable for the certification of the ATS B2 application and supporting avionics, and to include the certification requirements related to clock resilience to GNSS interference.

Update the DS for the attestation of ATM/ANS systems to include the certification requirements related to the new functionalities of the ATC systems. The DS should also include the list of ATS B2 standards that the ground system must support, respecting the backwards compatibility principle, whereby ATSPs shall continue to provide CP2 ATS B2 services to aircraft equipped before the applicability date with previous versions of the ATS B2 standard.

Other regulatory actions:

Publish in national AIPs the provisions for guarantee of accommodation of non-equipped State aircraft in ATS B2 airspace.

4.3.1.3 Implementation target dates:

ATM sub-functionality C.1	Stakeholder	Target Implementation date
	Air Traffic Service Provider	Date of issuance of the Industrialisation Notice + 5 years
	Airspace Users	Date of issuance of the Industrialisation Notice + 5 years

Table 18: Implementation Timeline for Stakeholders under ATM Sub-Functionality C.1

4.3.1.4 Implementation applicability area

The European Air Traffic Services Baseline 2 Performance Based Communications and Surveillance (European ATS B2 PBCS) area comprises the airspace for which EU + 2 (i.e., Norway and Switzerland) Member States are responsible for provision of air traffic services in the ICAO EU region in the vertical dimension defined below:

- European ATS B2 PBCS area: controlled airspace above FL 245. The deployment programme may exceptionally determine a higher floor than FL245 to account for airspace structure specificities.

4.3.1.5 Interdependencies with other CP2 functionalities

This sub-functionality has a performance dependency on ATM Functionality F, in particular the future high-performance air-ground connectivity environment supporting ATS B2 service provision and multilink resilience. Its implementation is not conditional upon the prior implementation of ATM Functionality G, although the ATS B2 services provided by ADSPs shall remain consistent with the progressive transition towards the service-oriented delivery model under ATM Functionality G.

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4.3.2 ATM sub-functionality C.2 Dynamic RAD [DA 5.3]

The ATM sub-functionality C.2 “dynamic RAD” addresses the introduction of dynamicity in the route availability document (RAD).

The objective is to make flight planning in Europe more flexible and efficient by allowing for the temporary relaxation of airspace restrictions, so airlines can file more efficient trajectories that were previously not available by static rules, saving fuel and time.

4.3.2.1 Mandatory service requirements (for implementation)

Air Traffic Service Provider (ATSP)

ATSPs shall establish and maintain a RAD catalogue:

- i. Listing all RAD restrictions within their area of responsibility.
 - ii. Identifying which RAD restrictions are subject to dynamic management.
- (b) ATSPs shall share their RAD catalogue with NM.
- (c) ATSPs shall make available RAD restrictions status to other ATSPs.

Airspace Users (AU)

- (d) Airspace Users shall be able to process dynamic RAD restrictions as published by NM.
- (e) Airspace Users shall be able to file or adapt in a timely manner a flight plan (eFPL) in accordance with the dynamic RAD information provided by NM.

Note: There are no new obligations for the Network Manager as the Network Manager (NM) confirmed that their current capabilities already support the implementation of this sub-functionality.

4.3.2.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions

The implementation is based on the following documents, which are already available:

- ATFCM/ASM Programme, edition. 1.0, 24.05.2019.
- Network Manager Release Notes NM-27 and MAINT.1, 18.09.2023 (implementation 2023-2024).
- ASM/ATFCM CONOPS, edition 1, 24.04.2024.
- EUROCONTROL Specification for Airspace Management (ASM) Support System Requirements supporting the ASM processes at local and FAB level Part I - Baseline Requirements.

Since implementation of this sub-functionality implies updates to ATM/ANS ground equipment, EUROCONTROL specifications shall be developed or updated, as necessary, to ensure interoperability between FDPS systems and the Network Manager.

Actions for EASA

The Detailed Specification for the attestation for ATM/ANS equipment 2023/1768 requires updates to consider the ground equipment supporting the requirements in this sub-AF.

4.3.2.3 Implementation target dates:

ATM sub-functionality C.2	Stakeholder	Target Implementation date
	Airspace Users	Date of issuance of the Industrialisation Notice + 5 years
	Air Traffic Service Provider	Date of issuance of the Industrialisation Notice + 5 years

Table 19: Implementation Timeline for Stakeholders under ATM Sub-Functionality C.2

4.3.2.4 Implementation applicability area

All ATSPs providing en-route ATC services in an EU + 2 (i.e., Norway and Switzerland) member state that applies RAD restrictions.

As of 2026, the ATSPs applying RAD restrictions are:

ATSU code	ATSU name	ATSP	State
EPWWACC	Warszawa ACC	PANSA	Poland
EDYYUAC	Maastricht UAC	MUAC	Maastricht
ESOSACC	Stockholm ACC	LFV	Sweden
ESMMACC	Malmö ACC	LFV	Sweden
EFESACC	Tampereen ACC	Fintraffic ANS	Finland
LIPPACC	Padova ACC	ENAV	Italy
LIBBACC	Brindisi ACC	ENAV	Italy
LIMMACC	Brindisi ACC	ENAV	Italy
LIRRACC	Roma ACC	ENAV	Italy

LECPACC	Palma TACC	ENAIRE	Spain
LECMALL	Madrid ACC	ENAIRE	Spain
LECBACC	Barcelona ACC	ENAIRE	Spain
LECSACC	Sevilla ACC	ENAIRE	Spain
GCCCACC	Canarias ACC	ENAIRE	Spain
LFRRACC	Brest ACC	DSNA	France
LFEEACC	Reims ACC	DSNA	France
LFBBALL	Bordeaux ACC	DSNA	France
LFMMACC	Marseille ACC	DSNA	France
LFFFALL	Paris ACC	DSNA	France
EDUUUAC	Karlsruhe UAC	DFS	Germany
EDGGACC	Langen ACC	DFS	Germany
EDMMACC	München ACC	DFS	Germany
EDWWACC	Bremen ACC	DFS	Germany

Table 20: ATSPs applying RAD restrictions in 2026

4.3.2.5 Interdependencies with other CP2 functionalities

No direct interdependency with another ATM sub-functionalities has been identified.

4.4 ATM Functionality D Virtualisation of operations [SDO 6]

This ATM functionality aims to establish an EU wide capability for ATSU-to-ATSU capacity-on-demand in en-route operations, as a concrete operational expression of virtualisation of operations. This capability may be established between ATSUs of the same ATSP or between ATSUs of different ATSPs, including in different Member States. It is intended to strengthen the resilience, continuity and scalability of ATM service provision by enabling defined ATS responsibilities to be temporarily delegated and received between ATSUs where operationally required and agreed, without mandating routine delegation, cross-border delegation or permanent transfer of responsibility. This functionality does not require the routine or permanent delegation of ATS between ATSUs. It ensures that the European ATM system progressively becomes technically and operationally capable of supporting such delegation safely, securely and efficiently where resilience, continuity of service or capacity management justifies its use. The decision to prepare and activate ATSU-to-ATSU capacity-on-demand for a specific operational use case remains an operational decision of the concerned ATSPs. Detailed activation arrangements, including the applicable safety case, agreed procedures, staffing and licensing conditions, civil-military arrangements, security requirements and coordination with the Network Manager, are required only for the use cases that the concerned ATSPs decide to prepare for operational activation.

In practical terms, this functionality is structured around three complementary elements:

- The definition of a proportionate operational, procedural and safety framework for ATSU-to-ATSU capacity-on-demand, distinguishing between the general concept, the technical capability to support it, and the detailed arrangements required only for use cases prepared for operational activation.
- The availability of relevant SDO 8-compliant technical capabilities, including virtualised and interoperable service interfaces, operational configuration management, configuration data management, service continuity, observability, recording, fallback and recovery capabilities.
- The implementation of an EU harmonised ATCO validation framework for en-route operations, building on the SESAR Increased Flexibility in ATCO Validation concept (IFAV) and supported by an EASA rulemaking task.

Capacity-on-demand means the capability for one ATSU to temporarily delegate or receive the provision of defined en-route ATC responsibilities for a sector, a group of sectors or another defined operational responsibility, under pre-agreed operational, technical, safety, security, staffing, training, licensing, civil-military, liability and coordination conditions applicable to the use case prepared for activation. Such delegation may be activated on a fixed scheduled basis or dynamically, according to operational need. It does not imply a permanent transfer of responsibility, structural redesignation of airspace, organisational unbundling, or a requirement to maintain dedicated permanent standby ATCO capacity.

Existing ATS provision remains largely organised around local systems, local operational procedures and unit-specific ATCO validations. While this model supports safe operations today, it limits the ability

of the European ATM system to absorb local capacity shortages, sudden disruptions, seasonal peaks or uneven availability of controller resources. Under the current ATCO licensing and unit endorsement framework, introducing ATSU-to-ATSU capacity-on-demand could require controllers to hold and maintain multiple full sector validations across different ATSUs. Given today's shortage of ATCOs, this would make the concept operationally impracticable or economically disproportionate.

The SDO 6 architecture therefore combines technical virtualisation and human flexibility. Technically, SDO 6 relies on the SDO 8 service-oriented delivery model, so that defined ATS responsibilities can be supported through interoperable, secure and observable service interfaces between the delegating and receiving ATSUs. From the human perspective, SDO 6 relies on an EU harmonised, IFAV enabled ATCO validation framework, allowing controller competence and currency to be managed in a more flexible, risk-based and operationally controlled way. This includes, where appropriate, a clearer distinction between competence related to the controller working position and competence related to the operational characteristics of specific sectors.

The start of the regulated implementation timeframe under this functionality shall remain conditional upon the issuance of the relevant Industrialisation Notice no later than five years after the entry into force of this CP. That Industrialisation Notice shall not be issued before the Industrialisation Notice for ATM Functionality G.1 has been issued and before the EASA regulatory material enabling an EU-harmonised en-route ATCO validation framework has reached the level of maturity required to support implementation. This ensures that ATSU-to-ATSU capacity-on-demand is not imposed on legacy systems or on today's licensing model, but is embedded in the transition towards virtualised, interoperable and service-oriented ATM provision.

The value of this capability lies primarily in resilience, continuity of service and the ability to respond to uneven capacity constraints across the European ATM system. It is not predicated on routine daily delegation of ATS between ATSUs. The capability may remain unused in normal operations, while still providing value as an operational contingency and capacity management option when technical disruption, seasonal demand, staffing imbalance or local capacity shortage makes activation beneficial.

This functionality is sequenced with SDO 8 because ATSU-to-ATSU capacity-on-demand depends on the availability of relevant SDO 8 compliant technical capabilities. Major ATC system upgrades and SDO 8 compliant service architectures introduced within the applicability area should therefore incorporate the technical capability required to support ATSU-to-ATSU capacity-on-demand. The objective is to ensure that the next generation of ATM systems does not technically preclude capacity-on-demand, while leaving the preparation of detailed operational, procedural, safety, staffing, civil-military and contractual arrangements to the use cases that the concerned ATSPs decide to prepare for operational activation.

Three types of actors are considered:

- ATSPs, responsible for deciding whether to prepare specific ATSU-to-ATSU capacity-on-demand use cases for operational activation and, where they do so, for establishing and

maintaining the corresponding operational, procedural, safety, staffing, training, licensing and contractual arrangements.

- ADSPs, responsible for providing the ATM data services and technical service interfaces necessary to support delegation and reception of ATS responsibilities, in accordance with SDO 8.
- The Network Manager, responsible for supporting coordination, operational awareness, ATFCM data distribution and, where relevant, the adaptation of network processes before and during activation.

For each use case prepared for activation, the concerned ATSP or ATSPs shall define and document the allocation of operational responsibilities, safety responsibilities, data access conditions, security requirements, civil-military arrangements and activation, suspension, recovery and termination procedures before activation. Both delegating and receiving ATSPs remain responsible, within their respective documented responsibilities, for ensuring that any activation of ATSU-to-ATSU capacity-on-demand is safe, properly coordinated, adequately staffed, supported by appropriately licensed and current ATCOs, and consistent with civil-military, security and coordination requirements. CP2 therefore establishes the European capability to use ATSU-to-ATSU capacity-on-demand as a resilience instrument, while preserving the operational responsibility of the concerned ATSPs to decide when and where that capability is prepared and activated.

The following terminology is used in this section:

- ATSU-to-ATSU capacity-on-demand: the capability for one ATSU to temporarily delegate or receive defined en-route ATS responsibilities to or from another ATSU under pre agreed operational, technical, safety, security, staffing, licensing, civil-military and coordination conditions.
- Delegating ATSU: the ATSU whose defined ATS responsibilities are temporarily provided by another ATSU under an activated capacity-on-demand arrangement.
- Receiving ATSU: the ATSU temporarily providing defined ATS responsibilities on behalf of the delegating ATSU under an activated capacity-on-demand arrangement.
- IFAV enabled ATCO validation framework: an EU harmonised framework for increased flexibility in ATCO validation, building on the SESAR IFAV concept and developed through EASA rulemaking, enabling proportionate, risk based and operationally controlled validation and currency arrangements for en-route operations.

4.4.1 ATM sub-functionality D.1 Virtualisation of operations [DA 6.1]

4.4.1.1 Mandatory service requirements (for implementation)

Air Traffic Service Provider (ATSP)

- (a) ATSPs providing en-route ATS within the applicability area shall ensure that their transition planning and, where relevant, their SDO 8 compliant technical architecture do not preclude the future use of ATSU-to-ATSU capacity-on-demand. Where an ATSP decides to prepare one or more ATSU-to-ATSU capacity-on-demand use cases for operational activation, it shall establish, maintain and demonstrate the operational, procedural, organisational and safety capability required for those use cases. Such use cases may concern ATSUs of the same ATSP or ATSUs of different ATSPs, including in different Member States.
- (b) The preparation and activation of ATSU-to-ATSU capacity-on-demand for a specific operational case shall remain a decision of the concerned ATSP or ATSPs. Activation shall only take place where the concerned ATSP or ATSPs have confirmed that the applicable operational, technical, safety, staffing, licensing, civil-military, security and coordination conditions are met. Where a use case prepared for activation involves ATSUs of more than one legal entity, the concerned ATSPs shall ensure that the respective roles, responsibilities, safety responsibilities, data access conditions, security requirements, civil-military arrangements and activation, suspension, recovery and termination procedures are documented before activation. The establishment of the capability shall not require ATSPs to conclude standing ATSP-to-ATSP delegation contracts covering all possible use cases. The form of the arrangement shall remain proportionate to the operational scenario, the actors involved and the applicable national or cross-border context.
- (c) ATSPs shall perform the safety assessment and change management activities necessary for the ATSU-to-ATSU capacity-on-demand use cases that they prepare for operational activation. Such activities shall be performed before activation and shall be proportionate to the scope and complexity of the use case concerned.
- (d) ATSPs shall ensure that, where ATSU-to-ATSU capacity-on-demand is activated, ATS is provided only by ATCOs who meet the applicable licensing, validation, training and currency requirements established under the EU harmonised IFAV based en-route ATCO validation framework. The validation and currency arrangements used for ATSU-to-ATSU capacity-on-demand shall be proportionate, risk based and operationally controlled. They shall support the safe use of capacity-on-demand while avoiding unnecessary multiplication of full sector validations, disproportionate currency burdens, or implied requirements for permanent standby staffing.
- (e) The establishment of ATSU-to-ATSU capacity-on-demand capability shall not require ATSPs to maintain dedicated permanent standby ATCO capacity. Where an ATSP decides to prepare a use case for operational activation, it shall demonstrate that the use case can be activated safely through approved rostering, validation, training, currency, operational planning and activation arrangements under the EU-harmonised en-route ATCO validation framework.
- (f) Where the delegated responsibilities concern airspace subject to civil-military coordination, the concerned ATSPs shall ensure that the same level of civil-military coordination, operational awareness and protection of military information is maintained during activation. The

applicable civil-military procedures and confidentiality requirements shall be defined before activation.

- (g) ATSPs shall coordinate with the Network Manager where an activation of ATSU-to-ATSU capacity-on-demand may affect ATFCM processes, traffic flows, sector configuration, airspace availability, ATFM data distribution or ATM performance. This coordination shall take place in sufficient time to allow the necessary adaptation of relevant processes and data distribution. Where activation has no material effect on ATFCM processes, traffic flows, sector configuration, airspace availability, ATFM data distribution or ATM performance, no additional Network Manager coordination shall be required beyond the arrangements applicable under the relevant operational procedures.
- (h) ATSPs shall ensure that ATSU-to-ATSU capacity-on-demand is supported by operational configuration management and configuration data management capabilities consistent with SDO 8. Where capacity-on-demand is activated, the applicable operational configuration, sector grouping, capacity declarations, fallback arrangements and recovery procedures shall be documented and coordinated between the concerned ATSUs.

ATM Data Service Providers (ADSPs)

- (i) ADSPs supporting ATSU-to-ATSU capacity-on-demand shall comply with the applicable SDO 8 requirements for the relevant air traffic data services, including operational configuration management, configuration data management, interoperability, portability, service continuity, security, observability and recovery capabilities. This ATM Functionality does not create a separate ADSP obligation layer beyond SDO 8; it specifies the operational use case for which the relevant SDO 8 capabilities shall be available.

Network Manager (NM)

- (j) The Network Manager shall support the activation of ATSU-to-ATSU capacity-on-demand where such activation may affect ATFCM processes, traffic flows, sector configuration, airspace availability, ATFM data distribution or ATM performance. This obligation does not confer on the Network Manager any responsibility for deciding whether, when or where ATSU-to-ATSU capacity-on-demand is activated. That decision remains with the concerned ATSPs.
- (k) Where ATSU-to-ATSU capacity-on-demand is activated and has network relevant effects, the Network Manager shall ensure that the relevant ATFCM data distribution, operational awareness and coordination processes can reflect the activated operational configuration in a timely manner. This may include, where relevant, changes in sector configuration, declared capacity, airspace availability, flow management arrangements and applicable operational responsibilities.
- (l) The Network Manager shall ensure that its relevant operational systems and processes can use the operational configuration and configuration data made available under SDO 8 where needed to support ATSU-to-ATSU capacity-on-demand with network relevant effects.

4.4.1.2 Performance and technical harmonisation requirements (for industrialisation)

This sub functionality relies on a structured combination of standardisation, rulemaking support and regulatory instruments. In the near term, harmonisation and enablement shall be supported through virtual centre standards and a dedicated SDO 6 rulemaking support concept of operations for ATSU-to-ATSU capacity-on-demand. These instruments are intended to provide early regulatory clarity, support demonstration activities and prepare the targeted evolution of the ATCO licensing framework necessary to make ATSU-to-ATSU capacity-on-demand operationally credible.

The rulemaking support concept of operations shall provide a structured operational and functional description of ATSU-to-ATSU capacity-on-demand, distinguishing between the general concept, the technical capability to support it and the detailed operational arrangements required only for use cases prepared for activation. It shall describe the intended roles of the actors, the operational context, the main interactions between delegating and receiving ATSUs, the allocation of responsibilities, the expected activation models, and the main assumptions and constraints relevant for safety, human performance, ATCO validation, civil-military coordination, security and oversight. It shall also describe the interface with ATM Functionality G.1 where needed to explain the dependency on operational configuration management and configuration data management.

The rulemaking support concept of operations shall also describe how the SESAR Increased Flexibility in ATCO Validation concept supports ATSU-to-ATSU capacity-on-demand. In particular, it shall cover the distinction between controller working position competence and sector specific operational competence, the possible use of full and restricted sector endorsements, and the conditions under which validation and currency requirements may be made proportionate, risk based and operationally controlled. The Industrialisation Notice for this sub functionality shall not be issued until the Industrialisation Notice for ATM Functionality G.1, Service oriented delivery model, has been issued. This reflects the direct dependency of ATSU-to-ATSU capacity-on-demand on the SDO 8 technical architecture.

The Industrialisation Notice for this sub functionality shall also not be issued until the EASA regulatory material enabling an EU harmonised IFAV based en-route ATCO validation framework has reached the level of maturity required to support implementation. This IFAV based framework is a precondition for triggering the regulated implementation obligations under this sub functionality.

Standardisation actions

EUROCAE WG 122 is tasked to develop the relevant standards and technical artefacts supporting virtual centre implementation and ATSU-to-ATSU capacity-on-demand, including:

- ER 026 “Virtual Centre Standardisation”, published on 31 January 2022;
- ER 029 “Taxonomy of Services for Virtual Centres”, published on 31 December 2023;
- ED XXX “Virtual Centre Guidelines for Implementation”, target publication date 31 December 2026;
- ED YYY “Interoperability Standard for ATM Data Services for Virtual Centres”, target publication date 31 December 2026.

These standards and technical artefacts shall support, as applicable, the interoperability, operational configuration, configuration data, monitoring, logging, fallback and recovery requirements necessary to enable ATSU-to-ATSU capacity-on-demand.

Where these requirements are already addressed under SDO 8 standards, technical artefacts or service specifications, this sub functionality shall rely on the relevant SDO 8 material and shall not create duplicate technical requirements.

Actions for EASA

EASA shall develop or update the regulatory material necessary to enable an EU harmonised IFAV based en-route ATCO validation framework under Commission Implementing Regulation (EU) 2015/340, as amended by Commission Implementing Regulation (EU) 2023/893.

This regulatory material shall consider the IFAV concept, standards or technical artefacts developed under the standardisation actions for this sub functionality and shall support the safe and proportionate use of ATSU-to-ATSU capacity-on-demand and fixed-time delegation.

It shall address:

- the distinction between controller working position competence and sector specific operational competence;
- the conditions for the use of full and restricted sector endorsements;
- the criteria, limitations and operational conditions applicable to restricted sector endorsements;
- harmonised training, endorsement and currency requirements for en-route operations;
- the conditions under which accumulated operational experience may support progression from a restricted sector endorsement to a full sector endorsement;
- rostering principles, including fatigue management and staff wellbeing;
- transition provisions, progression criteria and governance arrangements.

The regulatory material shall build on the direction already introduced by Commission Implementing Regulation (EU) 2023/893 regarding enhanced mobility options and streamlined qualifications for ATCOs, while addressing the additional harmonisation required to support ATSU-to-ATSU capacity-on-demand.

The IFAV based framework shall support proportionate, risk based and operationally controlled validation and currency arrangements. It shall avoid unnecessary multiplication of full sector validations, disproportionate currency burdens, and implicit requirements for permanent standby ATCO staffing.

EASA shall also assess whether complementary guidance material is needed to support the safety assessment and operational use of ATSU-to-ATSU capacity-on-demand, including the responsibilities of delegating and receiving ATSUs, the conditions for activation, suspension, recovery and termination, and the preservation of operational accountability by the concerned ATSPs.

4.4.1.3 Implementation target dates:

Stakeholders that are required to implement the functionalities related to this sub-functionality are the Air Traffic Service Providers and the Network Manager.

ATM sub-functionality D.1	Stakeholder	Target Implementation date
	Network Manager	Date of issuance of the Industrialisation Notice + 5 years
	ATSPs	Date of issuance of the Industrialisation Notice for D.1 + 5 years, subject to the availability of the relevant SDO 8-compliant capabilities and the IFAV-based regulatory framework

Table 21: Implementation Timeline for Stakeholders under ATM Sub-Functionality D.1

The Industrialisation Notice for this sub-functionality shall not be issued until the Industrialisation Notice for ATM Functionality G.1, Service-oriented delivery model, has been issued. This reflects the direct dependency of ATSU-to-ATSU capacity-on-demand on the SDO8 technical architecture.

4.4.1.4 Implementation applicability area

ATSPs providing en-route ATC services. The delegation between ATSUs providing service in two different member states requires as a pre-condition a member state level agreement between the states, the NSAs, NCAs and the relevant ministries from both states (for example Ministry of Defence, Ministry of Interior) of both states. States with only one en-route ATSU that demonstrate that this pre-condition cannot be met are exempt from the implementation of this sub-AF

4.4.1.5 Interdependencies with other CP2 functionalities

This ATM sub-functionality has a direct implementation dependency on ATM sub-functionality G.1. The Industrialisation Notice for D.1 shall not be issued before the Industrialisation Notice for G.1 has been issued, reflecting the dependency of ATSU-to-ATSU capacity-on-demand on the relevant SDO8-compliant technical capabilities.

4.5 ATM Functionality E Enable innovative air mobility (IAM) and drone operations [SDO 10]

ATM Functionality E consists of one ATM sub-functionality E.1 “Integration of IFR RPAS”. It aims to implement system support and procedures to integrate RPAS flying under instrument flight rules (IFR) in airspaces A to C. This includes certified IFR RPAS and State aircraft that are not subject to civil airworthiness certification but are capable of flying IFR and may choose to operate in accordance with general air traffic (GAT) rules. The objective of this AF is to ensure that the European ATM system provides the same level of service to RPAS flying under IFR as to IFR manned aircraft.

The benefits include:

- Improving the flexibility of the use of the airspace by integrating GAT IFR RPAS operations and improving operational efficiency of IFR RPAS operation in non-segregated airspace.
- Mitigation of the impact on air traffic management of GAT IFR RPAS related contingency events.
- Improved integration of GAT IFR RPAS operations into safety management systems, including risk identification, assurance and mitigation.
- Improved security and resilience of the IFR RPAS-ATM integration environment, including protection against cyber threats, spoofing, denial of service of C2 links or datalinks, and unauthorised airspace entry.

4.5.1 ATM sub-functionality E.1 Integration of IFR RPAS [DA 10.1]

4.5.1.1 Mandatory service requirements (for implementation)

RPAS holding an airworthiness certificate for IFR flight, or an equivalent military certification, shall be able to operate GAT IFR in airspaces A, B and C in the area of applicability, subject to the following provisions:

Airspace Users (AU)

- a) The pilot-in-command of an IFR RPAS operating in controlled airspace shall operate the aircraft in accordance with its ATC clearance unless an emergency situation arises which necessitates immediate action by the aircraft. In that event, after such emergency authority is exercised and as soon as circumstances permit, ATC shall be notified of the action taken and that this action has been taken under emergency authority.
- b) The pilot-in-command of an IFR RPAS shall always operate during flight a system providing traffic awareness for cooperative traffic.

- c) AU operating IFR RPAS shall always operate during flight with an airborne collision avoidance system that is interoperable with TCAS⁴. The operation of ACAS by the remote pilot-in-command shall be subject to the same rules applicable to the operation of ACAS by the pilot-in-command of a crewed aircraft.
- d) When an IFR RPAS initiates the execution of a lost-link contingency procedure, ATS B2-equipped IFR RPAS shall downlink an ADS-C and a CPDLC message notifying the start of the contingency procedure and the planned 4D trajectory, and downlink subsequent messages in case of updates.
- e) State IFR RPAS are exempt from the collision avoidance system and CDTI equipage and operation required in b) and c), but if equipped they shall make use of the equipment when flying IFR GAT, unless an exemption is justified by the security requirements of the mission.

Air Traffic Service Provider (ATSP)

ATSPs shall provide GAT IFR RPAS with the same ATC service as that provided to manned IFR aircraft, subject to the specific procedures and contingency arrangements applicable to RPAS.

- a) The ATC HMI shall identify aircraft operating as IFR RPAS.
- b) The ATC HMI shall clearly identify RPA known to be in a lost link situation.
- c) Demand complexity metrics used in the ATFM process by local ATFM units shall consider the potential added complexity linked to IFR RPAS management for ATC.

4.5.1.2 Performance and technical harmonisation requirements (for industrialisation)

Standardisation actions:

No standardisation action is required as a condition for the issuance of the Industrialisation Notice for this ATM sub-functionality.

This sub-AF establishes service requirements for the integration in European airspace of RPAS that are capable of flying IFR, including state aircraft that are not subject to airworthiness certificate but may choose to fly GAT IFR, or IFR RPAS certified by EASA against a certification basis built combining existing airworthiness codes with special conditions. The milestones in the sub-AF only address the availability of the air traffic service requirements.

The development of the first certification specification to allow the certification of RPA to fly in accordance with IFR will be developed as part of RMT.0230. The certification specification should

⁴ Please note that in accordance with ICAO modifications to Annex 2 (that will be translate into SERA.3201) in relation to integration of IFR RPAS, the remote pilot shall be always able to exercise its responsibilities to avoid collision independently of all other requirements. Also in accordance with ICAO, EASA would aim to require a DAA systems for IFR RPAS. This work will be undertaken within RMT.0230 thus compliance with the collision avoidance system will not be considered sufficient by EASA to meet this obligation.

include requirements to ensure the RPAS can operate as required in this sub-AF, but the availability of the RPAS certification specification is not required for the completion of the milestones in this sub-AF:

- CP2 requirements are aimed exclusively at ensuring the appropriate level of ATM service to IFR RPAS, whether certified through a certification specification developed as part of RMT.0230 or under military certification frameworks.
- RMT.0230 comprises several tasks, including the development of the first IFR RPAS certification specification and the amendment of ATM regulation to account for IFR RPAS' specificities.
- The requirements in this AF include requirements on the RPA and CMU that support the integration of the IFR RPAS in the European ATM environment and should be considered as an input to the future certification specification to be developed within RMT.0230. However, the scope of the certification specification will be much broader than what concerns the ATM requirements that apply to the IFR RPAS, which is why the completion of the certification specification is not a CP2 milestone for this AF.
- However, the RMT.0230 tasks related to the update of ATM regulation to account for the specificities of IFR RPAS are milestones for this AF; they are listed under the appropriate milestone.
- Once the milestones in this AF are completed and the corresponding ATSP requirements are deployed, and until the first certification specification for IFR RPAS is completed, the European ATM system will be ready to provide service to all IFR RPAS, but only IFR RPAS with military certification will be able to fly IFR and make use of this service (because there will not be any civilian certified RPAS yet).

For reference, the following aspects related to IFR RPAS certification are out of the scope of CP2 (and not relevant for the milestones above) but in scope of RMT.0230; for these aspects, CP2 requirements are an input to RMT.0230:

- The standards for CMU (MASPS ED-272 and MOPS in ED-311) may need to be updated in support of the IFR certification framework to cover the (cockpit display of traffic information) with display of cooperative traffic; these standards are also not required for the completion of the milestones in this sub-AF.
- The standards for ACAS for RPAS (e.g. ED-275 for ACAS Xu and ED-271A for EUDAAS) may need to be updated to cover the collision avoidance requirements for this AF, as well as interoperability between ACAS Xu and EUDAAs, between ACAS Xu and TCAS/ACAS X, between EUDAAS and TCAS/ACAS X and with future collision avoidance systems. These standards are also not required for the completion of the milestones in this sub-AF.

Actions for EASA

The following tasks are to be developed by EASA as part of RMT.0230 and are required for CP2 sub-AF E.1:

- To update the Standard European Rules of the Air (SERA) to include the consideration of IFR RPAS, establishing the applicable flight rules and harmonised contingency procedures, as well

as defining separation minima between RPAS and between RPAS and manned aircraft. This is sub-task C2 of RMT.0230, which covers the amendment of regulations applicable to type #1 regulations, and the corresponding AMCs and guidance material are part of sub-task C5 of RMT.0230.

- To update Commission Implementing Regulation (EU) 2017/373 defining ATC procedures applicable to RPAS, including contingency procedures. This corresponds to sub-task E4 of RMT.0230.
- To update Commission Implementing Regulation (EU) 2015/340 to include ATCO training requirements related to IFR RPAS, including contingency procedures. This is part of sub-task E4 of RMT.0230.
- To update the DS for the attestation of ATM/ANS systems as per IR 2023/1768 to reflect the required ATC ground system capabilities.

Additional regulatory actions:

National AIPs for all States in the area of applicability should publish provisions, including where necessary local provisions, to ensure the accommodation of State IFR RPAS that do not comply with the equipage requirements (ACAS and traffic awareness) applicable to non-state aircraft or that are equipped but are exempt from using equipment on a GAT flight due to the specific requirements of their mission.

4.5.1.3 Implementation target dates:

Stakeholders that are required to implement the functionalities related to this sub-functionality are the Air Traffic Service Providers and Airspace users.

ATM sub-functionality E.1	Stakeholder	Target Implementation date
	Air Traffic Service Provider	Date of issuance of the Industrialisation Notice + 5 years
	Airspace Users	Date of issuance of the Industrialisation Notice + 5 years

Table 22: Implementation Timeline for Stakeholders under ATM Sub-Functionality E.1

4.5.1.4 Implementation applicability area

The implementation applicability area covers ATSPs providing en-route and/or TMA ATC services in airspace classes A, B and C within the Single European Sky airspace, as defined in Article 3(33) of EASA Basic Regulation (EU) 2018/1139.

IFR RPAS operating in the area of applicability with individual certificate of airworthiness first issued on or after the target implementation date shall be equipped with traffic awareness function for cooperative traffic and a collision avoidance system.

State aircraft are exempt from equipage requirements.

4.5.1.5 Interdependencies with other CP2 functionalities

No direct interdependency with another ATM sub-functionality has been identified.

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5 COST-BENEFIT ANALYSIS

This chapter provides a high-level assessment of the economic value of CP2, with a particular focus on its contribution to the achievement of the performance ambitions set out in the ATM Master Plan (MP).

The analysis positions CP2 as a key implementation instrument to reduce the risk to the timely and effective delivery of Phase C of the ATM Master Plan. Without a coordination deployment framework for CP2, there is a material risk of fragmented implementation, delayed industrialisation, and reduced performance gains at network level within the required timeframe.

The CBA has therefore been structured to provide a clearer bridge between the performance and investment impact assessment performed at Master Plan level and the specific regulatory, industrialisation and implementation measures proposed under CP2. It assesses both the investment effort required to implement CP2 and the benefits expected from coordinated deployment, including capacity, operational efficiency, environmental performance and cost-effectiveness benefits.

5.1 CP2 scope, structure and time horizon

The CBA covers the ATM functionalities and sub-functionalities included in the CP2 proposal and reflects the geographical applicability defined in this document. The analysis covers EU Member States, Norway and Switzerland, and is based on a comparison between a reference scenario and a CP2 deployment scenario.

The reference scenario assumes that existing commitments, including CP1, are implemented, but that the additional coordination introduced by CP2 is not established. In that scenario, further modernisation may still take place, but in a more fragmented and less synchronised manner, with lower confidence that the full Master Plan performance benefits will be delivered in time.

The CP2 deployment scenario assumes that the ATM functionalities included in this proposal are industrialised and implemented in accordance with the sequencing logic defined in Section 2.6. The analysis therefore reflects the Industrialisation Notice as the key readiness gate between industrialisation and implementation.

For the purpose of management and consultation, the main emphasis is placed on the period up to 2035. This is the horizon by which all CP2 obligations are expected to be in force, although they may take different forms depending on the ATM functionality concerned. Some obligations take the form of classical implementation requirements, some take the form of forward-fit obligations, and some apply through RP5-linked transition planning or economic eligibility conditions.

Further details on the methodology applied for the CP2 cost-benefit analysis, including key assumptions on costs, benefits, traffic, and discount rate are provided in Appendix D.

5.2 Overall CBA Results

The overall CBA results confirm that CP2 requires a significant but proportionate investment effort to unlock the next phase of ATM performance. By 2035, total CP2 costs are estimated at approximately €3.1 billion (covering CAPEX⁵ and OPEX⁶). These costs reflect both the implementation investments borne by operational stakeholders and the industrialisation investments borne upstream by industry to enable deployment. The latter are progressively recovered over time through deployment and service provision. It also reflects one of the central lessons from CP1: implementation obligations are only credible if the upstream industrialisation effort is visible, sequenced and economically recognised from the outset.

The CBA also makes visible the scale of the industrialisation challenge. For AF G (SDO8) alone, initial input from major European ATM system manufacturers indicates an industrialisation effort of approximately €1 billion over the period 2028 to 2032. The industrialisation effort for AF F (SDO7), including the future multilink and connectivity architecture, will be consolidated in the final version and is also expected to be substantial.

At the same time, significant benefits are already at stake by 2035. By that horizon, cumulative benefits are estimated at approximately €5.7 billion, exceeding cumulative costs and generating a positive net impact of around €2.6 billion. This shows that CP2 is not only a long-term transformation instrument but already has a positive economic case within the next decade.

These results should be read together with Appendix D, which provides the detailed methodology, assumptions, cost and benefit identification, stakeholder breakdown, ATM functionality breakdown, and sensitivity analysis. The CBA approach is intended to avoid a black-box effect by making the calculation logic available for review by the relevant Reference Group and stakeholders.

The table 23 below summarises the main results of the analysis, including the cumulative investment costs and accrued benefits by 2035, 2040, 2045, and 2050. The 2045-time horizon provides a view of the benefits following full deployment. The 2050 perspective is aligned with the long-term outlook of the ATM Master Plan and allows for a more comprehensive capture of the benefits associated with sustained operations over time.

Time Horizon	Investments	Benefits
2028-2035	3.1	5.7
2028-2040	6.3	18.6
2028-2045	8.4	40.2
2028-2050	10.3	69.2

Table 23: Overall CBA results (undiscounted) in billion euro

⁵ Capital Expenditure (CAPEX): upfront investment costs associated with the design, development, procurement, integration and deployment of new systems, infrastructure and operational capabilities

⁶ Operating Expenditure (OPEX): recurring costs associated with operating, maintaining and supporting ATM systems and services once deployed and operational.

5.3 Impact on RP5 and potential write-offs

The period up to 2035 is particularly important for CP2 because its deployment sequence overlaps with RP5 and with the financing horizon highlighted by the European Commission during the Steering Group discussions. The CBA therefore gives specific attention to the timing of investment needs and to the implications for the performance and charging framework.

By 2035, total CP2 costs are estimated at approximately €3.1 billion. These costs are front-loaded in the period in which stakeholders will need to prepare industrialisation, launch procurement, adapt systems and start implementation. This makes CP2 directly relevant for RP5 performance planning, cost-recovery decisions and the treatment of restructuring costs.

Attention has been given to potential write-offs. The CBA distinguishes between incremental CP2 investment costs and accounting impacts linked to existing assets. Based on the current assessment, CP2-related write-offs are expected to be limited compared with the wider write-off exposure identified at Master Plan level, because the proposed sequencing, forward-fit approach and transition planning allow most legacy assets to continue operating during a managed transition. This is especially important for AF G (SDO8), where RP5 economic discipline is combined with ANSP transition plans to avoid both uncontrolled legacy renewal and pre-mature large-scale replacement.

This approach responds directly to the Steering Group request to assess the impact on RP5, including depreciation and potential write-offs, while ensuring that the CBA does not confuse implementation costs with accounting treatment of existing assets.

5.4 Investment needs, including industrialisation

CP2 requires investment on two distinct but interdependent fronts.

The first dimension relates to the upstream industrialisation investment needs of industry. These are the investments required before operational implementation can credibly scale, including the development of standards, technical artefacts, software baselines, service architectures, validation activities, certification ready solutions and market ready products or services.

The second dimension reflects the implementation investment needs of operational stakeholders. These are the costs incurred by ATSPs, ADSPs, airport operators, airspace users, the Network Manager and other relevant service providers to deploy, integrate, operate and transition towards the CP2 ATM functionalities.

This distinction is important. CP2 is not only an implementation framework for operational stakeholders. It is also an industrialisation framework for Europe's ATM industry. The credibility of the Industrialisation Notice, and therefore of the whole deployment sequence, depends on ensuring that the necessary industrial solutions are available before regulated implementation timeframes are triggered.

At CP2 level, implementation costs for operational stakeholders are estimated at approximately €3.1 billion by 2035, compared with total implementation costs of approximately €10.3 billion over the full

CBA horizon. This means that around 30 percent of total implementation costs are expected to materialise by 2035.

This confirms that CP2 has a material investment impact during RP5 and the first implementation horizon. At the same time, the phasing differs significantly by ATM Functionality. Some functionalities are more front loaded, while others continue to generate implementation costs after 2035 through forward fit, major system renewal, service scaling and lifecycle costs.

ATM Functionality	SDO	Implementation investment needs up to 2035	Total implementation investment needs to 2050	Share incurred by 2035
AF A - Airport data services and integration with the network	SDO 2	€259 million	€599 million	43 percent
AF B - Dynamic airspace configuration	SDO 3	€48 million	€90 million	53 percent
AF C - Trajectory based operations	SDO 5	€424 million	€677 million	63 percent
AF D - Virtualisation of operations	SDO 6	€147 million	€1,396 million	11 percent
AF E - IFR RPAS integration	SDO 10	€1,655 million	€3,079 million	54 percent
AF F - Multilink connectivity	SDO 7	€367 million	€2,980 million	12 percent
AF G - Service oriented delivery model	SDO 8	€216 million	€1,504 million	14 percent
Total CP2		€3,115 million	€10,325 million	30 percent

Table 24: Implementation investment needs by ATM Functionality in the CP2 Cost-Benefit Analysis

The table 24 shows that the largest implementation cost item by 2035 is currently AF E, followed by AF C, AF F, AF A, AF G, AF D and AF B. This should be interpreted with care. Some foundational functionalities, notably AF F and AF G, have a systemic enabling role that is not fully reflected in their investment profile up to 2035. Their associated costs remain relatively limited in this period, as they primarily support a broader transformation towards high-performance connectivity, service orientation, virtualisation and future automation, with more substantial deployment occurring later in the programme

The table 24 also shows that by 2035 all CP2 obligations are expected to be in force, but not all in the same form. Some take the form of classical implementation requirements. Others take the form of forward fit obligations, transition planning measures, RP5 linked economic conditions or service entry requirements. This is why implementation costs continue beyond 2035, especially for AF C, AF F, AF G and AF D.

In addition to the implementation costs shown above, CP2 requires substantial upstream industrialisation investment before 2035. These investments are necessary upstream investments that

must materialise for the implementation investment by operational stakeholders outlined above can be effectively scale.

For **AF G (SDO 8) alone**, initial input from major European ATM system manufacturers indicates an industrialisation investment need of around **€1 billion for ground manufacturing alone**. This relates to the development of the service-oriented delivery model, including modular ATM technical services, portability, interoperability, interchangeability, runtime and execution environments, and the industrial foundations needed.

This figure does not yet include the industrialisation investment required for **AF F (SDO 7)**. The final version of the CBA should consolidate this additional effort, which is also expected to be substantial given the scale of the multilink and future connectivity architecture.

The investment picture before 2035 therefore has two layers. The first layer is upstream industrialisation investment, which enables market uptake. The second layer is the operational implementation effort itself, estimated at around **€3.1 billion by 2035**. Around **€1 billion** of industrialisation investment has already been identified for AF G (SDO 8) alone, while a substantial AF F (SDO7) amount still needs to be added (more detailed available in Appendix D).

Significant Industrialisation investments	Period	Current status in CBA	Indicative investment need
AF G (SDO 8) Service oriented delivery model	Before 2035	Included based on initial input from major European ATM system manufacturers	Around €1 billion
AF F (SDO 7) multilink and future connectivity architecture	Before 2035	To be consolidated in the final version	Expected to be substantial
Other AF industrialisation actions	Before 2035	Reflected mainly through standards, EASA actions and implementation prerequisites	To be refined where relevant

Table 25: Significant Industrialisation Investment Needs Reflected in the CP2 Cost-Benefit Analysis

This confirms a central lesson from CP1. Coordinated implementation and industrialisation are closely connected and the period up to 2035 will be particularly critical to unlock these investments.

5.5 CP2 contribution to the Master Plan performance ambition

The benefits quantified in the CP2 CBA should be read against the wider performance ambition of the European ATM Master Plan. Table 14 of the Master Plan defines the expected performance impact of CP1, CP1 plus Phase C, Phase D and the overall 2050 trajectory across the main KPAs, using **2023 performance levels as the reference year**. The CP2 CBA uses a different but complementary baseline: it compares a CP2 deployment scenario with a reference scenario in which existing commitments, including CP1, continue, but the additional coordination introduced by CP2 is not established.

For this reason, the table 26 below should not be read as a strict one to one mathematical comparison. It is a like for like comparison by KPA and unit, intended to show how the selected CP2 scope contributes to the broader Master Plan performance ambition. CP2 does not cover the full Phase C envelope. It covers only the subset of Phase C SDOs, or parts of SDOs, for which a Common Project instrument is considered necessary because fragmented deployment, misaligned investment or delayed industrialisation would put network level benefits at risk.

KPA	Master Plan CP1 plus Phase C performance ambition, compared with 2023	CP2 CBA quantified assumption, compared with CP2 reference scenario	Indicative CP2 contribution compared with Master Plan envelope*	Interpretation
Airspace capacity, en-route and TMA	Plus 60 percent	Plus 45 percent	Around 75 percent of the CP1 plus Phase C ambition	CP2 captures a substantial share of the Master Plan airspace capacity ambition through dynamic airspace configuration, trajectory based operations, virtualisation, multilink connectivity and the service oriented delivery model
Airport capacity	Plus 15 percent	Not in scope of CP2	Not in scope of CP2	Not in scope of CP2
Environment, fuel and CO2	Minus 109 kg per flight, corresponding to minus 1.6 percent	Minus 25 kg per flight	Around 23 percent of the CP1 plus Phase C fuel saving ambition	CP2 captures a targeted part of the environmental ambition, mainly through TBO, dynamic RAD and better network predictability
Passenger time saving, departure punctuality	Minus 0.9 minutes per flight	Minus 0.9 minutes per flight	Aligned with the CP1 plus Phase C ambition	CP2 is aligned with the Master Plan punctuality assumption for the CP1 plus Phase C horizon
Cost efficiency, ANS cost reduction	Minus 164 euro per flight	Minus 100 euro per flight	Around 61 percent of the CP1 plus Phase C ambition	CP2 captures a significant share of the cost efficiency ambition through dynamic capacity management, ATCO productivity gains, service orientation and progressive virtualisation

Table 26: CP2 Contribution to Master Plan Performance Ambitions by KPA

***indicative because the baseline assumptions are not 100% equivalent (2023 vs CP1 + pure voluntary implementation of the SDOs)**

This comparison should be interpreted with care because the baselines are not identical. The Master Plan expresses the performance ambition compared with 2023. The CP2 CBA estimates the incremental contribution of the selected CP2 scope compared with a reference scenario in which existing commitments continue to generate benefits (e.g. CP1). Despite these methodological differences, the data confirms that CP2 represents a material and targeted slice of the Phase C performance ambition, especially for airspace capacity, passenger experience (punctuality) and cost efficiency.

CP2 acts as a critical enabler for network performance. Without CP2, existing modernisation efforts are unlikely to be sufficient to prevent further deterioration of European Network performance as traffic demand continues to grow.

5.6 Sensitivity analysis and robustness of the CBA

The robustness of the CBA has been tested through the sensitivity analysis presented in Appendix D. The table 27 below is reproduced from the appendix to ensure full traceability of the assumptions and results. It shows that the CBA remains positive across all tested downside scenarios, even though the level of net benefits varies depending on traffic evolution, discount rate, environmental benefits, passenger time savings, ATCO productivity and ADSP market structure.

Parameter	Low value	Base value	High value
Traffic evolution (low-medium-high)	6,989 M€	16,514 M€	40,794 M€
Environment (15-25-50)	15,724 M€		18,489 M€
Passenger time saving (0.5-0.9-1.5)	14,535 M€		19,483 M€
ATCO productivity (50%-100%-150%)	14,642 M€		17,827 M€
Discount rate (4%-8%-12%)	30,360 M€		9,446 M€
Number of ADSPs (3-13-29)	16,889 M€		15,914 M€

Table 27: Sensitivity Analysis Results for Key CP2 Cost-Benefit Parameters

The sensitivity analysis confirms that CP2 remains subject to uncertainty, but not to a fragile economic case. No tested scenario turns the CBA negative. The main implication is therefore not that CP2 is risk free, but that the economic case remains robust provided industrialisation, regulatory readiness and stakeholder implementation are effectively managed.

6 CONDITIONS FOR SUCCESSFUL IMPLEMENTATION OF CP2

This chapter describes the conditions considered necessary for the successful implementation of the CP2 proposal. It does not pre-judge future regulatory decisions on the evolution of SESAR governance, Union funding priorities or the future Multiannual Financial Framework.

1. CP2 as a system instrument ensuring SES instruments work hand in hand:

Experience from previous deployment cycles has shown that optimising individual SES instruments in isolation does not deliver system transformation. R&I outcomes risk stalling without industrialisation, deployment obligations lose credibility without regulatory readiness, and performance targets become misaligned when modernisation is delayed.

CP2 responds to this by acting explicitly as a system instrument. It creates structured continuity between SESAR (from definition to deployment) as the technological pillar of SES, the safety and regulatory pillar (EASA), the network pillar and the performance and charging pillar. This end-to-end integration directly reflects the conclusions of the DG MOVE study on the ATM innovation cycle, which identified weak phase-to-phase integration as a structural bottleneck in Europe's ability to deploy innovation.

What needs to change is not the existence of these instruments, but the way they interact. CP2 establishes a single, shared trajectory so that innovation, regulation, and performance incentives reinforce rather than undermine each other. This also requires timely strategic alignment between all stakeholder groups whose investment and implementation decisions materially affect the pace, coherence and benefits realisation of CP2.

2. A designated Deployment Manager function as the backbone of coordination:

Lessons from CP1 and subsequent assessments show that coordination limited to implementation projects is insufficient when deployment depends on standards availability, certification material, and synchronised industrial readiness.

For CP2, a strengthened Deployment Manager function is therefore essential. This function must coordinate sequencing across CP2 functionalities, manage interdependencies between actors, and bridge the gap between SESAR development, industrialisation, and implementation. It must also declare deployment readiness milestones, including the Industrialisation Notice milestone marking the availability of standards, EASA certification material and industrial products/services.

To be effective, this function cannot be implicit. The Commission must explicitly designate the entity responsible for performing the Deployment Manager function, ensuring continuity, neutrality, and accountability for coordination across the full CP2 lifecycle.

3. Industrialisation as a first-class success condition serving EU competitiveness:

One of the most important lessons from CP1, confirmed by the European Court of Auditors and echoed in the DG MOVE innovation cycle study, is that deployment coordination alone does not guarantee results if industrialisation is immature or fragmented. In several cases, solutions were technically validated but not yet sufficiently industrialised for smooth and synchronised deployment at scale, leading to delays and reducing the effectiveness of deployment.

In the current geopolitical and economic context, this shortcoming directly affects EU competitiveness. Air traffic management is a strategic infrastructure sector underpinning connectivity, productivity, and industrial leadership. Delays in ATM modernisation translate into higher costs for airlines, passengers, and the wider economy, while global competitors invest heavily in modernisation.

CP2 therefore elevates industrialisation to a first-class success condition. This requires predictable timelines for standards, certification specifications, and an enabling technical regulatory framework to be coordinated with EASA. This shift shortens time to market, reduces deployment risks, and strengthens Europe's technological sovereignty.

4. **Better leveraging EASA's role:**

The Master Plan and the DG MOVE study both underline that regulatory readiness must evolve in parallel with innovation. Late or misaligned regulatory intervention increases uncertainty and discourages investment.

Under CP2, EASA's role should be leveraged where it adds most value: ensuring that deployment readiness milestones are underpinned by available certification material, performing targeted field inspections for CP2-relevant functionalities, and providing feedback into deployment coordination. This creates a closed assurance loop between coordination, regulation, and implementation, improving credibility and predictability.

5. **Early designation of CP2-critical shared enabling functions:**

CP2 identifies a limited number of shared enabling functions whose value depends on uniform European implementation, and which cannot be delivered through fragmented national approaches. These include the **Union Air Traffic Data Services Framework (UADSF)** and the **Common European ATN backbone** for air-ground multilink communications infrastructure.

Early designation at Union level provides certainty to industry and operators, avoids parallel solutions, and enables progressive deployment aligned with CP2 milestones. Importantly, it delivers tangible benefits from day one by reducing uncertainty and coordination costs.

6. **Focused funding reflecting CP1 lessons learned:**

The experience of CP1 showed that broad co-financing of implementation investments, while useful in supporting coordinated deployment, did not always maximise additionality, in particular where investments were recoverable through the charging scheme. This reduced the leverage of EU funding and limited its capacity to accelerate timely modernisation.

CP2 therefore requires a qualitative shift in funding logic. Unlike in CP1, funding should also be targeted to industrialisation activities, coordination costs, and genuine restructuring efforts for faster implementation. This ensures that public resources actively change behaviour rather than subsidising the status quo.

7. **Alignment of the performance and charging framework and CP2 objectives:**

The Master Plan makes clear that performance and charging mechanisms must support modernisation objectives. For CP2 to succeed, it is therefore essential that the performance and charging framework – notably RP5 – and CP2 are fully aligned.

This implies that performance targets, restructuring mechanisms, and cost recovery rules must take due account of CP2-driven transformation, its implementation timeframes, the need for synchronised deployment, the protection of early movers, and the avoidance of unnecessary penalisation for transition costs. In this context, the Commission's work on modulation of charges can reinforce CP2 by aligning economic signals with deployment priorities, incentives and competitiveness objectives.

8. Preparing the evolution of CP governance and regulatory frameworks:

The systemic nature of CP2 requires the evolution of Commission Implementing Regulation (EU) No 409/2013. The current framework was designed for a more linear deployment context and does not fully reflect the importance of industrialisation, shared enabling functions, and phased readiness.

Preparing this evolution, together with aligning EASA's rulemaking planning (EPAS) with CP2 timelines, ensures that CP governance and regulation remain fit for purpose to de-risk the implementation of the Master Plan for the decade to come.

9. Ensuring CP2 benefits from day one:

CP2 is not a promise deferred to 2035. As experience from CP1 has shown, coordinated deployment can begin delivering benefits well before the final regulatory deadline is reached. Its adoption should mark a change of operating regime for SES from day one. CP2-relevant SDO elements move from optional evolution to managed transition; legacy solutions lose neutrality; and investment, industrial, regulatory, and performance decisions align around a known and agreed target architecture.

While full implementation extends to 2035, behaviour, incentives, and expectations change immediately. This immediate impact is essential to justify political sponsorship and to deliver early benefits in terms of predictability, coordination, and competitiveness.

This includes ensuring the network performance during the transition phase. As ATM in Europe is under increasing operational pressure, the transition phase allows for the roll-out of all capabilities that deliver capacity, efficiency and resilience to the network whether within the scope of CP2 or not.

10. Human resources as a critical enabler of ATM modernisation objectives:

A robust technological pathway for modernisation, alone, does not guarantee successful transformation. Across all phases from design to implementation the human dimension should be addressed with the same priority.

Ambitious objectives for air traffic control modernisation will inevitably mean important changes for a wide variety of staff and specifically for front-line actors. They will simultaneously need to ensure uninterrupted service continuity while being necessarily involved at all stages of research, industrialisation and implementation, adapting to new tools, procedures or operational concepts. This can create structural strain and social tensions if all aspects of a clear change management plan are not properly taken into account.

Strengthening the teams, beyond the staff needed to handle the constantly increasing traffic and assuring that staff are adequately trained and fully engaged is therefore not optional, but central to the success of CP2.

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Appendix B GLOSSARY

Actual In-Block Time (AIBT)	The actual time at which an aircraft arrives at the parking position and the parking brakes are set.
Actual Landing Time (ALDT)	The actual time at which the aircraft lands on the runway.
Actual Off-Block Time (AOBT)	The actual time at which an aircraft starts moving from the parking position, typically when the parking brakes are released.
Actual Take-Off Time (ATOT)	The actual time at which an aircraft becomes airborne.
Aerodrome of Departure (ADEP)	The airport from which a flight departs.
Aerodrome of Destination (ADES)	The airport at which a flight is planned to arrive.
Air-Ground (A/G)	Communication, connectivity, or data exchange between aircraft systems and ground-based ATM systems or service providers.
A/G Subnetwork	An air-ground communication subnetwork used to connect aircraft with the ground communication infrastructure supporting ATM data exchange.
A/G Subnetwork Communication Service Provider (A/G Subnetwork CSP)	A Communication Service Provider providing A/G subnetwork connectivity between aircraft and the common European communication infrastructure.
Air Navigation Service Provider (ANSP)	An organisation providing air navigation services, including air traffic services, and where applicable, communication, navigation, surveillance, meteorological, or aeronautical information services.
Air Traffic Control (ATC)	A service provided to prevent collisions between aircraft and to expedite and maintain an orderly flow of air traffic.
Air Traffic Controller (ATCO)	A person licensed and qualified to provide air traffic control services.
Air Traffic Management (ATM) Data Service Provider (ADSP)	An ADSP is an entity certified to provide ATM data services to one or more air traffic service units or other ATM service providers, under the SES regulatory framework (SES2+).
Air Traffic Flow and Capacity Management (ATFCM)	A network function aimed at balancing air traffic demand and available capacity.
Air Traffic Service Provider (ATSP)	An entity certified to provide air traffic services within a defined airspace or at an aerodrome, in accordance with the common requirements for ATM/ANS providers (SES2+).

Airport Decision Making (A-CDM)	Collaborative	A collaborative operational process through which airport stakeholders exchange timely and accurate information to improve airport and network predictability.
Airspace User (AU)		An operator of aircraft using airspace, including civil, and where applicable, military users.
ATM Software Function		A technology-neutral functional building block of the target ATM/ANS architecture, representing operational or support capabilities contributing to ATM/ANS functions.
ATM Technical Service		A modular software-based constituent implementing one or more ATM software functions through defined interfaces and associated performance, interoperability, cybersecurity and scalability characteristics.
Automatic surveillance – broadcast (ADS-B)	dependent	ADS-B is a Surveillance technique that relies on aircraft or airport vehicles broadcasting their identity, position and other information derived from on board systems (GNSS etc.). This signal (ADS-B Out) can be captured for surveillance purposes on the ground (ADS-B Out) or on board other aircraft in order to facilitate airborne traffic situational awareness, spacing, separation and self-separation (ADS-B In).
Automatic Surveillance (ADS-C)	Dependent - Contract	ADS-C is a datalink-based way of requesting different types of information directly from the aircraft's flight management system, without pilot interaction.
Capacity-on-Demand		The capability for an ATSU to delegate or receive defined air traffic services responsibilities under pre-agreed operational, technical and coordination conditions.
Commercial Sub-Network		An A/G subnetwork operating outside Aeronautical Mobile (Route) Service (AM(R)S) or Aeronautical Mobile Satellite (Route) Service (AMS(R)S) spectrum and used to complement safety subnetworks where permitted.
Common European Aeronautical Telecommunications Network (ATN) Backbone		The Common European ATN Backbone is a CSP certified in accordance with Regulation (EU) 2024/2083 providing connectivity between ADSPs providing ATS B2 and ATN B1 services and A/G sub-networks supporting the exchange of ATS B2 and ATN B1 data traffic
Communication Service Provider (CSP)		An entity that provides data link services for air traffic management (ATM).
Common European ATN Backbone CSP		The Communication Service Provider designated to provide the common European ATN backbone supporting the ATS B2 and ATN B1 data traffic exchange.
Controller-Pilot Link Communications (CPDLC)	Data	A means of communication between controller and pilot, using data link for ATC communications.
Cost-Benefit Analysis (CBA)		An assessment comparing the expected costs and benefits of an implementation over a defined time horizon.
Demand and Capacity Balancing (DCB)		The process of identifying and resolving imbalances between expected traffic demand and available capacity.

Departure Planning Information (DPI)	The purpose of the Departure Planning Information (DPI) message is to supply the NMOC with flight data related updates
Deployment Action (DA)	An implementation action defined in the European ATM Master Plan under an SDO
Design or Production Organisation (DPO)	An organisation approved by EASA to design or produce aeronautical products, parts, or appliances in compliance with EU aviation safety regulations (EASA).
Detailed Specifications (DS)	Technical specifications used within the EASA regulatory framework for ATM/ANS systems and constituents.
Digital European Sky (DES)	The SESAR programme framework supporting the development, industrialisation, and deployment of the next generation of European ATM capabilities.
Dynamic Airspace Configuration	An operational concept enabling the flexible adaptation of airspace structure in response to traffic demand and operational conditions.
European Union Aviation Safety Agency (EASA)	The EU agency responsible for civil aviation safety through certification, regulation and standardisation.
Estimated Taxi-in Time (EXIT)	The estimated time required for an aircraft to taxi from runway exit after landing to the parking position (in-block), used in arrival planning and sequencing.
Estimated Taxi-out Time (EXOT)	The estimated time required for an aircraft to taxi from the parking position (off-block) to the runway take-off point, used in departure planning and network calculations.
Extended Projected Profile (EPP)	Trajectory information downlinked from the aircraft, providing a projection of the planned flight profile.
Flight and flow information for a collaborative environment (FF-ICE)	An ICAO concept that aims to facilitate the transition to a fully collaborative environment where a flight trajectory is shared and optimised during all phases of a flight, known as trajectory-based operations or TBO.
Flight Management System (FMS)	An aircraft system supporting flight planning, navigation, and management of the aircraft flight profile.
General Air Traffic (GAT)	Encompasses all flights conducted in accordance with the rules and procedures of ICAO.
Human-Machine Interface (HMI)	The interface through which users interact with operational systems, including controller working positions and other ATM system interfaces.
Hybrid Communications Network (HYCON)	A multilink communication approach supporting the controlled use of different A/G communication links, including safety and commercial links, according to defined routing and performance policies.
Implementation	The phase during which ATM functionalities are deployed and put into operational use.
Increased Flexibility in ATCO Validation (IFAV)	A concept enabling more flexible ATCO validation agreements, particularly relevant to virtualisation and capacity-on-demand.

International Civil Aviation Organisation (ICAO)	The United Nations specialised agency responsible for international civil aviation standards.
Innovative Air Mobility (IAM)	Air operations involving new air vehicle types and operational concepts, including IFR RPAS.
Industrialisation	The phase preceding implementation, covering standardisation, certification readiness, and industrial maturity.
Industrialisation Notice	The formal readiness gate confirming that the conditions for industrialisation of an ATM functionality or sub-functionality have been met, allowing the regulated implementation timeframe to begin.
Interchangeability	Interchangeability of an ATM software function (within the ATM technical service) in a multi-vendor context, means that an ATM software function can be replaced by another ATM software function, from another vendor without requiring significant changes to the surrounding system's architecture, interfaces, configuration, or business logic. In case an ATM technical service covers more than one ATM software functions, it means that any ATM software function within that technical service can be replaced by the same ATM software function from another vendor without requiring significant changes to the ATM technical service and its surrounding system's architecture, interfaces, configuration, or business logic./
Interoperability	In general, interoperability is the ability of information and communication technology (ICT) systems, and of the business processes they support, to exchange data and to enable the sharing of information and knowledge. In the context of the new service delivery model, interoperability of an ATM software function (within the ATM technical service) is the ability to seamlessly exchange data and to enable the sharing of information and knowledge with another ATM software function (either within the same ATM technical service or with an ATM software function in another ATM technical service), including one provided by another vendor.
Internet Protocol Suite (IPS)	The protocol suite supporting the transition from ATN/OSI to IP-based air-ground data exchange.
IPS forward-fit phase	The point from which new ground implementations must be native to ATN/IPS.
LDACS	L-band Digital Aeronautical Communications System
Modular (architecture)	Modular Architecture refers to the practice of designing, building, and deploying services as discrete, self-contained, and reusable functional units that can be independently developed, maintained, and combined to form larger business processes or applications.
Multilink	The capability enabling the use of more than one air-ground communication link
Network Manager (NM)	The entity responsible for EU ATM network functions under Commission Implementing Regulation (EU) 2019/123
Network Operations Plan (NOP)	The operational plan used by the Network Manager to support network planning, coordination, and execution.
"Non-protected" sub-networks	"Non-protected" sub-networks in air traffic refer to radio frequency spectrum or communication links that do not have a dedicated, exclusive, or protected status, meaning they are subject to interference from other users. This can include shared

	bands like those used for Wi-Fi or mobile phone networks, which may be used for non-safety-critical applications.
Open Systems Interconnection (OSI)	The legacy communications protocol architecture currently used in parts of the aeronautical telecommunications environment.
Out-of-area flight	The term "out-of-area flight" generally refers to flights that originate outside the European Regulation Area and are arriving at European airspace or airports.
Performance-Based Communications and Surveillance (PBCS)	A framework specifying required communication and surveillance performance for defined operational services.
Predicted Off-block Time (POBT)	The time at which an aircraft operator or ground handler plans that the aircraft will be ready to leave the parking position, with all doors closed and ready for pushback or taxi.
Portability	Portability of an ATM technical service is the degree to which an ATM technical service can be transferred from one execution environment to another and continue to operate as intended without requiring redesign. Portability supports deployment across different compliant computing environments and, where applicable, across different organisational environments.
Proposal Development Team (PDT)	Group comprehending SJU, SDM and EASA representatives, set up for the drafting of the CP2 proposal
"Protected" sub-networks	"Protected" communication sub-networks in air traffic management (ATM) use dedicated, secure radio spectrum to ensure critical data links are reliable and secure for tasks like <u>controller-pilot data link communications</u> (CPDLC) and <u>surveillance</u> .
Reference Group (RG)	A stakeholder group established to support the CP2 Proposal Development Team.
Reference Period 5 (RP5)	The fifth reference period under the Single European Sky performance and charging scheme (2030-2034).
Regional Airport	Regional airports are typically defined not by strict size or traffic volume, but by its level of integration into the air traffic management (ATM) network and its operational capabilities.
Remotely Piloted Aircraft Systems (RPAS)	An unmanned aircraft which is piloted from a remote pilot station: expected to be integrated into the air traffic management system equally as manned aircraft [and,] real-time piloting control is provided by a licensed remote pilot.
Route Availability Document (RAD)	The document containing route availability restrictions used in European flight planning.
Safety Sub-network	An A/G subnetwork operating over protected aeronautical safety spectrum, including Aeronautical Mobile (Route) Service (AM(R)S) or Aeronautical Mobile Satellite (Route) Service (AMS(R)S) spectrum.
Satellite Communications (SATCOM)	Communication services provided through service links, including air-ground communications.
Service Oriented Architecture (SOA)	Architectural style that supports the designing of systems in terms of services and service-based development.

SES2+	The reform of the Single European Sky regulatory framework.
SESAR	The modernisation of Europe's Air Traffic Management (ATM) networks is crucial for the sustainability of European aviation and the forecasted increase in air traffic by 2035. The Single European Sky (SES) ATM research project, "SESAR", is one of the most ambitious modernisation projects launched by the European Union contributing to the implementation of SES. SESAR's goal is to define, develop, and deploy the technological solutions needed to increase the performance of Europe's ATM system.
SESAR Deployment Manager (SDM)	The SESAR Deployment Manager (SDM) is the entity that synchronises and coordinates the modernisation of Europe's air traffic management system under the political oversight of the European Commission. The SESAR Deployment Alliance has been appointed by the European Commission to fulfil this role. The main task of the SESAR Deployment Manager is to develop, submit to the European Commission for its approval and execute the Deployment Programme, a project view strictly drawn from the Pilot Common Project (PCP) set by Commission Implementing Regulation (EU) 2014/716, as well as any subsequent Common Projects in future regulations. Through the Deployment Programme, the SESAR Deployment Manager will ensure efficient synchronisation and coordination of implementation projects required to implement the PCP, as well as the related investments. The tasks of the Deployment Manager are described in Article 9 of Commission Implementing Regulation (EU) 2013/409.
SHALL statements	"Shall statements" are used to express a binding obligation
Standardised European Rules of the Air (SERA)	The common European rules of the air established under Commission Implementing Regulation (EU) 2012/923.
Steering Group (SG)	The governance body overseeing development of the CP2 proposal
Strategic Deployment Objective (SDO)	A high-level deployment objective defined in the European ATM Master Plan
System Wide Information Management (SWIM)	An information-sharing concept enabling interoperable exchange of ATM information through standardised services.
Target Time of Arrival (TTA)	A target time assigned for an aircraft to arrive at a defined port or airport.
Target Time Over (TTO)	A target time assigned for an aircraft to pass over a defined point.
Target Take-off-Time (TTOT)	The take-off time allocated by the Network Manager, taking into account airspace capacity constraints.
Technology Readiness Level (TRL)	A scale used to assess the maturity of a technology.
Terminal Manoeuvring Area (TMA)	A controlled airspace area normally established around one or more major aerodromes where arrival and departure routes converge.
Trajectory-Based Operations (TBO)	Operations based on the management and exchange of precise trajectory information across the flight lifecycle.

U-space	European system that is being developed to manage <u>UAS (unmanned aerial systems)</u> traffic. It is a set of specific services and procedures designed to ensure safe and efficient access to airspace for UAS.
Union Air Traffic Data Services Framework (UADSF)	Within the entity entrusted with the coordination of the deployment of CP2 (including maintenance of the deployment programme which shall include the planning and monitoring of industrialisation and implementation milestones), a Union-level coordination and facilitation framework for air traffic data services - hereinafter referred to as the Union Air Traffic Data Services Framework, UADSF - shall be established to support structured collaboration between all relevant stakeholders. The UADSF shall operate on the basis of a consensus driven approach and shall organise, with a leading technical role for DPOs with contribution from ADSPs and ATSPs, the preparation and regular maintenance of both the target (e.g. the targeted decomposition into ATM software functions) and the reference (e.g. the actual status of service decomposition at any given moment) framework for the new service-oriented delivery model. The UADSF shall maintain and adapt the target range of services over time as the shared target for industrialisation and implementation. In doing so, the UADSF shall support convergence on ATM software functions, the promotion of a competitive multi-vendor market and reduced time to deployment, and their standardisation implications, their interdependencies and associated (safety) criticality, and shall provide references to the applicable foundational industry standards. This shall also include common data structures and metadata, and, where necessary for interoperability and portability, a catalogue of standardised Application Programming Interfaces (API). The UADSF shall also facilitate the integration and delivery of deployment activities in support of compliance with CP2 obligations. The UADSF shall not replace or prejudice the design authority of DPOs with regard to the systems and constituents they design and produce, nor extend to product specific design choices or detailed implementation solutions and shall not duplicate existing regulatory or standardisation coordination mechanisms, including those for CP1.

Table 28: List of Terms

Appendix C MATURITY ASSESSMENT

***This appendix is NOT for consultation.
It represents the placeholder for the content described below, and it
will be significantly updated for the final version.***

In line with Commission Implementing Regulation (EU) 2013/409, this appendix contains the maturity assessment of all the SESAR solutions part of this CP2 proposal.

There are two groups of SESAR solutions to be considered:

1. Solutions which have reached TRL6 maturity in previous SESAR programmes, and
2. Solutions which have reached TRL6 maturity in the first wave of the current Digital European Sky Programme.

The maturity assessment for the solutions falling within group 1 has been performed by applying the EASA's "Methodology for the review of the suitability of a SESAR Solution/ATM Functionality to be specified in a Common Project". The description of the methodology, as well as the outcome of its application is reported C.1. It applies to the following solutions:

- AF A - DA 2.1: PJ.04-W2-28.1
- AF B - DA 3.1: PJ.09-W2-44
- AF C - DA 5.1: PJ.18-W2-53B
- AF C - DA 5.3: #201
- AD D - DA 6.1: PJ.10-W2-93
- AF F - DA 7.1: PJ.14-W2-77
- AF F - DA 7.2: #109
- AF G - DA 8.1: PJ.10-W2-93A, PJ.16-03
- AF E - DA 10.1: PJ.13-W2-115

The maturity assessment for the solutions falling within group 2 is still being performed and will be included in C.2 in September, during the finalisation of the proposal. It includes the following solutions;

- AF A - DA 2.2: FASTNet 0346, FASTNet 0347
- AF C - DA 5.2: ATC-TBO 0468, ATC-TBO 0469
- AF D - DA 6.1: ISLAND 0332, IFAV 0377 (now split in 4)

- AF F - DA 7.3: FCDI 0339, FCDI 0341
- AF G DA 8.1: iSNAP 0418, VITACY 0386, VITACY 0387, VITACY 0388
- AF E - DA 10.2: IRINA 0379

C.1 EASA methodology for the review of the suitability of a SESAR Solution/ATM Functionality to be specified in a Common Project

Introduction

The goal of the proposed methodology is to create a transparent process for assessing maturity and fitness for purpose for Common Projects, through a harmonised assessment of SESAR solutions contributing to ATM Functionalities.

The methodology could be applied at different points in time within the development cycle of a SESAR solution, but it is primarily targeted to be applied at the end of the industrialisation phase that enhance transparency in the process for the identification of SESAR solutions to support ATM Functionalities for Common Projects (CP).

Furthermore, it is structured in a manner to identify any possible risks and limitations for a successful implementation phase.

The methodology is divided into 3 parts:

- Part 1 – Description and operational target
- Part 2 – Self-reflecting questionnaire
- Part 3 – Independent evaluation

Part 1 is considered as a pre-requisite to move part 2. The responses to part 1 and part 2 are expected to be provided by the relevant experts. An independent body (e.g., an Agency) using internal or external experts not associated with the solution development, should act as an evaluator. This methodology is a tool to verify the validity, fitness for purpose, and maturity of proposed ATM Functionalities, it is not intended for the purpose of proposing any “new” rules”.

C.2 Maturity assessment of the SESAR Solutions from the first wave of the DES Programme

To be completed in preparation of the final version of the proposal.

Appendix D DETAILS OF THE COST-BENEFIT ANALYSIS

This appendix provides additional and more detailed information on the methodology and breakdown of the overall CBAs results reported in chapter 5. Still Sensitivity and risk analysis (section D.5) will be completed in next version.

D.1 Approach Overview

The CP2 Cost-Benefits Analysis has been carried out using a structural approach aimed at ensuring robust and reliable results. The CP2 CBA methodology consists of five steps.



Figure 9 - CP2 CBA Approach Overview

1. **Scenarios definition and operational assumptions:** the first step of the approach is to define the deployment scenario. This scenario describes how CP2-related investments (and associated benefits) would be implemented and are compared against the reference scenario, where the system evolves in accordance with the existing commitments (e.g. CP1) and without the additional coordination introduced by CP2. A set of common modelling assumptions is applied to operationalise this deployment scope for the purposes of the CP2 CBA.
2. **Cost and benefits identification:** the second step aims to identify the costs and benefits linked to the investment instances defined for each AF. It involves collecting and consolidating the necessary data base of information to cover CP 2 requirements.
3. **Cost-benefits execution:** the third step executes the cost-benefits calculation using the data collected in step 1 and 2. The calculation determines key financial indicators, including Net Present Value (NPV), Payback Period, Internal Rate of Return (IRR), and Benefit-Cost Ration (BCR), all at the overall CP2 level and for each individual AF/sub AF;

4. **Sensitivity and risk analysis:** the fourth step performs sensitivity analysis to assess the impact of changes in selected key drivers on the overall NPV of CP2 as well as to identify high-priority risks attached to individual AFs.
5. **Conclusions and recommendations:** the final step focuses on the elaboration of final conclusions and recommendations, also in terms of lessons learned, stemming from the cost-benefits execution process.

It is worth noting that a continuous iteration process has taken place among the involved stakeholder categories throughout the CP2 CBA exercise, in order to share, consolidate and validate approach, data, information, assumptions as well as logics underpinning the model used for the exercise.

D.2 Scenario definition and operational assumptions

The CP2 Cost-Benefit Analysis (CBA) applies the methodological principles defined in the SESAR DES HE ATM CBA Model Guide. Consistent with this methodology, the analysis is based on a delta comparison between a reference scenario and the CP2 deployment scenario.

- Reference scenario

The reference scenario (“do nothing”) is defined as the reference case in which only CP1⁷ is fully implemented, with its benefits realised by 2030. While Phase C investments may still occur beyond this point, they are deployed in an uncoordinated manner, without a common regulatory mandate or synchronised implementation approach. As a result, the expected system-wide benefits are not fully achieved and/or are significantly delayed. In this context, performance gains from CP1 will plateau after 2030, and as traffic continues to grow without aligned capacity and efficiency improvements. Consequently, the network is expected to experience increasing constraints and a marked deterioration in performance⁸.

- Deployment scenario

The analysis assumes the deployment of the full set of AFs within scope, aligned with the implementation pathway defined in the ATM Master Plan. For certain AFs, however, the industrialisation and implementation timeframes may differ from those foreseen in the Master Plan, reflecting the coordinated approach and specific conditions introduced under CP2 (e.g. AF G).

For each sub-AF included in CP2, and in line with the agreed SESAR CBA methodology, key deployment milestones are identified. These include the M2 milestone, corresponding to the issuance of the industrialisation notice and marking the start of implementation, as well as the implementation target date, corresponding to the achievement of full operational capability.

⁷ Reg. (EU) 2021/116 on the establishment of the Common Project One

⁸ European Commission: Directorate-General for Mobility and Transport. [Study on the current and possible future frameworks for the Air Traffic Management \(ATM\) innovation cycle.](#)

The table 29 below presents these milestones for the CP2 deployment scenario, detailed at ATM Functionality (AF) and ATM sub-functionality (sub-AF) level:

AF	Industrialisation Notice	Implementation date
A	2030	2035
B	2030	2035
C	2030	2035*
D	2032	2042
E	2030	2035
F	2030	2035*
G	2032	2042

Table 29: Hypothesis of Industrialisation notice and Implementation date per AF for CBA

*with forward fit equipage for airborne part

- Operational assumptions

The CBA assumes the following operational assumptions⁹:

- Traffic: the traffic outlook used in the CP2 CBA (for flights and CO₂ emissions) is derived from the EUROCONTROL Aviation Long-Term Outlook¹⁰. This forecast provides annual projections for total SES flight volumes, the share of scheduled air traffic, and unaccommodated demand.

	2028	2030	2035	2040	2045	2050
SES traffic (million flights)	10,4	10,8	11,3	12,1	12,8	13,3
SA traffic share (%)	84,3	85,4	82,9	83,4	83,7	83,8
SA Fleet (a/c)	4.510	4.626	4.768	4.992	5.229	5.383

Table 30 - Traffic outlook

- Fuel: fuel-related assumptions in the CP2 CBA are based on ReFuelEU Aviation (Commission Implementing Regulation (EU) 2024/2405), which sets out the expected development of the aviation fuel mix and corresponding cost components.

⁹ SESAR 3 Common Assumptions, 2035 outlook, narrowed down to SES airspace (EU27 + Norway and Switzerland) & SDM Common Project 1 CBA Update 2024, D.2.4.4, July 2024

¹⁰ STATFOR medium traffic Forecast 2024–2050

	2028	2030	2035	2040	2045	2050
Cost of fuel mix (€/tonne)	1.171	1.224	1.464	1.625	1.779	1.959
Kerosene price (€/tonne)	725	731	755	778	796	819
ETS allowance (€/CO2 tonne)	96	106	131	157	223	369
bio-SAF price (€/tonne)	1.835	1.794	1.898	1.872	1.793	1.740
e-SAF price (€/tonne)	3.625	2.975	2.500	2.025	1.863	1.700
Kerosene share (%)	95.6	94	80	66	58	30
bio-SAF share (%)	3,7	4,8	15	24	27	35

Table 31 - Fuel related assumptions

- Discount rate: a constant discount rate (i.e. 8%) is applied in line with the SESAR guidance, and all values are expressed in actual terms.
- Airspace Users:
 - For Flight Operating Centers (FOC): Airlines with more than 100 flights per day in the SES area (30 Airlines in 2035)¹¹
 - For Aircraft equipage: only forward fit equipage, up to 100 % a/c

The following aircraft forward-fitting rates are applied in this CBA:

Sub-AF	Stakeholder	Forward-fit rate
C.1	SA-R ¹²	55%
	SA-M ¹³	100%
	BA ¹⁴	100%
F.5 (SATCOM)	SA-R	11%
	SA-M	20%
	BA	20%

¹¹ Source: CAPA

¹² SA-R: Schedule Aviation Regional

¹³ SA-M: Schedule Aviation Mainline

¹⁴ Business Aviation

Sub-AF	Stakeholder	Forward-fit rate
F.5 (LDACS)	SA-R	44%
	SA-M	80%
	BA	80%
F.5 (HYCON)	SA-R	17%
	SA-M	30%
	BA	30%

Table 32: Forward-fitting rates per sub-AF and stakeholder

- RPAS:
 - For Remote Pilot Stations (RPS): 463 by 2050
 - For RPAS equipage: 650 flying aircraft by 2050

D.3 Costs and benefits identification

D.3.1 Costs identification

The costs accounted for in the study are summarized into several primary categories that capture both the initial investment and the long-term operational impact of the AFs in scope of CP2:

- Capital Expenditure (CAPEX): Initial investment required for each AF, including system design, hardware, software, integration, first-wave operational training, and development of new operational procedures. CAPEX is phased over time using a Gaussian distribution, consistent with the DES HE ATM CBA guidance on technology adoption profiles.¹⁵

While industrialisation costs (covering typically product development up to TRL6, industrialisation up to TRL8 and contribution to standardisation) are included in CAPEX, the following figures are reported:

- The approximate industry-side industrialisation cost is estimated by major European ATM system manufacturers (LIFT consortium: Leonardo, Indra, Frequentis and Thales) at approximately **€1 billion** over the period 2028 to 2032.
- The estimated airborne industrialisation Costs will be presented in final version of CP 2 proposal.

- Operating Expenditure (OPEX): Recurring costs associated with operation and maintenance of the new systems from Initial Operating Capability onwards. OPEX follows an S-curve

¹⁵ CAPEX spreads following a Gauss bell (diffusion of innovation theory) as there will be early adopter that deploy earlier (M2) and laggards that deploy later (M2+5 years). For the NM (since there is only one provider), the CAPEX is split equally between M2 and M2+5 years. Cost of capital is not considered.

progression, reflecting the gradual increasing number of operating environments (OEs) until Full Operating Capability (FOC) is achieved.¹⁶

All cost figures are expressed on a unit basis (e.g. per investment instance for CAPEX and per year of operation for OPEX).

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¹⁶ Consequently (see CAPEX spread footnote), the OPEX ramps up following an “S” adoption curve. Besides, the NM OPEX ramps-up linearly between M2 and M2+5years.

AF	sub-AF	ATSP			ADSP			AO			AU			NM			RPAS		
		CAPEX	OPEX	#	CAPEX	OPEX	#	CAPEX	OPEX	#	CAPEX	OPEX	#	CAPEX	OPEX	#	CAPEX	OPEX	#
A ¹⁷	A.1	-	-	-	-	-	-	1.54 M€	0.19 M€/y	28 APTs	-	-	-	0.10 M€	-	28 APTs	-	-	-
	A.2	-	-	-	-	-	-	0.98 M€	0.10 M€/y	15 APTs (ANI)	-	-	-	0.05 M€	-	70 APTs	-	-	-
								1.65 M€	0.23 M€/y	55 APTs									
	A.3	-	-	-	-	-	-	0.83 M€	0.10 M€/y	31 APTs	0.16 M€	-	30 FOCs	0.16 M€	-	31 APTs	-	-	-
B	B.1	0.82 M€	0.06 M€/y	48 ACCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C	C.1	8.35 M€	0.17 M€/y	42 ACCs + 4 APPs	-	-	-	-	-	-	0.03 M€	-	Jet aircraft: 100% FW > 2035	-	-	-	-	-	-
	C.2	0.67 M€	-	23 ACCs	-	-	-	-	-	-	-	0.07 M€	7 CFSPs	-	-	-	-	-	-
D	D.1	16.90 M€	0.94 M€/y	48 ACCs	-	-	-	-	-	-	-	-	-	13.56 M€	-	1 NMOC	-	-	-
E	E.1	4.80 M€	0.36 M€/y	48 ACCs + 211 APPs	-	-	-	-	-	-	-	-	-	-	-	-	0.16 M€	0.001 M€/y	463 RPS
																	0.08 M€	-	650 RPA
F	F.1	-	31.30 M€/y	2 CSPs, SES airspace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F.2	-	2.50 M€/y	2 CSPs, SES airspace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F.3	-	14.02 M€/y	2 CSPs, SES airspace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

¹⁷ Airport related costs included in CP2 support improved airspace and network capacity performance.

	F.4	-	4.51 M€/y	2 CSPs, SES airspace	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F.5	-	-	-	-	-	-	-	-	-	0.16 M€	-	Jet aircraft: 20% SATCOM 80% LDACS 30% HYCON FW > 2035	-	-	-	-	-
	F.6 ¹⁸	-	8.83 M€/y	2 CSPs, SES airspace	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G	G.1	5.74 M€	0.10 M€/y	48 ACCs	76.38 M€	1.04 M€/y	13 ADSPs	-	-	-	-	-	-	-	-	-	-	-
Total		2,769 M€	2.77 M€/y	-	993 M€	14 M€/y	-	174 M€	22 M€/y	-	91.2 M€	1 M€/y	-	25 M€	-	-	127 M€	0.6 M€/y

Table 33: Inputs to CP2 model

¹⁸ The cost of LDACS transition to IPS is covered in AF F.3

The total undiscounted cumulative costs over the reference time, including for RP4 and RP5 are presented in the following table 34.

Time Horizon	Cumulative costs (undiscounted; M€)
RP4 (2025-2029)	0
RP5 (2030-2034)	2,665
2028-2035	3,115
2028-2040	6,311
2028-2045	8,446
2028-2050	10,325

Table 34: Overview of cumulative costs (undiscounted) per time horizon

CP2 Write-offs

The ATM Master Plan 2025 defines a long-term transformation of the European ATM system, combining both additive and substitutive modernisation to be achieved by 2035. As some old ATM systems are planned to be replaced before the end of their planned life, part of their remaining value has to be treated as a write-off—meaning that the unused value of these assets is recorded as a cost of the transition.

This approach is consistent with the EU framework, which recognises that the introduction of new technologies and more integrated service models can generate long-term cost savings for users, while also requiring upfront restructuring costs.

Total write-offs during CP2 are estimated at around €30 million considering a 10-year depreciation period, in line with standard EU accounting rules. This amount is significantly lower than the €3.7 billion in write-offs foreseen in the Master Plan for Phase C. The difference is mainly explained by CP2 updated implementation timeline, now extending from 2030 to 2042, allowing more time to depreciate assets and thereby reducing write-offs.

For the cost-benefit analysis (CBA), these write-off values are not included in the modelling, as they represent accounting adjustments linked to past or already committed investments rather than incremental costs directly attributable to the implementation of the Master Plan.

D.3.2 Benefits identification

The benefits assessed are derived from operational performance improvements enabled by the ATM Functionalities (AFs) defined in section 3 and 4. These benefits are defined and assessed across key performance areas (KPA) reflecting improvements in capacity, environment, passenger time, and cost-effectiveness, in line with the European ATM Master Plan. These benefits capture how CP2 deployment affects the performance of the European ATM system and its stakeholders.

The table 35 below summarises the overall benefits of CP2 for the European ATM system and its stakeholders across the relevant KPAs.

Performance KPA	Description	Performance benefit
Airspace capacity	En-route capacity benefits represent delay savings for Airspace Users resulting from increased en-route airspace capacity enabled by CP2 AF/sub AFs. These benefits arise from reductions in ATFM delay per flight and include both tactical delay at gate and airborne strategic delay.	+45%
Environment	Flight time efficiency benefits represent reductions in fuel burn per flight enabled by CP2 AF/sub AF through more efficient trajectories and operations. These benefits are monetized and include the cost of fuel and associated CO2 emissions.	-25 kg/flight
Passenger time saving (Departure Punctuality)	Departure punctuality benefits capture reductions in departure delay per flight enabled by CP2. Benefits include savings from reduced tactical and strategic delays.	-0.9 min/flight
Cost Efficiency (ANS cost reduction)	ATCO productivity benefits represent cost efficiency gains for ANSPs resulting from increased controller productivity enabled by CP2 AF/subAFs. These benefits are reflected in reduced ATCO hours required per flight and monetised as avoided ATCO staffing costs. Efficiency gains stemming from transitioning to a more optimised service delivery model enabled by new functionalities lead to lower operational costs.	-100 euro/flight

Table 35 - Summary of KPA Performance Improvements Used for Benefit Quantification

RP4/RP5 Alignment

The CP2 proposal foresees significant improvements of the KPAs identified in the European ATM Master Plan for the next reference periods of the Performance and charging scheme of the Single European Sky. Performance benefits from CP2 are expected to materialise during Reference Period 5 (RP5). However, a direct alignment cannot yet be fully established, as work is still ongoing on the definition of RP5 KPIs, which may evolve alongside the regulatory framework. In this context, a positive and constructive cooperation has been initiated between the SJU and the PRB to ensure the best possible alignment going forward.

The key performance areas (KPAs) for RP5 are established under the SES2+ Commission Implementing Regulation (Article 21.3(a)) and focus on Climate and Environment (fuel and CO₂), Capacity, and Cost-efficiency.

In this context, CP2 is expected to contribute to measurable performance improvements during RP5, including:

- reductions in fuel burn and CO₂ emissions,
- improvements in capacity (reduced delay minutes per flight),
- cost-efficiency (lower costs per flight).

These contributions illustrate how CP2 supports the achievement of the foreseen RP 5 KPAs.

1. Benefit ramp-up

Operational benefits are assumed to materialise progressively over time as CP2 AF/subAFs are deployed across both ground systems and airborne fleets. The timing of cost and benefit realisation follows the implementation sequence defined in Section 2.6. Investment costs start at industrialisation notice, while operational benefits increase until 2040 for AF-A, AF-B, AF-C, AF-E and AF-F and until 2042 for AF-D and AF-G.

For each AF, benefit ramp-up is modelled through the combination of two mechanisms:

- **Ground ramp-up:** The deployment of ground systems and operational capabilities is assumed to follow an S-curve between industrialisation notice and full implementation. During this period, unit benefits (i.e. benefit per flight) increase progressively and remain constant once full implementation is reached.
- **Airborne ramp-up:** For benefits requiring aircraft equipage, the model translates the aircraft equipage ratio into a flight equipage ratio and, ultimately, into a share of achievable benefits. This mechanism reflects the fact that benefits are constrained until a sufficient proportion of flights is operated by equipped aircraft.

The effective benefit realised at any point in time is calculated as the product of the ground and airborne ramp-up curves, ensuring that benefits only materialise when both ground and airborne components are available.

For each KPA, operational performance improvements are monetised using the standardised mechanisms, which link performance changes to stakeholder-specific cost parameters.

KPA benefit calculations

For each KPA, operational performance improvements are translated into economic benefits using the SESAR calculation methodology described below and illustrated in the corresponding graphics.

Airspace capacity

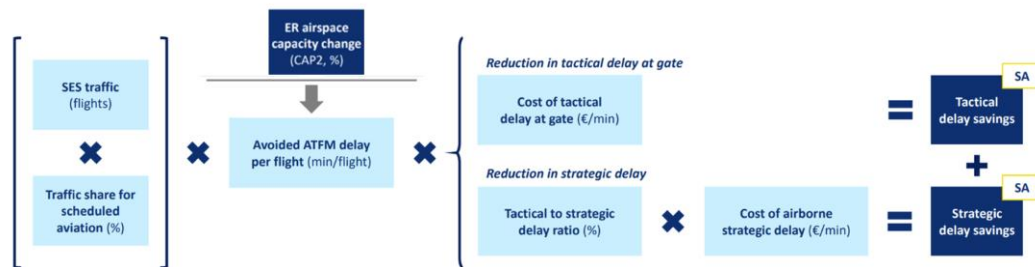


Figure 10 – Airspace capacity calculation

Airspace capacity benefits are calculated as follows:

- SES traffic (flights) is adjusted for the share of scheduled aviation.
- Terminal and en-route airspace capacity changes are applied.
- The resulting avoided ATFM delay per flight (minutes/flight) is calculated.
- Tactical delay at gate is valued at 100% of the ATFM delay using the tactical delay cost (€/min), while strategic airborne delay is valued as 25% of the tactical delay using the airborne strategic delay cost (€/min).
- Total airspace capacity benefit equals the sum of tactical and strategic delay savings.

Environment (Fuel reduction)

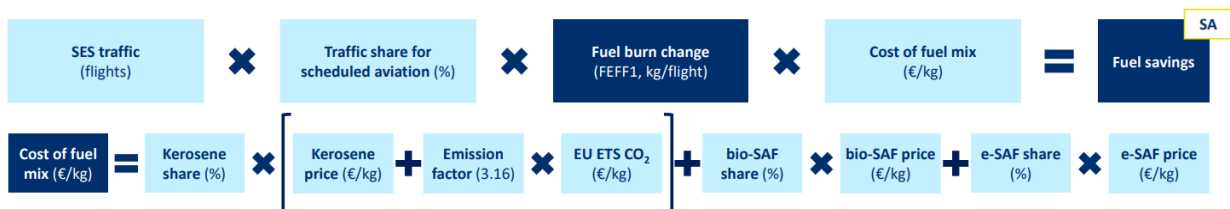


Figure 11 – Environment (fuel reduction)

Fuel Savings are calculated as follows:

- SES traffic is adjusted for the share of scheduled aviation.
- Fuel burn change per flight (kg/flight) is applied.
- Fuel savings are monetised using a weighted fuel mix cost composed of:
 - Kerosene share and price,
 - Associated EU ETS CO₂ allowances price.
 - Bio-SAF and e-SAF shares and prices.
- Total fuel savings equal fuel burn reduction multiplied by the fuel mix cost.

Passenger experience (Departure Punctuality)

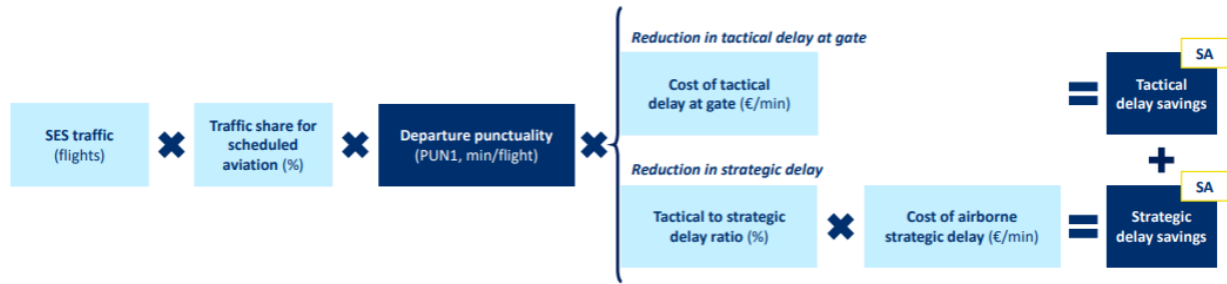


Figure 12 – Passenger experience computation

Departure Punctuality benefits are calculated as follows:

- SES traffic is adjusted for the share of scheduled aviation.
- Reduction in departure delay per flight (minutes/flight) is applied.
- Tactical delay at gate is valued as 100% of the delay reduction, using the tactical delay cost.
- Strategic airborne delay is valued as 25% of the delay reduction, using the airborne strategic delay cost.
- Total punctuality benefit equals tactical plus strategic delay savings.
- Included IATA delay codes. The indicator captures delay causes mapped to the following code groups:
 - Airport Weather: 71, 72, 75, 76, 77, 84
 - Airport ATM Factors: 83, 88, 89
 - Airspace ATM Factors: 81, 82
 - Airspace Weather: 73

Cost-efficiency (ANS cost reduction)

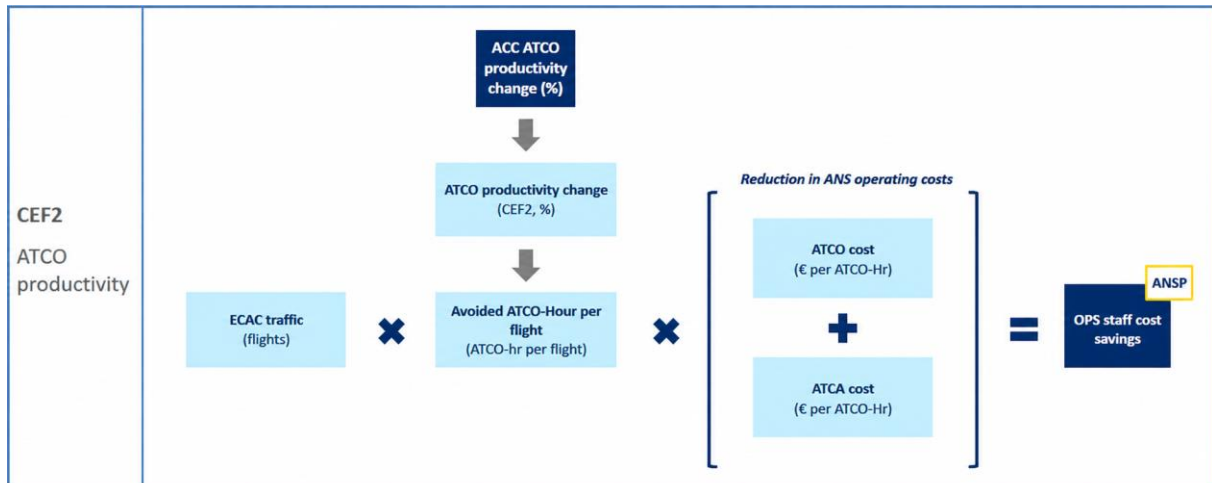


Figure 13 – Cost-efficiency calculation

Cost-efficiency benefits are calculated as follows:

- Traffic (flights) is combined with ATCO productivity improvements (ACC and TWR/APP), resulting in avoided ATCO-hours per flight.
- These avoided ATCO-hours are monetised using ATCO and ATCA unit costs to estimate reductions in ANS operating costs (OPS staff cost savings).
- In parallel, technology-related cost savings are captured through the avoidance of associated technology costs.

2. Benefits monetisation

Benefits are aggregated and reported at the level of individual AFs. For each AF, the operational performance improvements across all relevant KPIs are combined to derive the total economic benefit attributable to that functionality.

The calculation is performed on a yearly basis over the full analysis horizon, considering:

- the deployment milestones (Industrialisation notice + target implementation date);
- the ground and airborne ramp-up mechanisms; and
- the evolution of traffic and unit cost parameters.

These yearly values are used to generate benefit profiles over time. Results are presented both at overall KPA level and at AF level in the table 36 and figure 13 below. They form the basis for the cash-flow analysis and financial indicators described in the section 'Costs-Benefits execution'.

KPA	Cumulative benefits (undiscounted; M€)					
	RP4 2025-2029	RP5 2030-2034	2028 - 2035	2028 - 2040	2028 - 2045	2028 - 2050
Airspace capacity	-	1,222 M€	1,862 M€	6,791 M€	17,529 M€	34,262 M€
Environment (fuel reduction)	-	240 M€	385 M€	1,670 M€	3,921 M€	6,709 M€
Passenger experience (departure punctuality)	-	1,300 M€	1,953 M€	5,364 M€	9,008 M€	12,833 M€
Cost-efficiency (ANS cost reduction)	-	1,005 M€	1,501 M€	4,806 M€	9,724 M€	15,445 M€
Total	-	3,766 M€	5,701 M€	18,631 M€	40,181 M€	69,249 M€

Table 36: Overview of cumulative benefits (undiscounted) per KPA

The benefit ramp-up trajectory is illustrated in the figure 13 below.

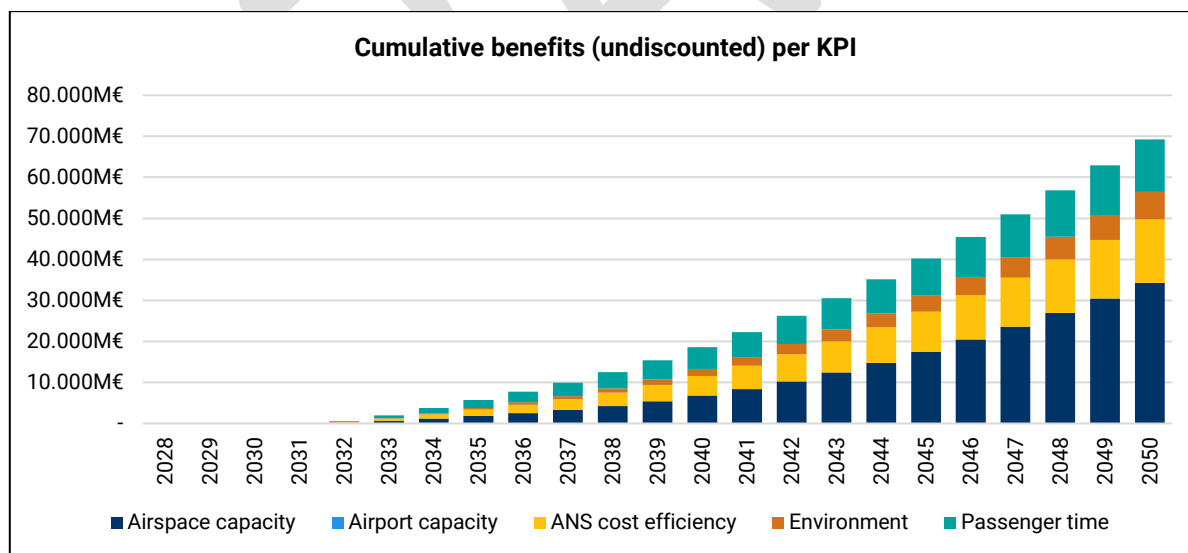


Figure 14 - Overall CP2 Benefits (undiscounted) Ramp-Up

D.4 Cost-Benefits execution

The CP2 CBA model calculates undiscounted and discounted annual free cash flows according to the following logic:

- Costs: Determined by multiplying the relevant unit cost parameters by the number of required investment or implementation instances for each ATM Functionality.
- Benefits: Obtained by monetising the operational performance improvements generated by the deployed solutions in line with their start industrialisation notice and implementation date.
- Annual Cash Flow: Computed as Benefits minus Costs for each year within the analysis horizon.

The cash-flow analysis produces the following indicators, both at overall level and per stakeholder:

- Net Present Value (NPV): The cumulative sum of the discounted annual cash flows over the full analysis period.
- Internal Rate of Return (IRR): The discount rate at which the NPV becomes zero.
- Payback Year (PBY): The first year in which cumulative discounted benefits exceed cumulative discounted costs.
- Benefit-to-Cost Ratio (BCR): The ratio of discounted cumulative benefits to discounted cumulative costs.

All annual cash flows are discounted using a fixed discount rate of 8%.

As the CP2 CBA is a cash-flow analysis, non-cash accounting impacts are excluded from the calculation of these indicators. The CBA does not intend to provide an exhaustive overview of the financial impact for the different stakeholders (e.g., existing OPEX nor potential write-offs is considered).

D.4.1 Overall results

This section provides an integrated overview of the CBA results, assessing cost and benefit performance across the full CP2 scope.

The cost-benefit analysis shows that CP2 requires early investment, with total costs reaching around €3.1 billion by 2035. However, benefits already exceed costs from RP5 onwards, generating a positive net cash flow of approximately €2.6 billion by 2035.

Over time, the economic case strengthens considerably. By 2040, cumulative benefits (€18.6 billion) clearly outweigh costs (€6.3 billion), resulting in a net positive impact of over €12.3 billion. This trend continues through 2050, with total net benefits reaching nearly €58.9 billion.

Time Horizon	Costs	Benefits	CCF	IRR	BCR	PBY
2028-2035	3,115 M€	5,701 M€	2,586 M€	102.9%	1.8	2034
2028-2040	6,311 M€	18,631 M€	12,320 M€	119.9%	3.0	
2028-2045	8,446 M€	40,181 M€	31,735 M€	120.5%	4.8	
2028-2050	10,325 M€	69,249 M€	58,924 M€	120.5%	6.7	

Table 37 - Overall cashflow (undiscounted) results

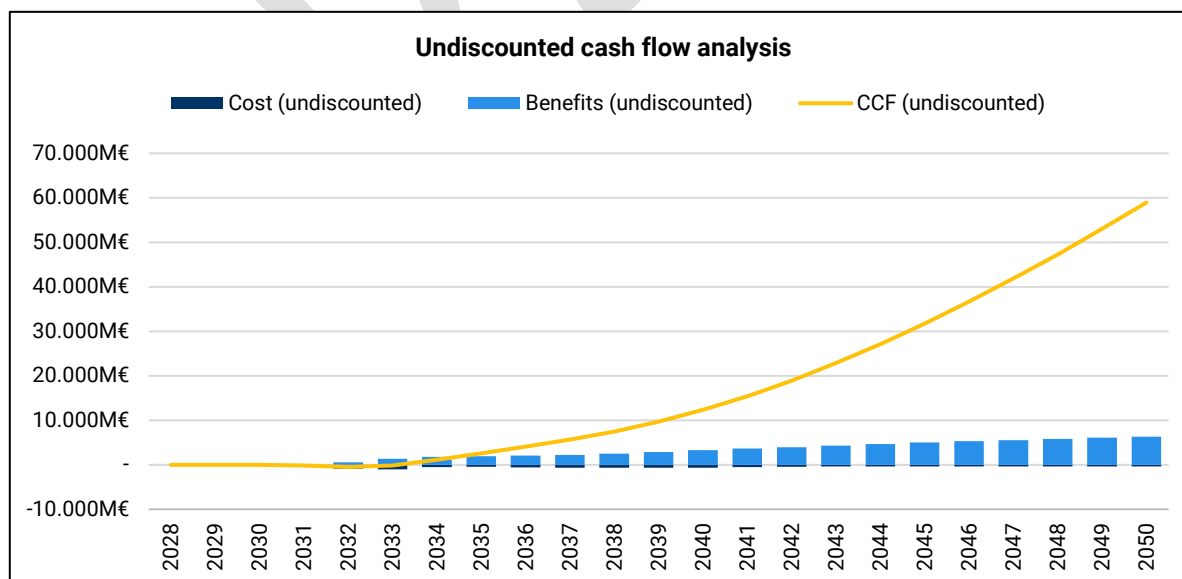
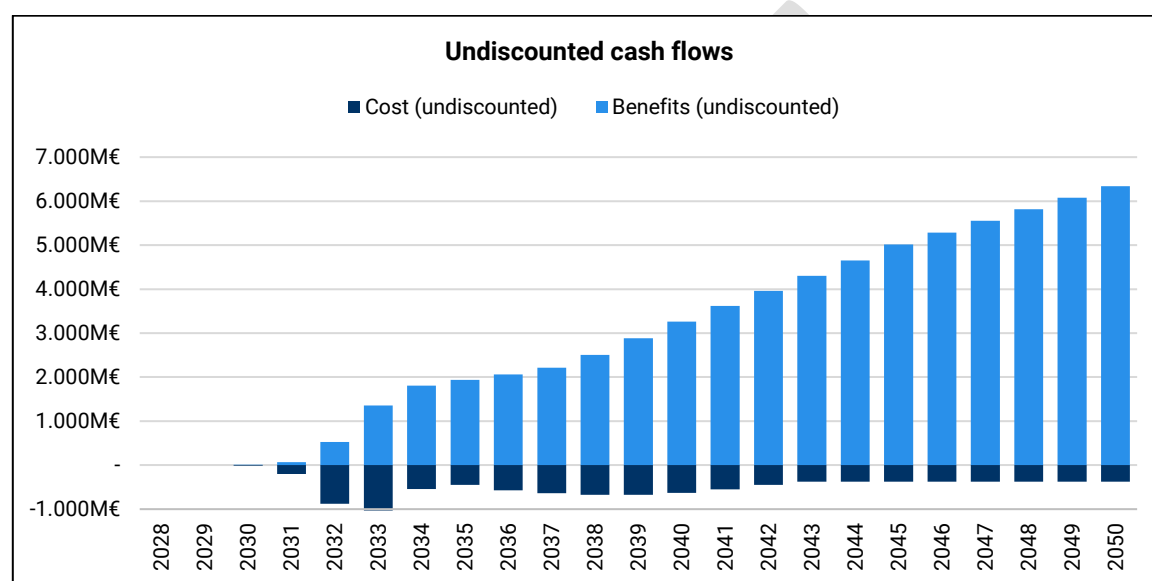


Figure 15 - Overall cashflow (undiscounted) results

Over the investment period up to 2035, CP2 achieves a NPV of 1,405 M€ for an investment of 1,964 M€. When considering discounted totals over the full 2028–2050 horizon, CP2 produces 20,864 M€

benefits. The table 38 below displays the discounted costs, benefits, and resulting NPV over various time horizons.

Time Horizon	Investments	Benefits	NPV	IRR	BCR	PBY
2028-2035	1,964 M€	3,369 M€	1,405 M€	102.9%	1.7	2034
2028-2040	3,337 M€	8,846 M€	5,509 M€	119.9%	2.7	
2028-2045	3,974 M€	15,095 M€	11,121 M€	120.5%	3.8	
2028-2050	4,350 M€	20,864 M€	16,514 M€	120.5%	4.8	

Table 38 - Overall NPV (discounted) results

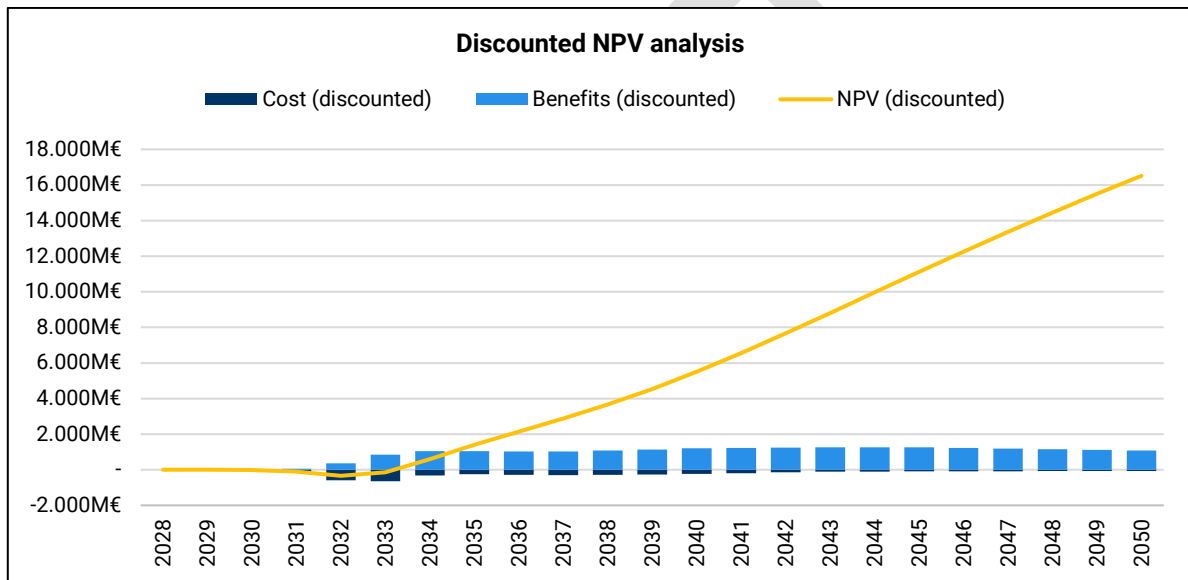


Figure 16 - Overall NPV (discounted) results

D.4.2 Results per stakeholder

Aviation users are the main beneficiaries, capturing most benefits through reduced delays, fuel savings, and improved efficiency, while air navigation service providers initially bear most of the investment costs but turn positive in the longer term.

The figures below present the undiscounted cumulative costs per stakeholder group over different time horizons.

STK	Cumulative costs (undiscounted; M€)					
	RP4 2025-2029	RP5 2030-2034	2028-2035	2028-2040	2028-2045	2028-2050
ATSP	-	2,219 M€	2,555 M€	4,590 M€	6,107 M€	7,493 M€
ADSP	-	81 M€	169 M€	907 M€	1,097 M€	1,165 M€

AO	-	219 M€	243 M€	356 M€	470 M€	583 M€
AU	-	6 M€	6 M€	302 M€	613 M€	921 M€
NM	-	12 M€	14 M€	23 M€	25 M€	25 M€
RPAS	-	128 M€	129 M€	132 M€	135 M€	138 M€
Total	-	2,665 M€	3,115 M€	6,311 M€	8,446 M€	10,325 M€

Table 39: Overview of cumulative costs (undiscounted) by stakeholder

D.4.3 Results per AF

As described in section 3 & 4, the CP2 content is structured around a set of ATM Functionalities (AFs), each contributing differently to the overall costs and benefits of the CP2 CBA. The analysis shows that benefits are highly concentrated in a limited number of AFs, while costs are more broadly distributed. In particular, AF B.1 is the main driver of benefits, generating very large gains already in RP5 (around €3.3 billion) and reaching over €37 billion by 2050. Other significant contributors include C.1, which deliver substantial benefits over time, especially from 2040 onwards. On the cost side, investments are more evenly spread, with AF E.1, G.1, D.1, and F-family AFs representing the largest cost items.

AF F and G contribute to the overall transformation as an enabling component, with their value reflected through system-wide benefits rather than directly quantified impacts. Indeed, the transition to a more flexible, service-oriented IT architecture is expected to reduce costs through faster deployment of solutions, lower hardware and software expenses, reduced maintenance needs, and shorter training times as expected with AF G (new service delivery model). These benefits are expected to materialise progressively, with the largest impact in Phase D, including around 30% reduction in CAPEX (approximately €1 billion) and annual OPEX savings of about €200 million.

As a result, the overall cash flow is already positive in RP5 (around €1.1 billion) and increases significantly over time, reaching more than €12 billion by 2040 and nearly €59 billion by 2050.

The tables below display cumulative undiscounted and discounted costs, benefits, and NPV per AF.

AF	Sub-AF	Cumulative costs (undiscounted; M€)					
		RP4 2025-2029	RP5 2030-2034	2028-2035	2028-2040	2028-2045	2028-2050
A	A.1	-	56 M€	62 M€	88 M€	115 M€	141 M€
	A.2	-	137 M€	152 M€	223 M€	294 M€	364 M€
	A.3	-	42 M€	45 M€	61 M€	77 M€	94 M€
B	B.1	-	45 M€	48 M€	62 M€	76 M€	90 M€
C	C.1	-	397 M€	407 M€	487 M€	570 M€	652 M€
	C.2	-	16 M€	17 M€	20 M€	22 M€	25 M€
D	D.1	-	70 M€	147 M€	847 M€	1,171 M€	1,396 M€
E	E.1	-	1,554 M€	1,655 M€	2,130 M€	2,604 M€	3,079 M€
F	F.1	-	125 M€	188 M€	501 M€	814 M€	1,127 M€
	F.2	-	10 M€	15 M€	40 M€	65 M€	90 M€
	F.3	-	56 M€	84 M€	224 M€	365 M€	505 M€

	F.4	-	18 M€	27 M€	72 M€	117 M€	162 M€
	F.5	-	-	-	251 M€	515 M€	778 M€
	F.6	-	35 M€	53 M€	141 M€	230 M€	318 M€
G	G.1	-	104 M€	216 M€	1,162 M€	1,411 M€	1,504 M€
Total		-	2,665 M€	3,115 M€	6,311 M€	8,446 M€	10,325 M€

Table 40: Overview of cumulative costs (undiscounted) per AF

AF	Sub-AF	Cumulative benefits (undiscounted; M€)					
		RP4 2025-2029	RP5 2030-2034	2028-2035	2028-2040	2028-2045	2028-2050
A	A.1	-	16 M€	24 M€	68 M€	115 M€	165 M€
	A.2	-	143 M€	215 M€	589 M€	990 M€	1,410 M€
	A.3	-	286 M€	429 M€	1,179 M€	1,980 M€	2,820 M€
B	B.1	-	3,288 M€	4,938 M€	14,156 M€	24,858 M€	37,056 M€
C	C.1	-	-	-	1,235 M€	8,327 M€	21,166 M€
	C.2	-	-	-	-	-	-
D	D.1	-	34 M€	95 M€	1,404 M€	3,911 M€	6,632 M€
E	E.1	-	-	-	-	-	-
F	F.1	-	-	-	-	-	-
	F.2	-	-	-	-	-	-
	F.3	-	-	-	-	-	-
	F.4	-	-	-	-	-	-
	F.5	-	-	-	-	-	-
	F.6	-	-	-	-	-	-
G	G.1	-	-	-	-	-	-
Total		-	3,766 M€	5,701 M€	18,631 M€	40,181 M€	69,249 M€

Table 41: Overview of cumulative benefits (undiscounted) per AF

For AF F and AF G, benefits are reflected indirectly through the enabling effect on other AFs and system-wide transformation rather than allocated as stand-alone monetized benefits in the model.

AF	Sub-AF	Cumulative cash flow (undiscounted; M€)					
		RP4 2025-2029	RP5 2030-2034	2028-2035	2028-2040	2028-2045	2028-2050
A	A.1	-	-40 M€	-37 M€	-21 M€	-0 M€	23 M€
	A.2	-	6 M€	63 M€	367 M€	696 M€	1,046 M€
	A.3	-	244 M€	384 M€	1,118 M€	1,902 M€	2,727 M€
B	B.1	-	3,243 M€	4,890 M€	14,094 M€	24,782 M€	36,965 M€
C	C.1	-	-397 M€	-407 M€	747 M€	7,757 M€	20,514 M€
	C.2	-	-16 M€	-17 M€	-20 M€	-22 M€	-25 M€

D	D.1	-	-36 M€	-52 M€	557 M€	2,740 M€	5,236 M€
E	E.1	-	-1,554 M€	-1,655 M€	-2,130 M€	-2,604 M€	-3,079 M€
F	F.1	-	-125 M€	-188 M€	-501 M€	-814 M€	-1,127 M€
	F.2	-	-10 M€	-15 M€	-40 M€	-65 M€	-90 M€
	F.3	-	-56 M€	-84 M€	-224 M€	-365 M€	-505 M€
	F.4	-	-18 M€	-27 M€	-72 M€	-117 M€	-162 M€
	F.5	-	-	-	-251 M€	-515 M€	-778 M€
	F.6	-	-35 M€	-53 M€	-141 M€	-230 M€	-318 M€
G	G.1	-	-104 M€	-216 M€	-1,162 M€	-1,411 M€	-1,504 M€
Total		-	1,101 M€	2,586 M€	12,320 M€	31,735 M€	58,924 M€

Table 42: Overview of cumulative cash flow (undiscounted) by AF

D.5 Sensitivity & Risk Analysis

The objective of the sensitivity analysis is to assess how changes in key assumptions influence the results and to identify the main drivers of variability.

The sensitivity analysis shows that results are primarily driven by a few key factors, with traffic evolution having the largest impact and leading to wide variations in outcomes. Other factors—such as environmental values, passenger time savings, and ATCO productivity—have a moderate impact on the results. On the other hand, the number of ADSPs has only a limited effect.

Overall, the results remain positive but are most sensitive to traffic and discount rate assumptions.

Parameter	Low value	Base value	High value
Traffic evolution (low-medium-high)	6,989 M€	16,514 M€	40,794 M€
Environment (15-25-50)	15,724 M€		18,489 M€
Passenger time saving (0.5-0.9-1.5)	14,535 M€		19,483 M€
ATCO productivity (50%-100%-150%)	14,642 M€		17,827 M€
Discount rate (4%-8%-12%)	30,360 M€		9,446 M€
Number of ADSPs (3-13-29)	16,889 M€		15,914 M€

Table 43: Sensitivity analysis

Overall, the sensitivity analysis confirms the robustness of the results, showing that the economic case for CP2 remains positive across a wide range of assumptions, despite variations in key parameters.

Appendix E INDUSTRIALISATION PLAN

This CP2 Industrialisation Plan identifies, for each ATM functionality or sub-functionality, the standardisation actions, enabling regulatory actions and other industrialisation prerequisites that must be completed before the relevant Industrialisation Notice can be issued, where such a Notice is required. It shall be read together with Section 2.6, which defines the three cumulative conditions for the issuance of an Industrialisation Notice, including the verification of a credible path to market availability within the regulated implementation timeframe.

E.1 AF A – Airport data services and integration with the network

Sub-AF A.1 – Connected regional airports

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
EUROCONTROL Specification for On-Line Data Interchange (OLDI), EUROCONTROL-SPEC-106	EUROCONTROL	Published (update is planned for Q2 2026)	ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS.GE.SoC	EASA	To be planned
EUROCONTROL Guidelines for On-Line Data Interchange (OLDI), EUROCONTROL-GUID-176	EUROCONTROL	Published (update is planned for Q2 2026, in line with the Specs update)			
DPI & API Implementation Road Map (Edition 2.400, 1 October 2023)	EUROCONTROL	Published			
DPI Implementation Guide (Edition 2.700, 30 June 2025)	EUROCONTROL	Published			
API Implementation Guide (Edition 1.300, 1 October 2023)	EUROCONTROL	Published			

ED 141A "Minimum Technical Specifications for Airport CDM Systems"	EUROCAE	Published			
EUROCONTROL Specification for Airport Collaborative Decision Making (A-CDM)	EUROCONTROL	Published			
EUROCONTROL DPI Specifications	EUROCONTROL	To be planned			
Update of ED 141A "Minimum Technical Specifications for Airport CDM Systems"	EUROCAE	To be planned pending further confirmation of the need			
Update of EUROCONTROL Specification for Airport Collaborative Decision Making (A-CDM)	EUROCONTROL	To be planned pending further confirmation of the need			

Table 44: Standardisation and EASA Actions for Sub-AF A.1

Note: following coordination with relevant experts, both the Standardisation actions and the actions for EASA listed above are considered achievable by 2029.

AF A – Airport data services and integration with the network

Sub-AF A.2 – Enhanced airport-NOP tactical planning

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
EUROCONTROL Specification for On-Line Data Interchange (OLDI), EUROCONTROL-SPEC-106	EUROCONTROL	Published (update is planned for Q2 2026)	ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS-GE.SoC	EASA	To be planned
EUROCONTROL Guidelines for On-Line Data Interchange (OLDI), EUROCONTROL-GUID-176	EUROCONTROL	Published (update is planned for Q2 2026, in line with the Specs update)			
DPI & API Implementation Road Map (Edition 2.400, 1 October 2023)	EUROCONTROL	Published			
DPI Implementation Guide (Edition 2.700, 30 June 2025)	EUROCONTROL	Published			
API Implementation Guide (Edition 1.300, 1 October 2023)	EUROCONTROL	Published			
EUROCONTROL DPI Specifications	EUROCONTROL	To be planned			
New standard on data exchanges required for the airport-to-airport coordination process	EUROCAE	To be planned			

Table 45: Standardisation and EASA Actions for Sub-AF A.2

Note: following coordination with relevant experts, both the Standardisation actions and the actions for EASA listed above are considered achievable by 2030.

Note: the table above contains already the inputs related to FastNET project, which held its maturity gate before the finalisation of this v3 proposal.

AF A – Airport data services and integration with the network

Sub-AF A.3 – AOP-NOP data enhancement to the strategic and pre-tactical planning phases

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
EUROCONTROL Specification for On-Line Data Interchange (OLDI), EUROCONTROL-SPEC-106	EUROCONTROL	Published (update is planned for Q2 2026)	ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS-GE.SoC	EASA	To be planned
EUROCONTROL Guidelines for On-Line Data Interchange (OLDI), EUROCONTROL-GUID-176	EUROCONTROL	Published (update is planned for Q2 2026, in line with the Specs update)			
DPI & API Implementation Road Map (Edition 2.400, 1 October 2023)	EUROCONTROL	Published			
DPI Implementation Guide (Edition 2.700, 30 June 2025)	EUROCONTROL	Published			
API Implementation Guide (Edition 1.300, 1 October 2023)	EUROCONTROL	Published			
EUROCONTROL DPI Specifications	EUROCONTROL	To be planned			
New standard on data exchanges in support of the passenger demand prediction	EUROCAE	To be planned			

Table 46: Standardisation and EASA Actions for Sub-AF A.3

Note: following coordination with relevant experts, both the Standardisation actions and the actions for EASA listed above are considered achievable by 2030.

Note: the table above contains already the inputs related to FastNET project, which held its maturity gate before the finalisation of this v3 proposal.

E.2 AF B – Dynamic airspace configuration

Sub-AF B.1 - Dynamic airspace configuration

No standardisation actions or actions for EASA have been identified for this AF.

E.3 AF C – Transformation to trajectory-based operations (TBO)

Sub-AF C.1 – European ATS B2 Performance-Based Communications and Surveillance area

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
ED-110B - Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (Interop ATN B1)	EUROCAE	Published	CS-ACNS	EASA	To be planned
ED-242D - MASPS for AMS(R)S Data and Voice Communications Supporting Required Communications Performance (RCP) and Required Surveillance Performance (RSP)	EUROCAE	Published	SERA update (to ensure datalink requirements are compatible with CP2 connectivity requirements during operations of a flight in the applicability area)	EASA	To be planned
EUROCONTROL Specification for Data Link Common Services for the Aeronautical Telecommunication Network (ATN) EUROCONTROL-SPEC-192	EUROCONTROL	Published	DS for the attestation of ATM/ANS systems as per IR 2023/1768 (DS)	EASA	To be planned
ED-228C -Safety and Performance Requirements Standard for ATS Data Communications If additional requirements need be considered in support of CP2, then need to assess the feasibility to include it in the proposed timeframe	EUROCAE	Planned (expected Q4 2028)	2017/373 as amended by 2023/1771 (Provision of ATM/ANS) To consider how new ATS B2 CP2 services impact ADS procedures	EASA	To be planned
ED-229C -Interoperability Requirements Standard for	EUROCAE	Planned (expected Q4 2028)	1332/2011 AUR	EASA	To be planned

Baseline 2 ATS Data Communications					
ED-231C -Interoperability Requirements Standard for Baseline 2 ATS Data Communications, ATN Baseline 1 Accommodation. If additional requirements need be considered in support of CP2, then need to assess the feasibility to include it in the proposed timeframe	EUROCAE	Planned (expected Q4 2028)			
New standard to support the certification of the cockpit CPDLC HMI for its use with the advanced CPDLC applications, including the push-to-load functionality	EUROCAE	To be planned			
New standard (or update an existing one) to cover clock resilience requirements to GNSS interference	EUROCAE	To be planned			

Table 47: Standardisation and EASA Actions for Sub-AF C.1

Note: following coordination with relevant experts, the Standardisation actions listed above are considered achievable by 2028, the actions for EASA by 2029.

Note: the table above does not contain yet the inputs related to ATC-TBO project, for which the information will be available by end of Q2 2026.

AF C – Transformation to trajectory-based operations (TBO)

Sub-AF C.2 – Dynamic RAD

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
New EUROCONTROL specification to ensure interoperability between FDPS in NM for Dynamic RAD	EUROCONTROL	To be planned	ATM/ANS GE (ground equipment) 2023/1768: Annex III: Part ATM/ANS.EQMT.DEC DS-GE.SoC.003	EASA	To be planned

Table 48: Standardisation and EASA Actions for Sub-AF C.2

Note: following coordination with relevant experts, the Standardisation actions and the actions for EASA listed above are considered achievable by 2028.

E.4 AF D – Virtualisation of operation

Sub-AF D.1 – Virtualisation of operation

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
Interoperability Standard for ATM Data Services for Virtual Centres.	EUROCAE	Work ongoing in WG-122	Material necessary to enable an EU harmonised IFAV based en-route ATCO validation framework under Commission Implementing Regulation (EU) 2015/340, as amended by Commission Implementing Regulation (EU) 2023/893.	EASA	To be planned
ER-026 - Virtual Centre Standardisation	EUROCAE	Published	Complementary guidance material to support the safety assessment and operational use of ATSU-to-ATSU capacity-on-demand, including the responsibilities of delegating and receiving ATSUs, the conditions for activation, suspension, recovery and termination, and the preservation of operational accountability by the concerned ATSPs.	EASA	To be planned
ER-029 - Taxonomy of Services for Virtual Centres	EUROCAE	Published			

ED-XXX - Virtual Centre - Guidelines for Implementation	EUROCAE	Planned (expected Q4 2026)			
ED-YYY - Interoperability Standard for ATM Data Services for Virtual Centres	EUROCAE	Planned (expected Q4 2026)			

Table 49: Standardisation and EASA Actions for Sub-AF D.1

Note: following coordination with relevant experts, the Standardisation actions listed above are considered achievable by 2028, the actions for EASA by 2029.

Note: the table above contains already the inputs related to IFAV3 project, which held its maturity gate before the finalisation of this v3 proposal.

E.5 AF E – Enable innovative air mobility (IAM) and drone operations

Sub-AF E.1 – integration of IFR RPAS

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
			923/2012 (SERA) as amended by 2023/1772	EASA	Opinion 2030
			2017/373 as amended by 2023/1771 (Provision of ATM/ANS)	EASA	Opinion 2030
			965/2012 (Air operations)	EASA	Opinion 2030
			DS for the attestation of ATM/ANS systems as per IR 2023/1768 (DS)	EASA	To be planned

Table 50: Standardisation and EASA Actions for Sub-AF E.1

Note: following coordination with relevant experts, the Standardisation actions listed above are considered achievable by 2029, the actions for EASA by 2030.

Note: the table above contains already the inputs related to IRINA project, which held its maturity gate before the finalisation of this v3 proposal.

E.6 AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.1 – Transition towards high performance of air-ground connectivity (multilink) – A/G SATCOM over the L-band subnetwork component

No standardisation actions or actions for EASA have been identified for this AF.

AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.2 Transition towards high performance of air-ground connectivity (multilink) – common European backbone

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
Standard for the administrative and performance-based routing policies to be applied across the common European backbone and the associated air-ground communication environment, including the associated policy logic, performance inputs and operational application principles, subject to endorsement or recognition by EASA.		To be planned	Material required under Commission Implementing Regulation (EU) 2017/373 for the certification and oversight of backbone CSPs and other protected service providers involved in the common European backbone, as well as the regulation of ATS B2 ADSPs in part-ADS.	EASA	To be planned
Technical specifications for operational visibility, monitoring and logging functions necessary to support service monitoring, incident management and network oversight through the backbone.		To be planned	Clarify, through the relevant regulatory material, the respective roles, responsibilities and interfaces of ADSPs, backbone CSPs and certified A/G subnetwork CSPs operating over protected spectrum in the provision of ATS B2 services through the common European backbone.	EASA	To be planned

			Material required to support the coexistence of OSI and IPS configurations during the transition period, including the associated gateway and interoperability functions.	EASA	To be planned
			Endorse or recognise the proposed standard for the administrative and performance-based routing policies to be applied across the common European backbone and the associated air-ground communication environment, including the related policy logic, performance inputs and operational application principles, and reflect it as appropriate in the relevant regulatory material.	EASA	To be planned
			Material necessary to support the transition towards the future backbone-based architecture, including any consequential updates required to maintain consistency with Commission Implementing Regulation (EU) 2023/1770 and the	EASA	To be planned

			applicable certification framework.		
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Table 51: Standardisation and EASA Actions for Sub-AF F.2

Note: the table above does not contain yet the inputs related to FCDI project, for which the information will be available by end of Q2 2026.

AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.3 – Transition towards high performance of air-ground connectivity (multilink) – A/G subnetwork component LDACS

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
The LDACS communication technical standards and ICAO standards required for ground and airborne implementation of the terrestrial safety sub-network.		<i>To be planned</i>	Develop the regulatory material required for the certification and oversight of A/G subnetwork service provision over LDACS.	EASA	<i>To be planned</i>
The standards and technical artefacts required for integration of LDACS into the multilink architecture.		<i>To be planned</i>			
The standards required for the LDACS airborne antenna and related interfaces, and where relevant including compatibility with future hybrid terrestrial-satellite evolutions where applicable.		<i>To be planned</i>			

Table 52: Standardisation and EASA Actions for Sub-AF F.3

AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.4 – Transition towards high performance of air-ground connectivity (multilink) –A/G subnetwork component HYCON

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
The HYCON communication technical standards and ICAO standards required for the ground and airborne implementation of HYCON.		To be planned	Regulatory material required for the certification and oversight of A/G subnetwork service provision over HYCON.	EASA	To be planned
The standards and technical artifacts required for the integration of HYCON into the multilink architecture.		To be planned			

Table 53: Standardisation and EASA Actions for Sub-AF F.4

AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.5 – Transition towards high performance of air-ground connectivity (multilink) –Aircraft multilink connectivity

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
The standards and technical artefacts required for airborne multilink connectivity supporting the SDO 7 architecture.		To be planned	Develop or update the certification material required to support the implementation of the multilink architecture and corresponding administrative and performance-based routing policies.	EASA	To be planned
The standards and technical artefacts required for the airborne router, including link-health monitoring and multilink management functions.		To be planned			
The standards and technical artefacts required for implementation in aircraft of the applicable administrative and performance-based prioritisation policies for link selection.		To be planned			

Table 54: Standardisation and EASA Actions for Sub-AF F.5

AF F – Transition towards high performance of air-ground connectivity

Sub-AF F.6 – Transition towards high performance of air-ground connectivity (multilink) – transition to IPS

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
The aviation IPS profiles required to support ATS B2 communications.TN/IPS end to end interoperability.		To be planned	Material required to support the transition from ATN/OSI to ATN/IPS.	EASA	To be planned
The standards and technical artefacts required for ATN/IPS end to end interoperability.		To be planned	Material required to support coexistence of OSI and IPS configurations, including the associated gateway and interoperability functions.	EASA	To be planned
The standards and technical artefacts required for OSI to IPS gateway interoperability and coexistence.		To be planned	Confirm, through the relevant regulatory material, that the transition to ATN/IPS can be implemented without introducing unacceptable cyber-security vulnerabilities and without degradation of the required service performance laid down in the technical annex.	EASA	To be planned
The technical artefacts required to ensure that the ground architecture		To be planned	Material required to ensure that the transition	EASA	To be planned

can continue to accommodate OSI-equipped aircraft while enabling forward-fit transition to IPS for new aircraft.			from ATN/OSI to ATN/IPS does not introduce unacceptable cyber-security vulnerabilities, including as regards gateway functions, coexistence arrangements, authentication, integrity protection and the relevant security architecture of the transition environment.		
EUROCAE ED-262A "ED-262A Technical Standard of Aviation Profiles for Internet Protocol Suite".	EUROCAE	Published	Confirm, through the relevant regulatory material, the conditions under which the transition to ATN/IPS remains compatible with the objective of global interoperability.	EASA	To be planned
EUROCAE ED-315 MASPS on ATN-IPS end-to-end interoperability and certification.	EUROCAE	Published	Material necessary to support any consequential updates to the applicable aircraft, airspace use and service provision framework required for the transition to ATN/IPS.	EASA	To be planned
The standard for IPS-OSI gateway (e.g. AEEC 858 Part 2).					

Table 55: Standardisation and EASA Actions for Sub-AF F.6

E.7 AF G – Service-oriented delivery model (Data-driven and cloud-based)

Sub-AF G.1 – Service-oriented delivery model (Data-driven and cloud-based)

Standardisation Actions			Actions for EASA		
Scope	Organisation	Availability	Type of material (e.g. AMC)	Organisation	Availability
<u>Service Portability and Runtime/Execution Layer (of ATM technical services):</u> standard and technical specifications for the Service Portability and Runtime/Execution Layer in a service-oriented architecture for ATM/ANS systems	EUROCAE	To be planned	Update of (EU) 2017/373: development of a new Part-ADS in the regulatory framework of 2017/373, and common performance and safety requirements for ADSPs consistent with the SES2+ Basic Regulation Implementation and the provisions in CP2.	EASA	To be planned
<u>COTS cloud platform profile for ATM/ANS computing environments:</u> standard and corresponding technical specifications for a “Platform envelope” capability in a service-oriented architecture for ATM/ANS systems.	EUROCAE	To be planned	Update of Detailed Specifications: definition of high-level requirements about the ATM/ANS computing platform and include in an update of the Detailed Specifications and include as Acceptable Means of Compliance (AMC) the standard on Platform envelope and the standard on Runtime/Execution Layer for Service Portability.	EASA	To be planned

<u>Network</u> : guidance for safety assurance for non-functional network requirements, in a safety critical environment. This includes ATSP-ADSP and ADSP-ADSP connectivity.	EUROCAE	To be planned	Update of detailed specifications: Iterative update of the functions identified in the Detailed Specifications to include as Acceptable Means of Compliance (AMC) the industry standards for the corresponding ATM software functions (and consequently for the ATM technical services implementing these functions) as they become available and have been approved by EASA as AMC.	EASA	To be planned
<u>European harmonised safety/software assurance (for an ATM software function)</u> : industry standard for European harmonised safety/software assurance, including for the development of ATM software functions	EUROCAE	To be planned			
<u>Interoperability (of an ATM software function)</u> : industry standard on platform agnostic interoperability through open and standardised SWIM-compliant interfaces for ATM software functions, ATM technical services and ATM industry products, that can be referred in the reference architecture, that prescribes how interoperability at	EUROCAE	To be planned			

the level of an ATM software function is to be achieved					
<u>Interchangeability (of an ATM software function):</u> industry standard on interchangeability for the development of ATM software functions, that can be referred in the reference architecture, that prescribes how interchangeability is to be achieved.	EUROCAE	To be planned			
Industry standard for each of the ATM software functions (L2), in accordance with the service prioritisation roadmap, governed under the UADSF.	TBD	To be planned			
ER-029 WG-122 (Taxonomy of Services for Virtual Centres)	EUROCAE	Published			
ER-024 - WG-104 (SWIM SERVICES)	EUROCAE	Published			
ER-018 - SWIM SERVICE STANDARDISATION PACKAGE	EUROCAE	Published			
ED-294 - SWIM SERVICE SPECIFICATION TEMPLATE AND METHODOLOGY	EUROCAE	Published			
EUROCONTROL-SPEC-170 EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile	EUROCONTROL	Published			

EUROCONTROL-SPEC-195 EUROCONTROL Specification for SWIM Service Definition	EUROCONTROL	Published			
EUROCONTROL-SPEC-168 EUROCONTROL Specification for SWIM Service Description	EUROCONTROL	Published			
EUROCONTROL-SPEC-169 EUROCONTROL Specification for SWIM Information Definition	EUROCONTROL	Published			

Table 56: Standardisation and EASA Actions for Sub-AF G.1

Appendix F SUGGESTED UPDATES TO REGULATION 409

This Appendix is NOT for consultation.

**In agreement with the European Commission, it will be provided in
the final version**

Appendix G TECHNICAL ANNEXES

This appendix aims to further detail the technical requirements and services associated with the various ATM Functionalities described in the proposal. Considering its complexity and the need to provide regulatory unambiguity, this appendix should serve as the technical guideline for the stakeholders who must implement those requirements. It must be read in conjunction with the overall proposal, meaning that the technical requirements further described here are also mandatory when they are accompanied with a “shall”.

This appendix contains the technical annexes referred to in the requirements of the following functionalities

- AF B – Dynamic Airspace Configuration
- AF C – Transformation to Trajectory Based Operations
- AF F – Transition towards high performance of air-ground connectivity (multilink)
- AF G – Service Oriented delivery model (Data-driven and cloud based)

G.1 Technical Requirements ATM functionality B

The what-if function shall include the following functionalities:

- a) Utilisation of traffic loads and complexity traffic data.
- b) Integration of the impact on capacity of available weather data received from external providers via SWIM.
- c) Integration on the effective number of available positions, considering staff availability, including endorsement and currency constraints.

Integration of the impact scenarios developed by NM.

- d) Integration of the impact on capacity of airspace availability data based on Airspace Use Plan (AUP)/Update Airspace Use Plan (UUP) and on their tactical activation
- e) Presentation of resolution proposals for sector configuration, based on pre-defined performance indicators, and identification of associated flow measures, when needed.

G.2 Technical Requirements ATM functionality C

G.2.1 Technical airborne requirements

The onboard application shall support:

- a) All CPDLC messages in the CP2 ATS B2 services.
- b) Push-to-load for CPDLC messages with a clearance for a revision of the lateral route.
- c) Creation of along-track waypoints (ATW)/Place Distance (PD) in the FMS flight plan via a push-to-load action from the flight crew upon reception of a climb or descent clearance with a vertical constraint for the cleared altitude or level to be reached at or before a waypoint that is not already in the FMS active flight plan.
- d) Creation of an along-track waypoints (ATW)/Place Distance (PD) in the FMS flight plan via a push-to-load action from the flight crew upon reception of an ATC instruction requiring the flight to cross a specified waypoint at, at or below or at or above a specified altitude or flight level when the waypoint is not already in the FMS active flight plan.
- e) Provision of the following data groups via ADS-C when so requested by the ATSP:
 - I. Air vector and ground vector.
 - II. The extended projected profile including any waypoint level, speed or time restrictions, as well as the trajectory intent status indicating the navigation mode in the lateral, vertical, speed and time dimensions.
 - III. The earliest and latest time that the aircraft can reach a specified waypoint.
 - IV. The maximum and minimum speed for the climb, cruise at TOC, cruise at TOD and descent (or the subset thereof that is downstream from the current position of the aircraft).
 - V. For aircraft equipped with the ADS-C ACM application, the active VHF data with at least three (3) active VHF data frequencies.
- f) The extended projected profile window shall include the destination airport (if the destination airport is in the IFPZ) or the exit point of the IFPZ (for flights with a destination outside of the IFPZ).

G.2.2 Technical CPDLC – coordination and transfer HMI in the CWP integration requirements

The human-machine-interface (HMI) in the controller working position (CWP) supporting the coordination and transfer of flights across the border of two ATSPs in the area of applicability shall be integrated with the CPDLC application in support of the cross-border coordination of CPDLC clearances, including:

- a) Coordination of transfer conditions with the following attributes:

- I. Referral to the accepting controller.
 - II. Direct routing proposal.
 - III. Revised route proposal.
 - IV. Speed constraints, including maximum and minimum speed constraints.
 - V. Association of “DUE TO” (e.g. weather, airspace, traffic).
 - VI. Request for a specific STAR to be uplinked
- b) Proposal for revision of transfer conditions with the same attributes in listed in point a), including support for negotiation of counterproposals and for cancellation of a previously agreed speed constraint.
- c) Proposal/request for transferring an aircraft to a specific frequency.

G.2.3 Technical requirements for ATSUs providing En-Route ATC

The ATC ground system shall support the following functions:

- a) On-demand display on the controller HMI of the following data:
- I. 2D route in the EPP [Covered in CP1, but area of applicability is now larger.]
 - II. FMS top-of-descent (TOD) and top-of-climb (TOC) if in the current ATSU.
 - III. Crossover waypoint, if in the current ATSU.
 - IV. Display of predicted altitude and time over each of the EPP waypoints in the current ATSU.
 - V. The minimum and maximum speeds that each aircraft can do for the phases of flight that are relevant for the current ATSU.
- b) Alert the controller when the 2D route in the EPP is not the same as the 2D route in the ATC systems. *[Covered in CP1, but area of applicability is now larger.]*
- c) Airspace infringement alerts against the cleared trajectory considering the predicted 4D route downlinked from the aircraft.
- d) ATC ground systems shall use an input for trajectory prediction the 4D trajectory in the extended projected profile downlinked from the aircraft in preference to the 4D trajectory or flight-specific performance data from the FF-ICE flight plan.
- e) Conformance monitoring of current sector frequency against the active VHF frequencies downlinked from the aircraft.
- f) Controller support tools for the delivery of conflict-free CPDLC clearances:

- i. Descend when ready.
- ii. Start descent at EPP TOD, by preparing a clearance (for the controller to uplink) for the aircraft to descend to a specific level with a constraint to start descent at an ATW / PD created at the position of the EPP TOC downlinked by the aircraft.
- iii. Climb to reach cruising level at EPP TOC, by preparing a clearance (for the controller to uplink) for the aircraft to climb to the requested cruising level with a constraint to reach cruising level at or before an ATW / PD created at the position of the EPP TOC downlinked by the aircraft.
- iv. Climb or descend to reach a specific level at or before a specific waypoint.
- v. Climb or descend with one or more intermediate vertical constraints requiring the aircraft to cross an ATW at, at or below or at or above a specific intermediate flight level.

G.3 Technical Requirements ATM functionality F

G.3.1 A/G subnetwork service requirements (ATM sub-functionality F.3)

Datalink services must be provided with sufficient capacity to meet the following service requirements:

- Datalink services supporting the ATN B1 and ATS B2 applications must be provided with the quality of service sufficient to ensure that the most stringent TT95 requirements in the RSTP and RCTP in the ATS B2 standards at peak traffic times.
- The study referred to in AF F.3 should forecast the TT95 performance in accordance with the following provisions:
 - i. The EUROCONTROL air traffic forecast medium scenario and forecast distribution of air traffic density across the European network.
 - ii. The increase in data traffic due to the deployment of SDO 5.
 - iii. The forecast evolution of the AOC data traffic volume on the same link.
 - iv. Lowest hourly forecast TT95 performance in the ten (10) days with higher air traffic forecast per year in the European network.
 - v. The study shall consider the forecast evolution of VDL M2 technologies, including introduction of advanced VDL and secure VDL M2, and the introduction of IPS.

G.4 Technical Annex for ATM functionality G

G.4.1 Target L2 breakdown (target framework) and their initial assessment of criticality

The L2 services in dashed squares of

Figure 18: Target L2 breakdown (target framework) and their initial assessment of criticality are subjected to further individual cost, technical and performance feasibility analyses, as the costs and potential degradation of performance or resilience implied by the breakdown versus the gains in performance, scalability, reusability and resilience would depend on the design of the current industry ATM solutions.

For current designs being stateful, the split can prove challenging and might require a deep rework. Failing this, the L2 service reworked may suffer a lack of performance, or even a lack of integrity, and not rise to the promise, since the new design would not be fully scalable, especially in a triangle architecture where ADSPs are specialised and remote. Other types of design may or may not justify the split and entail a positive CBA, e.g. in terms of scalability, performance, data ownership or CI/CD.

It becomes therefore a matter of technical and performance feasibility analyses.

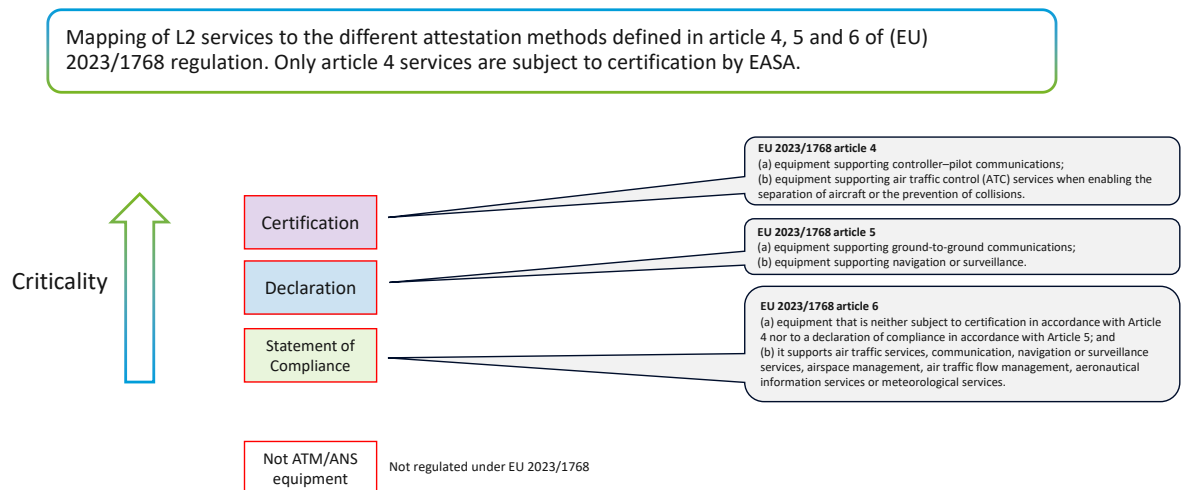


Figure 17: The various attestation methods applicable to L2 services (legenda to the breakdown)

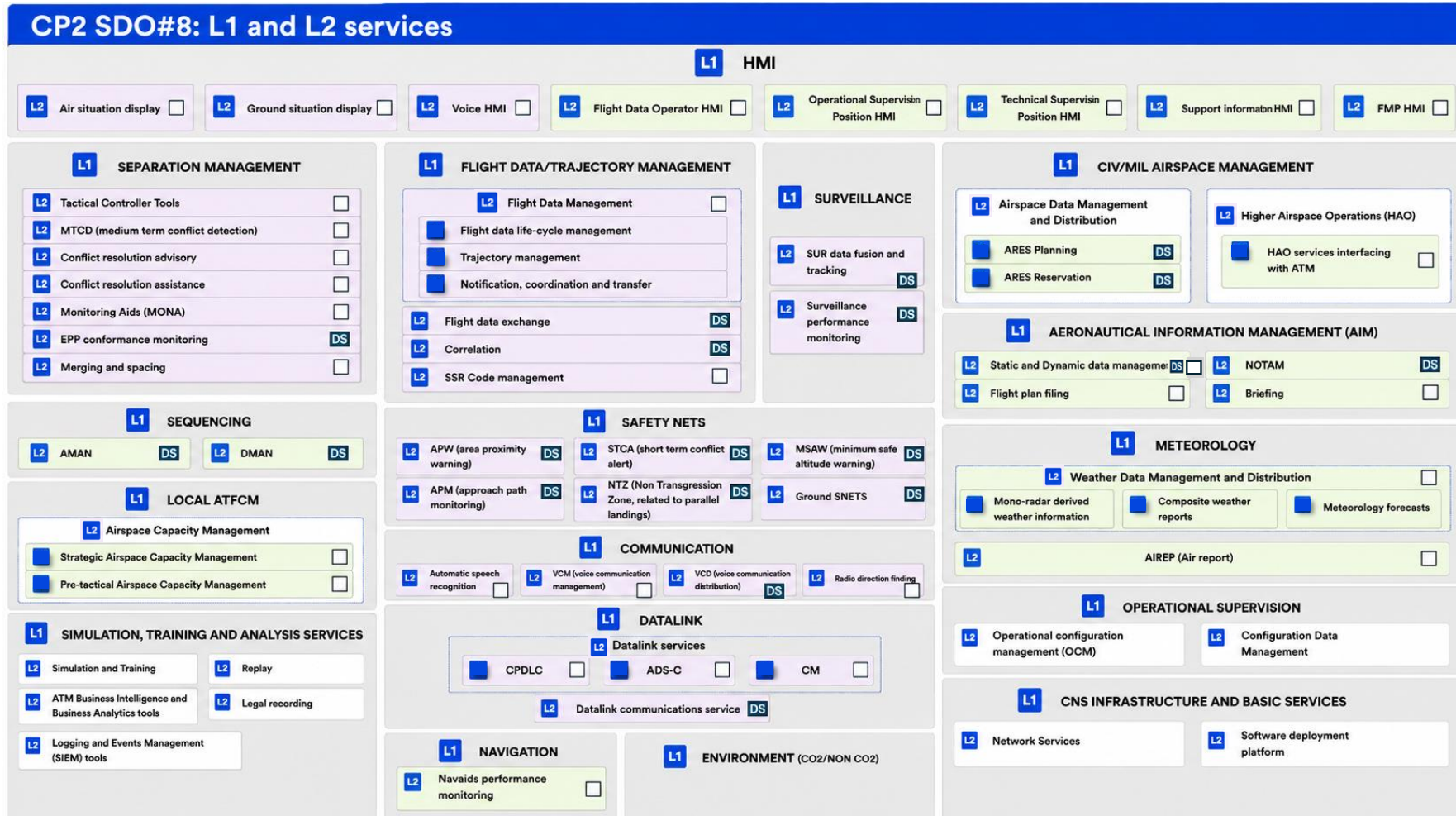
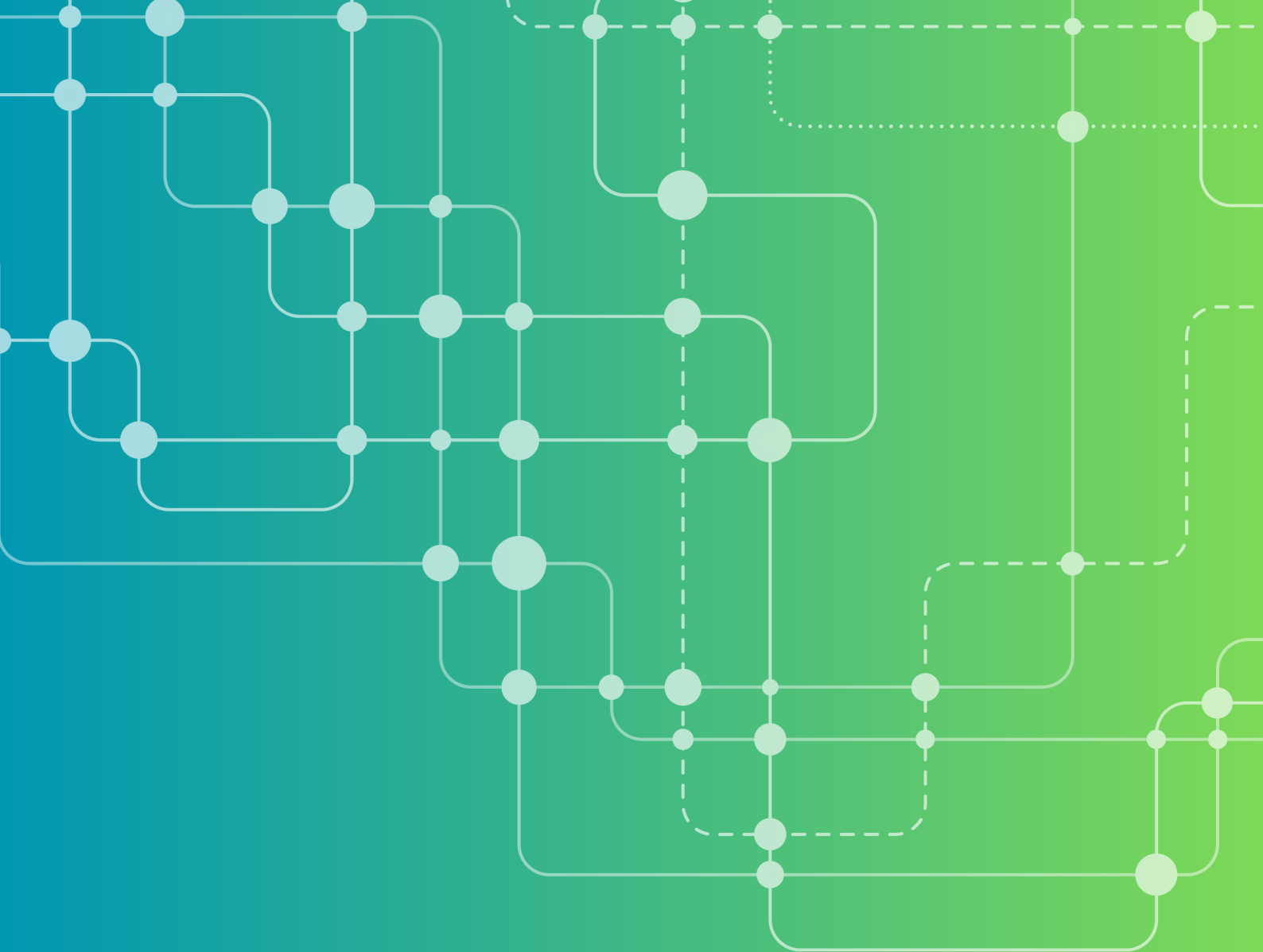


Figure 18: Target L2 breakdown (target framework) and their initial assessment of criticality



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