EUROCONTROL

Network Performance Plan 2025 - 2029

Approved through the COMMISSION DECISION (EU) 2025/1780 of 9 September 2025

CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER

FOUNDING MEMBER sesar JOINT UNDERTAKING

NETWORK MANAGER

Executive Summary

The Network Performance Plan (NPP) is, together with the Network Strategy Plan and the Network Operations Plan, a cornerstone instrument under the SES policy to ensure a functional European aviation network. Those instruments should thus be seen in conjunction. The specific aim of the NPP is to deliver measurable performance in partnership with Member States and all operational stakeholders. The NPP is guided by the Network Strategy plan and its strategic objectives, which guides the networks long term development, and is aligned with the ATM Master plan. The overall policy objective and challenge is to ensure a conversion towards a net zero emission sector by 2050 and to balance network capacity.

This NPP is taking into account the new, future environment and has used the performance targets defined in Commission Implementing Decision 2024/1688 of 12 June 2024.

The NM approach to achieve an agile and scalable ATM network will be based on:

- Coordinating airspace and managing air traffic flows both at strategic and tactical level
- Driving coordinated implementation of operational concepts and technologies
- Monitoring network performance
- Monitoring and coordinating the provision of infrastructure services
- Coordinating and supporting crisis management

Within the next reference period innovative SESAR technological solutions should be available. The challenge would be that of deploying them in the right way, thus fully supporting the Network Operational Concept of Operations (CONOPS) roadmap. NM's single value chain approach will continue to be instrumental to achieve this initial objective. In line with this the EUROCONTROL Network Manager has proposed the following three priorities, supported by the Network Management Board:

1. Open digital infrastructure
2. Air ground integration
3. Seamless airspace organisation

According to Article 10 of Regulation 2019/317, the objective of the NPP is twofold, namely:
1) to define the added value of the activities of the Network Manager in support of the activities of Member States and operational stakeholders towards achieving capacity and environmental targets as well as the contribution of the network functions towards achieving the Union-wide performance targets, and
2) define the NM performance targets and objectives and those for each network function, and the measures aimed at achieving those targets.

The key components of this NPP are thus the NM performance targets and objectives and the NM measures aimed at achieving these targets. Those measures are also quantified in order to enable monitoring.

The Commission is responsible for the monitoring of the performance of the network functions and have in this regard to assess whether the performance targets contained in the Network Performance Plan are met. In case the performance targets contained in the Network Performance Plan are not met or risk not being met, the Commission has to request the Network Manager to define appropriate measures in order to rectify the situation and achieve those targets.

The summary of the **key performance targets in this NPP** are as follows (full details in Chapter 3):

Safety

SAF-T: The NM target for RP4 is to achieve at least Level C in the safety management objectives (MOs) 'safety culture', 'safety assurance', and 'safety promotion' and Level D in the safety management objectives 'safety risk management' and 'safety policy and objectives' for its own Safety Management System.

Environment

ENV-T: The NM target is to achieve 4.15% for the horizontal en-route flight efficiency of the last filed flight plan trajectory (KEP).

Capacity

CAP-T(1): Achieve over RP4 a 10% ratio of total minutes of en route ATFM delay saved as a result of Collaborative Decision-Making network procedures and Network Manager Operations Centre actions over the initial total minutes of en route ATFM delays (en-route Delay Savings ENR-DS).

CAP-T(2): Achieve over RP4 a 5% ratio of total minutes of airport arrival ATFM delay saved as a result of Collaborative Decision-Making network procedures and Network Manager Operations Centre actions over the initial total minutes of airport arrival ATFM delays (airport Delay Savings APT-DS).

NM and the network partners will implement **measures during RP4 to achieve these targets** and support the achievement of the EU-wide targets. The main measures that are fully in line with the strategic and operational priorities agreed within the NM governance framework are presented below.

Safety KPA: NM will use the latest standards and best practices developed by NM in cooperation with its stakeholders, like Standard of safety management system (SMS) Excellence, in the implementation of its own SMS, to achieve not only the target but the highest possible maturity for each safety management objective.

Through its actions in the past, NM has already proven to be an effective actor to enhance the performance of the network. The NPP is thus key to ensure a functioning and performant network. Actions, programmes and plans agreed with the operational stakeholders will help in achieving the overall policy objectives of the EU in line with its international engagements while ensuring a balancing of capacity and demand. The main benefits estimated for the end of the decade are:

- approximately 1000 million nautical miles cumulated savings, i.e. the equivalent of 6 million tons of fuel saved, or reduced emissions of 20 million tons, cumulative since the start of RP3; this represents a reduction by 2pp of the European average route flown resulting from airspace design improvements;
- up to 30% reduction of ATFM delays resulting from direct and indirect actions of NM representing more than 25 million minutes of delay for the RP4 period (6.5 million minutes in 2025, 6.5 million minutes in 2026, 5 million minutes in 2027, 5 million minutes in 2028 and 3 million minutes in 2029).

Transversal initiatives that will address the **Strategic Priorities** implementation of an **open digital infrastructure** and the **air ground integration** through:

ALL(1). integrated Network Manager System (iNM) programme

Environment KPA related initiatives will address the **Strategic Priority** implementation related to **seamless airspace organisation** through the implementation of the:

ENV(1) Airspace changes included in the ERNIP Part 2 – ARN version 2021-2030, including major areas of cross border Free Route Airspace (FRA) – 0.05 pp of the KEP improvement for the entire RP4, i.e. 0.01 pp average reduction every year;
ENV(2) NM Flight Efficiency strategic project – 0.10 pp of the KEP improvement for the entire RP4, i.e. 0.02 pp average reduction every year
ENV(3) ASM and Advanced FUA Network Strategic Programme and the RAD measures re-organisation and rationalisation – 0.42 pp of the KEP improvement for the entire RP4, i.e. 0.08-0.09 pp average reduction every year
ENV(4) Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide targets;
the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

Capacity KPA related initiatives will also address the **Strategic Priorities** implementation related to **air ground integration** and **seamless airspace organisation** (through their integration in NOP and ERNIP, respectively) and through the implementation of the:

CAP(1) Summer operational priorities (first rotation, flight plan adherence, deliver agreed capacities and increased flexibility, realistic scheduling including turnaround times, adverse weather management) – 15% delay reduction every year compared to the final NOP forecast (this includes tactical NMOC delay savings)
CAP(2) New Network Operations Plan processes – 15% delay reduction every year compared to the initial NOP forecast prepared at the beginning of the NOP preparation cycle (this also includes the delay savings related to the Network Summer measures and the effects of the Network Strategic Projects included in the NOP)
CAP(3) Network Strategic projects (Cooperative Traffic Management (CTM), Flight Plan and Flight Data Evolution (FPFDE), Operational Excellence Programme (OEP), Airport and TMA Network Integration Network)
CAP(4) Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

NM will implement these initiatives while continuing to improve its **cost effectiveness**.

In addition to the above, NM has worked closely with SDM to ensure the implementation of the obligations arising from the Common Project One Implementing Rule (CP1) IR 2021/116[1]. NM has implemented all its obligation arising from the CP1 requirements and has worked closely with all the operational stakeholders to facilitate the implementation of their CP1 obligations. Based on simulations prepared between NM and SDM, the contributions of the CP1 implementation to the overall network performance can be summarised as follows:

- 34% airspace capacity increase
- -22 kg fuel per flight saved
- 1 min en-route ATFM delay per flight

The measures aiming to implement the targets are being described further and in more detail in the Network Operations Plan and the Annual Report of the Network Manager, which both describe its main activities and represent the main monitoring tool for the NPP on a yearly basis. They also include the evaluation of the measures taken in terms of environment and capacity.

The main risks to achieve the targets are described in the Chapter 6 Risk Assessment and Mitigation of the NSP 2025-2029. On a more specific note, if the forecasted traffic increase is not followed by a similar capacity evolution, there is a high risk that the environment KPIs (KEA and KEP) would increase between 0.1-0.2 percentage points per year in an attempt by airspace users to find options across the network. This will also have a high detrimental effect on traffic volatility and predictability and, in turn, an even higher increase in ATFM delays

[1] COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan

Foreword to the Network Performance Plan

The European aviation network is currently undergoing substantial changes in light of the Covid crisis and the unprovoked Russian Aggression against Ukraine. Policy objectives have also substantially and fundamentally been reshaped towards a net zero emission policy both at European and international level. At the same time, traffic levels are according to the STATFOR forecasts expected to increase in the coming years to unprecedented levels due to an ever-increasing passenger demand. This will put tremendous pressure on the network to deliver against this demand without any major traffic disturbances. Already in 2024, traffic levels are expected to exceed traffic levels in 2019 despite that 20 % less airspace is available to civilian air traffic.

With significant operational challenges ahead, NM and the network partners need to step up and continue to develop their commitment to building a single aviation value chain. Robust technical and operational coordination and integration at network level will ensure the necessary evolution towards a sustainable, optimum and efficient network. This will require an ever-closer collaboration with all relevant actors at the European level, in close collaboration with Member States and operational stakeholders.

NM will continue to undertake various cost efficiency measures during RP4. It will also have a strong succession planning and agility in managing the workforce.

Vision for RP4

In order to be able to perform successfully these challenging tasks, the NM will promote a network-centric approach, which means that all ATM stakeholders in the network agree that the benefits of the network are beneficial for all, both at network and especially at local level. The NM will act in the interests of the whole ATM community servicing the operational stakeholders to provide them with a real value added in their day-to-day operations, with the aim of gaining the trust to drive the transformation of the network and to deliver network functions and other operational/technical services for high-performing ATM.

It is crucial to build a scalable and agile ATM network, and that strategy becomes everyone's job, therefore a full engagement of all stakeholders is required.

RP4 will have significant emphasis on cost effectiveness. Given the economic effects of COVID, particularly in aviation, there is a strong emphasis of cost effectiveness in RP4. This may affect the operational services of NM and ANSPs, which highlights the importance of the short-term operational planning to react to changing operating conditions. There is strong pressure to rationalise operational services and infrastructure, particularly through digitalisation.

Network performance – the main priorities

In addition to the efforts towards a net zero emission network, the balance between the network perspective and the local operational and business needs remains critical, particularly through an extensive collaborative decision-making process. The pace of adoption of a network-centric culture improved in RP3, but needs to improve more in RP4, and more convergence on actions of proven network benefit will be key.

The commitment to the network is paramount to achieve both network and local targets. Operational stakeholder plans will change in RP4 thus affecting the network performance, therefore maintaining a robust Collaborative Decision Making (CDM) process is crucial. This process must support NM, together with the Member States and operational stakeholders, to deliver on network-centric actions.

At times of high network disruption, network initiatives addressing both capacity and flight efficiency improvements need to be developed through the CDM process coordinated by the NM[2]. The Network Manager will ensure a pro-active role through the CDM processes to influence local flow management practices where there is a network issue to resolve.

To meet the continuous growing demand, there is a need for a robust parallel approach:

- Boost the operational partnership, including further enhancing NM's efforts to support aviation through the network Cooperative Decision Making (CDM) processes.
- Implementation of new operational concepts and supporting technological systems and tools, medium and long term addressing the structural capacity issues.

It is key that the network maintains safe operations and deliver on EU sustainability goals, whose achievement in RP4 will continue to be challenging and adequate countermeasures shall be evaluated.

Within the next reference period **innovative SESAR technological solutions** should be available. The challenge would be that of deploying them in the right way, thus fully supporting the operational concept of operations (CONOPS) roadmap. NM's single value chain approach will continue to be instrumental to achieve this initial objective. In line with this the EUROCONTROL Network Manager has proposed the following three priorities:

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For this, strong project management processes and tools will be necessary. Moreover, NM needs to ensure that its systems fully integrate with the rest of the network and with local systems, it supports SESAR Deployment, and it participates in the consortium SESAR Deployment & Infrastructure Partnership (SDIP).

[2] As referred in Article 15 of Commission Implementing Regulation 2019/123

Table of Contents

1. INTRODUCTION

1.1. Description of the situation, including scope of the Network Performance Plan, network functions covered, roles and responsibilities and other general information relevant to the plan.

The purpose of the Network performance plan is according to Article 10 of Regulation 2019/317 two fold, namely to define

> (a) the value added of NM in support to the activities of Member States, functional airspace blocks, air navigation service providers and civil and military airspace users towards achieving capacity and environment targets, as well as the contribution of the network functions towards achieving the Union-wide performance targets;
>
> (b) the performance targets and objectives for NM and for each network function and the measures aimed at achieving those targets.

The Commission is, under Article 37 of the same Regulation, responsible for the monitoring of the performance of the network functions and have in this regard to assess whether the performance targets contained in the Network Performance Plan are met.

This performance plan for the Network Manager (NM) contains performance targets for all relevant key performance areas and key performance indicators in Annex I, Section 3 of the Performance IR 2019/317, consistent with the Union-wide performance targets.

According to the SES rules in place, the network management functions apply to EU Member States, EUROCONTROL States and third parties with bilateral agreements with NM[3], referenced throughout the document as the NM area. The scope of the targets and objectives defined in the NPP is consistent with this pan-European approach.

The NM targets are fully compliant with Performance IR 2019/317 and the targets defined in the Article 1-3 of the Commission Implementing Decision 2024/1688 of 12 June 2024[4] for the EU Member States plus Norway and Switzerland, referenced throughout the document as the SES area.

NM has defined several additional performance indicators to monitor, analyse and take corrective actions in regard of the NM and network performance, see Appendix II.

Performance IR 2019/317 defines in Annex I the key performance indicators (KPIs) and indicators for monitoring at different levels. In RP3 there are KPIs defined both at Union-wide level (Section 1) and for the network functions (Section 3). Not all the Union-wide KPIs are directly applicable to network functions.

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[3] EU Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden; EUROCONTROL Member States not members of EU: Albania, Armenia, Bosnia and Herzegovina, Georgia, Moldova, Monaco, Montenegro, Norway, Serbia, Switzerland, North Macedonia, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland; EUROCONTROL Comprehensive Agreement States: Morocco and Israel

[4] COMMISSION IMPLEMENTING DECISION (EU) 2024/1688of 12 June 2024 setting revised Union-wide performance targets for the air traffic management network for the fourth reference period (2025-2029)

The NPP sets targets and defines measures for the network functions KPIs. NM will monitor all the indicators and take remedial actions when targets are not being met.

In addition to the achievement of network function targets, NM will support the ANSPs and Member States to implement the Union-wide targets (as detailed in chapter 2 of NPP). NM will use the Union-wide targets to perform an impact assessment on the national targets included in the local performance plans. NM will propose further remedial measures through the Network Operations Plan (NOP) and European Network Improvement Plan (ERNIP) to achieve the Union-wide targets. The Union-wide KPIs are monitored, and the weekly and yearly updates of the NOP will address the identified gaps between results and targets.

The implementation of the NPP and the NM support to the implementation of the Union-wide targets will help tackle the limits to growth in the air and on the ground by reducing capacity constraints and improving efficiency and connectivity, in line with the Aviation Strategy for Europe. The chapter 3 of the Network Strategy Plan gives an overview of how NM and the wider European ATM network will contribute to the implementation of the European Aviation Strategy.

1.2. Description of the traffic forecast and macroeconomic scenario underpinning the Network Performance Plan.

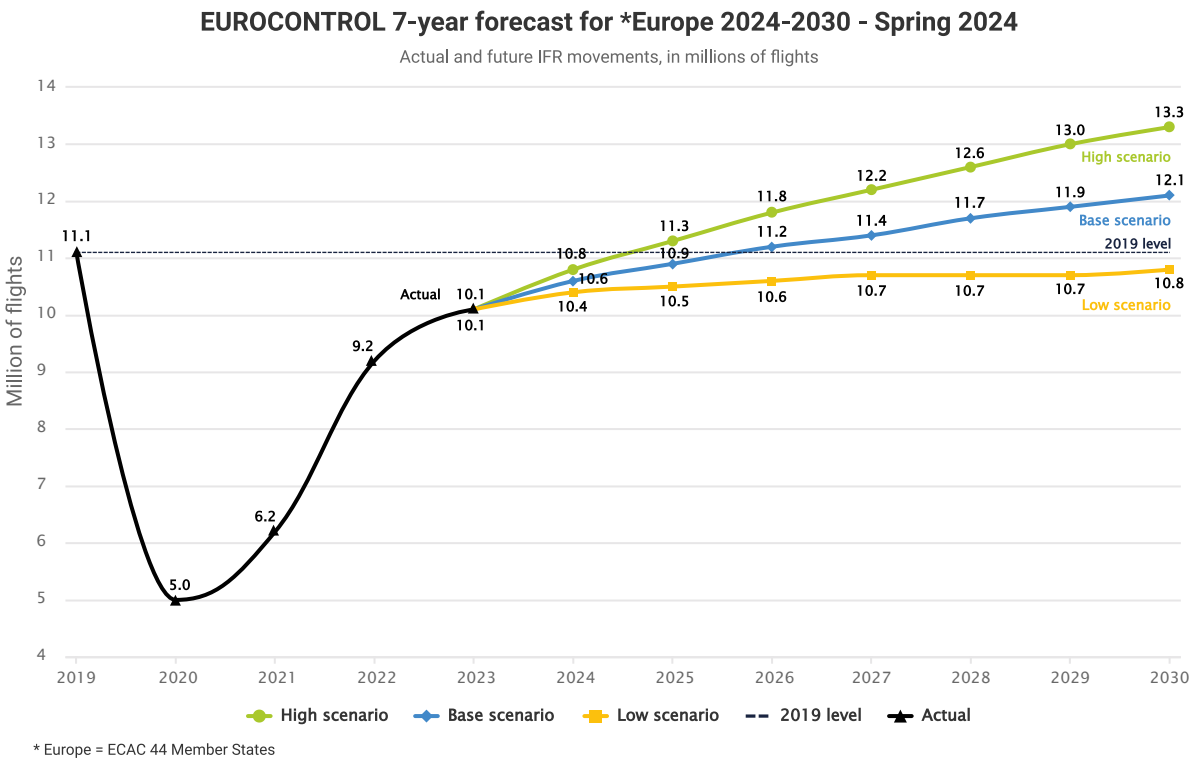
During RP3 several major events have changed the European Aviation Network:

- The COVID-19 health crisis led to an unprecedented decrease of traffic for a long period of time accompanied by a fast recovery with a major volatility component; aspects related to strong resilience, scalability, adaptability and the single value chain became of vital importance;
- The Russian invasion of Ukraine in February 2022 and the subsequent airspace sanctions and restrictions have had a serious impact on the European network with almost 20% of the European airspace no longer available for civil operations; aspects related to national security and civil/military cooperation became even more important on the European agenda;
- The political commitment towards greening aviation became stronger than ever; The Sustainable and Smart Mobility Strategy [1] defines sustainability as the licence for the aviation sector to grow. In addition, the long-term aspirational goal of net zero emissions in the aviation sector by 2050 was agreed by ICAO in 2022
- The acceleration of digitalisation in the EU should benefit the delivery of operational performance and the development of new (U-space, Higher Airspace Operations-HAO) and multimodal transport systems, in particular by using open data and artificial intelligence

This context will strongly influence the priorities for action in RP4.

Traffic assumptions in the NPP

The NPP considers the EUROCONTROL STATFOR base scenario traffic forecast published in February 2024 [2]. Beyond 2025, flight growth is expected to average 2.0% per year (±1.4pp), rising to over 12 million flights in 2030. This creates significant challenges for all operational stakeholders in responding to the overall performance requirements.



* Europe = ECAC 44 Member States

Economic context and network forecast

Air transport has long seen cycles of growth driven by world-wide economic expansion. Historically, this generated an average annual flight growth of 3-4 percent. There were also periods of economic, health or political crisis that led to a traffic decline. For the period 2025-2029, the forecast is driven by the sustained post-COVID recovery, the rise in oil prices, uncertainties related to the outcome of the Russian invasion of Ukraine, etc. In 2025, the base forecast is for 10.9 million IFR flight movements in Europe (±0.4 million flights), which will be close to the level of traffic of 2019 (11.1 million flights). In 2029, traffic is expected to be at 12.1 million IFR (Instrumental Flight Rules) flight movements in Europe an average annual growth of 2.0%. In 2029, for the full ECAC area, it is not excluded that some peak days of traffic would reach up to 45,000-50,000 flights per day, to be compared with peak levels of 37,500 flights in 2019.

Worldwide evolution and long-term trends

When considering a longer-term perspective – as described in the EUROCONTROL Aviation Outlook 2050 Report, flights will increase by up to 44% compared to 2019, with a range between 13-20 million flights per year. The Middle East and Asia/Pacific regions are expected to provide the strongest growth. Faster growth from outside Europe means that there will be a gradual shift in the mix of European traffic, with an increasing proportion of flights to and from the Middle East and Asia as compared to intra-European and North Atlantic traffic (NAT). In view of the current geographical distribution of traffic in Europe, this factor is not expected to have a major impact on European traffic patterns, bearing in mind that intra-European flights will continue to represent three quarters of the total traffic at network level. A long-term trend feature will be the implementation of several key environmental policies such as the EU Green deal, the smart and sustainable transport policy.

1.3. Description of the consistency of the Network Performance Plan with the Network Strategy Plan.

The following correspondence has been established between the Network Strategic Objectives in the NSP [3] and their contribution to the performance Key Performance Areas, as defined in the Performance IR 2019/317. The contribution of Network Strategic Objectives (SO) to the Key Performance Areas is illustrated as follows: 'X' is used to show a contribution and 'XX' is used to show a significant contribution.

		Capacity	Environment	Safety	Cost-efficiency
SO 1	Manage network performance through 'Network-minded' decision making	X	X	X	X
SO2	Digitalise aviation through the deployment and integration of interoperable and secure information management systems	X	X	X	XX
SO 3	Sustainable and optimised Network design	XX	XX	X	XX
SO 4	Sustainable and optimised Network operations	XX	XX	X	X
SO 5	Provide on-time operations for and at airport platforms with the support of the Network Manager	X	X		X
SO 6	Ensure network resilience, safety and security, and reinforce crisis management	XX		XX	X
SO 7	Optimise and Digitalise (as appropriate) ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services	X	X	X	XX
SO 8	Develop the network people and improve its flexibility through excellence	XX	X	X	XX
SO 9	Towards net zero emissions aviation	X	XX		X
SO 10	Support European aviation on global markets	X	X	X	X

The NSP operational drivers and the strategic objectives have a direct and/or indirect impact on the key performance areas of the performance scheme. The Annex A1.5 shows the relationship between SOs and the key performance indicators (KPIs) and indicators for monitoring (PI) of the performance of the Network Manager and of the network functions.

1.4. Description of the outcome of the stakeholder consultation on the draft Network Performance Plan, including the points of agreement and disagreement as well as the reasons for any such disagreement, and description of the outcome of the consultation of the Network Management Board.

Consultation:

PRB in May 2024.

Network Directors of Operations (NDOP) and NDTECH and Network Management Board (NMB) members in June and July respectively 2024.

The NM social partners in EUROCONTROL (June).

European Commission and Performance Review Body (second half August 2024).

Final check with NMB in September 2024 and NMB endorsement in November 2024.

2. NETWORK MANAGER'S VALUE ADDED

This chapter details the NM improvement actions and added-value from operations and services, as well as specific improvements and short to medium term evolutions to provide direct benefit and effective support to the tasks and activities of Member States, functional airspace blocks, air navigation service providers, airports, civil and military airspace users.

The actions, programmes and plans agreed with the operational stakeholders will help in accelerating the decarbonisation of the European ATM network and the delivery of additional capacity.

Environment KPA related initiatives will address the **Strategic Priority** implementation related to **seamless airspace organisation** through the implementation of the:

- ENV(1) Airspace changes included in the ERNIP Part 2 – ARN version 2021-2030, including major areas of Free Route Airspace (FRA) – 0.05 pp of the KEP improvement for the entire RP4, i.e. 0.01 pp average reduction every year
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- ENV(3) ASM and Advanced FUA Network Strategic Programme and the RAD measures re-organisation and rationalisation – 0.42 pp of the KEP improvement for the entire RP4, i.e. 0.08-0.09 pp average reduction every year
- ENV(4) Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide targets; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

Capacity KPA related initiatives will also address the **Strategic Priorities** implementation related to **air ground integration** and **seamless airspace organisation** (through their integration in NOP and ERNIP, respectively) and through the implementation of the:

- CAP(1) Summer operational priorities (first rotation, flight plan adherence, deliver agreed capacities and increased flexibility, realistic scheduling including turnaround times, adverse weather management) – 15% delay reduction every year compared to the final NOP forecast (this includes tactical NMOC delay savings)
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- CAP(4) Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

The benefits estimated for the end of the decade are:

- approximately 1000 million nautical miles, i.e. the equivalent of 6 million tons of fuel saved, or reduced emissions of 20 million tons, cumulative since the start of RP3; this represents a reduction by 2% of the European average route flown resulting from airspace design improvements;
- up to 30% reduction of ATFM delays resulting from direct and indirect actions of NM representing more than 25 million minutes of delay. (6.5 million minutes in 2025, 6.5 million minutes in 2026, 5 million minutes in 2027, 5 million minutes in 2028 and 3 million minutes in 2029).

2.1. Elaboration and harmonisation of network and regional operational concepts;

The achievement of a true pan-European partnership approach is one of the key NSP objectives for NM and the principal stakeholders. It requires a network operation concept that delivers safe operations, reduce existing operational constraints to airspace users by using the latest technical development and support its ANSPs, airspace users and airport operators in meeting their objectives.

Within the next reference period innovative SESAR technological solutions should be available. The challenge would be that of deploying them in the right way, thus fully supporting the Network Operational Concept of Operations (CONOPS) roadmap. NM's single value chain approach will continue to be instrumental to achieve this initial objective. In line with this the EUROCONTROL Network Manager has proposed the following three priorities, supported by the Network Management Board:

1. Open digital infrastructure
2. Air ground integration
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In addition to the above, NM has worked closely with SDM to ensure the implementation of the obligations arising from the Common Project One Implementing Rule (CP1) IR 2021/116[5]. NM has implemented all its obligation arising from the CP1 requirements and has worked closely with all the operational stakeholders to facilitate the implementation of their CP1 obligations. Based on simulations prepared between NM and SDM, the contributions of the CP1 implementation to the overall network performance can be summarised as follows:

- 34% airspace capacity increase
- 22 kg fuel per flight saved
- 1 min en-route ATFM delay per flight

The High-Level Network Concept of Operation (CONOPS) 2029[6][4] operationalises the NSP and offers more details in terms of operational and technological developments based on the NSP.
The main RP4 directions of change are:

- **Optimised network design and utilisation.**
- **Optimum Capacity and Flight Efficiency Planning.**
- **Trajectory and Cooperative Traffic.**
- **Airport and TMA – Network Integration.**
- **Network components/systems and CNS infrastructure.**

Details on the main concepts are in Annex A2.1

[5] COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan
[6] Approved by NMB/34 on 5 July 2022; this is an updated version of the document titled "High Level Network Operational Framework 2029", which was approved by the NMB/27 on 2 April 2020

2.2. Development and harmonisation of airspace projects based on network priorities including cross-border airspace design initiatives;

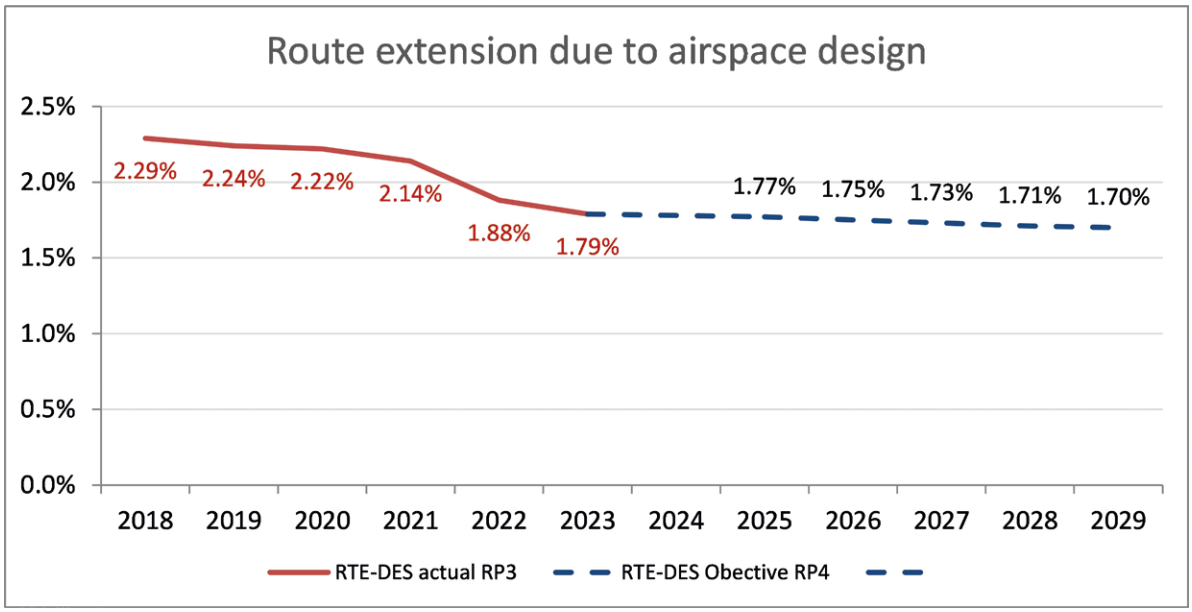
The implementation of the European Network Improvement Plan (ERNIP) was successful in RP3. By the end of 2023, NM already met the objective for the entire RP3 (1.79%).

As confirmed by the Annex I of the new NF IR 2019/123, ERNIP will continue to provide the framework for the development and harmonisation of airspace projects during RP4, including cross-border initiatives, based on the agreed CDM processes.

NM will support the development and implementation of the a seamless airspace organisation, which will be required to enable progress with the overall operational performance and with addressing both civil and military airspace users' requirements, considering a network-minded approach to airspace availability and utilisation to meet the required operational performance targets.

The implementation of the airspace and route design projects will contribute to the improvement of the design indicator and the KEP with 0.05 pp over RP4 (see 3.3.1.2 for more details). The implementation of the ERNIP Part 2 ARN Version 2024-2030 includes further projects on the expansion of the cross-border FRA implementation bringing this implementation beyond the requirements of CP1.

The graph below shows both the values achieved in RP3 and indicative annual values for RP4.



Details on the main NM actions are in Annex A2.2

2.3. Reducing inefficient use of route network and available airspace;

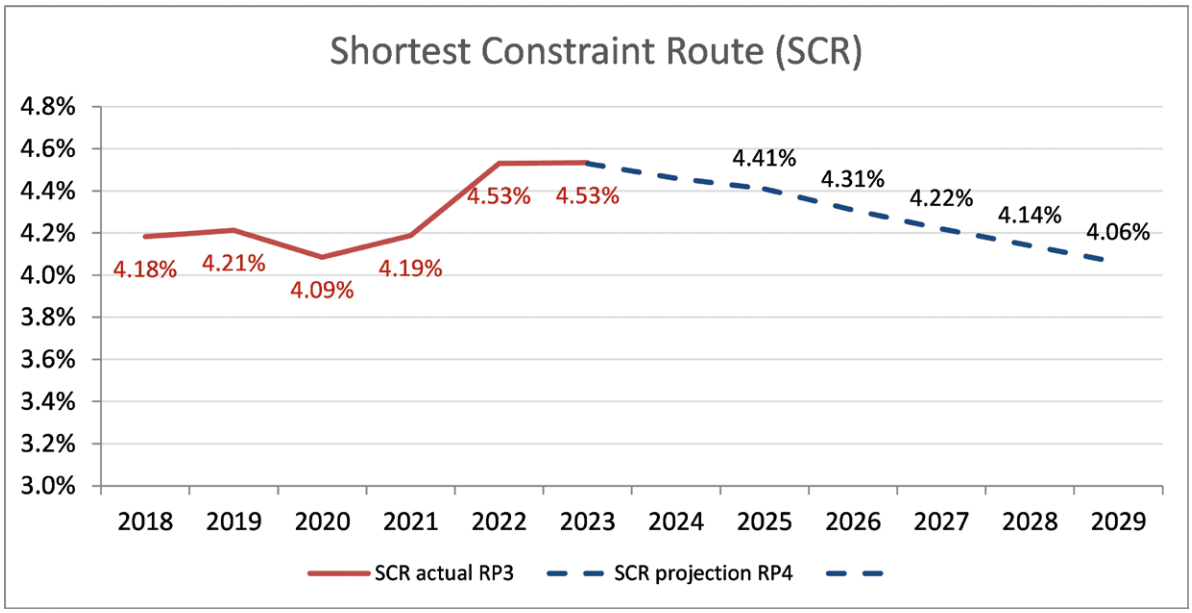
While the airspace design indicator (RTE-DES) improved during RP3, benefiting from the implementation of airspace improvements, the flight planning indicator deteriorated after the start of the war in Ukraine. This contributed to the widening of the gap between what the airspace design has to offer and what the airspace users were able to use (airspace closures, ATC restrictions) and what they used in flight planning (difference in route charges, awareness of the horizontally optimum route).

The shortest constrained route (SCR[7]) deteriorated even more than the KEP, mainly because of the war in Ukraine, + 0.34 pp in 2022 over 2021 level. One consequence is that the gap between KEP and SCR decreased to a record low of 0.19 pp in 2023. This also means that opportunities for better routes narrowed accordingly, especially for the States that were most affected by the war.

The restrictions above also negatively impacted the actual trajectory indicator KEA. They were compensated by the improvements in the airspace structures and procedures enabled by the wide implementation of cross-border Free Route Airspace, beyond the CP1 requirements.

During RP4 the NM will focus on reducing the inefficient use of available airspace through the implementation of the NM Flight Efficiency strategic project in cooperation with the Computer Flight Plan Service Providers (CFSP) and the Aircraft Operators – ENV(2), as well as reducing the impact of RAD restrictions in cooperation with the ANSPs – ENV(3).

Detailed actions can be found under A2.3 The optimisation of the use of the available route options will contribute to up to 0.1pp to the improvement of KEP over RP4 (see 3.3.1.2 for more details).



This will be monitored using the SCR indicator.

[7] SCR stands for the Shortest Constraint Route and considers restrictions published in the RAD and the status of conditional routes at the time of the last filed flight plan. SCR is calculated by the path-finding algorithm of the NM system and represents the shortest route available at that time that the system can find, route that can be filed with the flight planning system. In RP4 this is a EU-wide performance indicator for monitoring

2.4. Development of enhanced airspace management and air traffic flow and capacity management processes;

The following paragraphs describe the NM added value in the areas of airspace management and air traffic flow and capacity management, as well as their integration. The operational procedures related to those evolutions as well as the required NM system support are planned for gradual implementation over RP4. They are aligned with the requirements of the Common Project 1 (CP1) IR 2021/116[8] (notably related to AF3, AF4 and AF5) and their full implementation is expected to contribute to the achievement of the Union-wide targets. Nevertheless, implementation by the operational stakeholders of their related actions remains key and this will be monitored through the Network Operations Plan and the European Route Network Improvement Plan that will also contain, whenever necessary, remedial local and network measures.

2.4.1 ASM/ATFCM Integration

Airspace Management (ASM) and Air Traffic Flow and Capacity Management (ATFCM) are integral parts of ATM and should work in close cooperation to achieve a more efficient utilisation of the available airspace and capacity.

One of the key improvements will derive from the progressive integration of ASM/ATFCM/ATC operations, evolving in the management of dynamic airspace configurations, fully integrated in a dynamic demand capacity balance process, able to dynamically accommodate civil and military airspace users' requirements according to predefined priorities.

The **ASM/ATFCM Concept of Operations** provides a high-level description of the current and future processes and views of systems evolution to support advanced ASM/ATFCM integrated management during RP4.

The main vehicle for the implementation by NM of the advanced ASM/ATFCM integrated processes will be iNM system. The progressive implementation in RP4 is described in the ASM/ATFCM integration roadmap and the iNM roadmap. the implementation of its new functionalities is also aligned with the Network Concept of Operations roadmap.

2.4.2 Airspace Management (ASM) and Advanced FUA

These evolutions aim to improve existing ASM/ATFCM processes by putting more emphasis on the better utilisation of existing ASM processes, enhancing performance-driven ASM/ATFCM processes. It will be supported by the further Advanced FUA implementation. NM will develop/update procedures, as part of the ASM Handbook, to identify the ASM scenarios associated to existing ATFCM re-routing scenarios, with the goal of having a more efficient utilisation of ATFCM scenarios. NM will work with the military stakeholders to improve the availability and use of the Conditional Routes (CDR). More detailed action under A.2.

NM will continue to monitor the ASM indicators – rate of planning (RAI) and rate of usage (RAU) of conditional routes (CDR).

The implementation of the ASM and Advanced FUA will contribute, together with RAD improvements and other similar initiatives, to the reduction of the gap between the horizontal flight efficiency indicators related to the shortest constraint route and the airspace design, with the objective of improving KEP with 0.05pp over RP4 (see 3.3.1.2 for more details).

This will be monitored using the SCR indicator. See 2.3 above for the projected evolution of SCR during RP4.

[8] COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan

2.4.3 Development of Air Traffic Flow and Capacity Management (ATFCM) processes

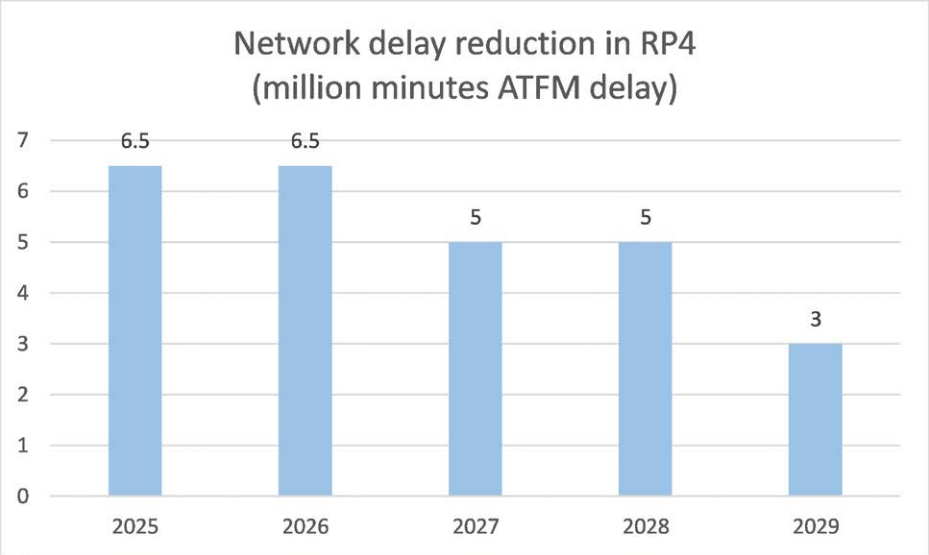
This section summarises the main components of the ATFCM processes and their expected evolutions during RP4. The RP4 evolution is strongly related to the concepts and principles described in section 2.1.

NM will continue to deploy during RP4 ATFCM processes to improve performance across the whole pan-European network. NM will fully support its stakeholders, FABs, ANSPs, Aos, Airports and CFSPs, to achieve and improve their capacity performance.

A detailed description of the steps to be implemented over RP4 is included in the High Level Network Concept of Operation (CONOPS) 2029 and in the FLOW CONOPS approved by the NMB in April 2024. They are aligned with the requirements of the Common Project 1 (CP1) IR 2021/116 ((notably related to AF3, AF4 and AF5) and their full implementation is expected to contribute to the achievement of the Union-wide targets. The full implementation of iNM – ALL(1) – will enable the provision of common network situation awareness and enhanced demand and capacity balancing tools.

Nevertheless, implementation by the operational stakeholders of their related actions remains key and this will be monitored through the Network Operations Plan and the European Route Network Improvement Plan that will also contain, whenever necessary, remedial local and network measures. See section 2.5 for more actions on the capacity planning actions.

In addition and support to the network measures, NM will focus together with the operational stakeholders on several priority initiatives – CAP(1), to support smooth operations, avoid bottlenecks and volatility, and improve the predictability in the network.
The graph below presents the projected overall network delay reduction during RP4 from both direct and indirect delay savings.

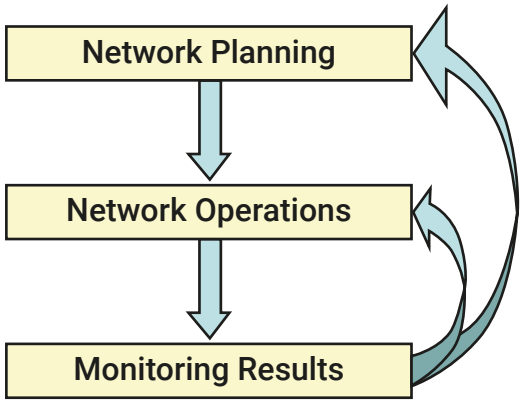


NM will support the **Airport and TMA integration** in the network.

More details on the NM actions in A2.4

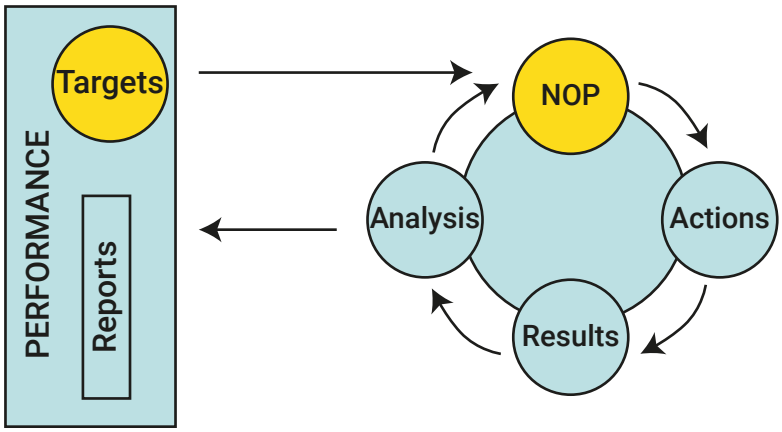
2.5. Harmonised capacity planning and measurement of operational performance;

NM consolidates and coordinates the activities of the network to continuously improve network performance. NM's planning, operations and continuous monitoring activities are closely interconnected to ensure that network performance is achieved.



The development of the NOP, together with the implementation of cooperative decision making processes and improved information management will ensure better use of the capacity available on the network and improved management of both planned and unplanned events and constraints.

Network operations are driven by enhanced stakeholders' participation in a rolling cooperative process with several layers over time. This is achieved by continuously sharing the demand (incorporating the latest flight intentions) and the available capacity, defining measures in the NOP, considering NOP as a target by all actors taking into account operational updates, evaluating operations against performance targets and updating the plan.



Overall network performance will be closely monitored and managed, including monitoring of the performance targets for the main actors in aviation. This enables Member States and Operational Stakeholders to enhance their local performance from a network perspective. All partners operate with a high level of transparency, through intensive information sharing via SWIM, allowing dynamic management of available resources responding to the airspace/airport user needs.

The **enhanced capacity planning process** – CAP(2) will be reinforced with the **NOP – Rolling Seasonal Plan**, which will be a permanent feature of the ATFCM planning process, focusing on the planning of the next eight weeks and in managing the execution and implementation of the 5-years NOP. The weekly Enlarged NDOP Coordination Cell will support and enhance the updated process.

The **network measures** will address major capacity bottlenecks, with the aim to stabilise the network and to allow advanced planning in neighbouring ACCs.

Full details on the elements of the enhanced NOP under A2.5.

New tools are available, including FATHOM, CO_2MPASS, and FLAIR. They will enable the analysis of environment performance through fuel burn indicators (excess fuel burn, fuel burn through each phase of flight and each ACC or TMA), that can transform data into climate-friendly fuel efficiency measures. This will support NM stakeholders in identifying areas of improvement and analysing the root causes of the inefficiency.

NM will introduce new capacity monitoring metrics for RP4 period to understand better ANSP **capacity delivery and their flexibility in adapting capacity** to network requirements (e.g. changes and imbalances in traffic). The lessons learned from this exercise could form the basis for a more formal capacity monitoring approach beyond RP4. More info on the metrics in section 3.3.2.2.

2.6. Supporting the resolution of air traffic controller shortages across the network;

As part of the Operational Excellence Programme (OEP) related to Cross border utilisation of ATCOs, NM, in cooperation with NDOP, identified several processes leading up to implementing of cross-border utilisation of ATCOs. They are captured in the "Cross-border utilisation of ATCOs – The Guidelines" document.

The Operational Excellence Programme will continue to help in addressing best practices in this area.

NM has well documented OPS strike procedures needed to manage strikes at network level. Furthermore, there are specific procedures for the countries most affected by ATM strikes, which will be further developed to cover the specificities for each country.

2.7. Strengthening technical area coordination including at FAB level and addressing technical interoperability among air navigation service providers' systems and in particular with the Network Manager's systems;

The European aviation network is facing challenging operational issues. Getting on board all parts of the aviation value chain, and meeting the challenges together, is the way forward to prove that the European aviation is resilient and agile.

Within the framework of the Network Directors of Operations (NDOP) / Network Directors of Technology (NDTECH), NM significantly contributes to the single aviation value chain. The close collaboration with the SESAR3 Joint Undertaking, the SESAR Deployment Manager, EASA achieved a more integrated lifecycle approach, ensuring the involvement of all relevant stakeholder through consistent decision-making.

The full implementation of the CNS Programme Manager concept will support the integration of the CNS infrastructure planning, rationalisation and monitoring into a single value chain approach.

NM updated the NM Interoperability Strategy and the Transition to SWIM Policy, and merged them into the "**NM B2B Strategy**. The NM B2B Strategy aims at the adoption of open data in ATM, enabling true information sharing and supporting the creation of an ATM digital collaborative environment with NM stakeholders.

The implementation of the iNM digital system ATM architecture will support the interoperability between all aviation stakeholders.

NM working together with ANSPs, SJU, European Organisation for Civil Aviation Equipment (EUROCAE) and EASA, will identify the network ATM infrastructure requirements needed to achieve the performance targets.

Overall, NM will ensure the implementation of the Network Concept of Operations roadmap and the stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide targets; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

The overall performance benefits of the implementation of the Network Concept of Operations is summarised below (as per the Network Concept of Operations approved by the NMB):

- Environmental benefits (CO2 savings) due to flight time and fuel reduction
- Air Transport Operation benefits
- ATM capacity & ATM cost efficiency

• Environmental benefits

The cumulative benefits are approximately 1000 million NMs savings, i.e. the equivalent of 6 million tons of fuel saved, or reduced emissions of 20 million tons, or 5 000 million Euros.

• Air Transport Operation benefits

The main driver of air transport operations benefits is departure delay. It is expected to reduce departure delays of 4 minutes compared to the 2018 baseline. The contributors for these improvements are:

- 2.6 minutes per flight of reduction from ATM. This impact is not monetised in the table to avoid double counting with the monetisation expressed in NET CONOPS benefits for ATM (see KPA capacity).
- 0.7 minutes per flight from primary delays caused by non-ATM actors (airlines, airports, etc.)
- 0.7 minutes per flight from reactionary delays caused by non-ATM actors.

The air transport network will also become more robust and resilient, so sustaining connectivity and payload throughput (passengers and cargo) under adverse conditions.

Industry Sector	Key Performance Area	KPI	2018 baseline	2029 expected performance enabled by NET CONOPS	Benefit gain	Monetisation of gain in million € (difference between 2029 do nothing scenario and 2029 with NET CONOPS)
Air Transport Operations	Departure Delay	Minutes of dep delay per flight (reference to schedule)	14,4	10,4	4	€1.081
Air Transport Operations	Predictability	Traffic ahead of schedule in minutes Million minutes (AIBT-SIBT)	9	7,9	1,1	€17
Air Transport Operations	Predictability	Opertational Cancellations (number of events)	10.000	8.000	2.000	€35
Air Transport Operations	User Prioritisation	Number of ATFM slot swapping	15.000	35.000	20.000	€92
					TOTAL	**€1.225**

- **ATM capacity & ATM cost efficiency**

Key Performance Area	KPI	Baseline	2029 expected performance enabled by NET CONOPS	Benefit gain	Monetisation of gain in million € (difference between 2029 do nothing scenario and 2029 with NET CONOPS
ATM En-route capacity	Minutes of ATFM En-route delays per flight	5	0,5	4,5	€2.205
ATM airport capacity	Arrival airport ATFM delay	1,13	0,5	0,63	€308
Cost-Efficiency	ATCO productivity	0,94	1,21	0,27	€155
Cost-Efficiency	Supporting costs in € million	€5.718	€5.070	€648	€648
				TOTAL	€3.316

More details on the NM actions in A2.6

2.8. Support to Network Safety and the implementation, monitoring and improvement of local safety performance.

NM supports ANSPs and other NM stakeholders to manage existing hazards and anticipate new safety threats, in order to keep the network safe. It aims to arrive at a common approach to tackling new safety risks based on identified hotspots and trends in the network.

The actions and objectives identified in the NPP are in line with NSP strategic objective 6.

Network Operational Safety Risks

The activity of identification of operational safety hazards at network level in cooperation with operational stakeholders and of assessment of the associated **network operational safety risk** will continue during RP4 in line with NF IR 2019/123 requirements 7.2.(e). The results are being reported to EASA.

The Operational Studies are/will be developed/updated for identified top risks, which will enable the sharing of lessons learned from incidents and the facilitation of best practices implementation.

Improving Safety Management

NM will support the ANSP in improving their safety management and meeting their target for the effectiveness of the safety management KPI.

The NM activities will support the ANSPs through Safety Tools, Safety culture and Just implementation and improvement. More details under A.2.

The NM will also continue to work with its partners from beyond the NM area to extend the Standard of Safety Management System (SMS) Excellence.

Safety Occurrences Reporting and Monitoring

NM supported during RP2 and RP3 the reporting, investigation and risk assessment of the safety occurrences, including runway incursions and separation minima infringement, notably in support of the KPI Severity Classification by the use the Risk Analysis Tool (RAT) Methodology. This enabled the definition of new safety indicators for monitoring.

NM will support the monitoring, at both EU wide and local level, of the rate of runway incursions and separation minima infringement during RP4 and provide tools like TOKAI (Tool Kit for ATM occurrence Reporting), Risk Analysis Tool (RAT) and ASMT (Automatic Safety Monitoring Tool).

More details in the Annex A2.7. The measures are further detailed in the NOP – Safety Requirements and Support to Network Safety sections.

3. PERFORMANCE TARGETS, OBJECTIVES AND MEASURES

NM's performance is presented below per key performance area and network function. Where performance initiatives are presented, relevant NM objectives are stated.

This chapter presents the main NM initiative put in place to achieve the RP4 targets. These initiatives are detailed in the Annex A1. Where relevant, references were provided to the various implementations plans detailing the deadlines for implementation of the measures undertaken to achieve the performance targets. In that respect, the Network Operations Plan (NOP) will be the main vehicle where information on expected benefits and deployment plans are presented. The NOP and the implementation plans will serve as a "live" update of the measures in this plan, as they will reflect throughout RP4 the actions foreseen for the achievements of the performance targets and objective.

Monitoring of the KPIs, objectives and initiatives is done through internal and external processes (e.g. Network and NM performance monitoring, NOP reporting) and are presented to governance bodies as necessary (see Chapter 4).

3.1. Safety performance of the Network Manager

3.1.1. Performance target for the Network Manager on effectiveness of safety management.

The NM will continue to improve its safety management system in RP4 to achieve the highest possible maturity for each safety management objective.

The NM target for RP4 is to achieve at least Level C in the safety management objectives (Mos) 'safety culture', 'safety policy and objectives', 'safety assurance', and 'safety promotion' and Level D in the safety management objective 'safety risk management' for its own Safety Management System in line with the RP4 EU-wide targets for the level of the effectiveness of safety management of the NM (EoSM).

The annual values set for the EoSM key performance indicator management objectives, are presented in the table below.

EoSM	2025	2026	2027	2028	2029
Safety culture	B	B	B	C	C
Safety policy and objectives	B	C	C	D	D
Safety risk management	C	C	C	C	D
Safety assurance	B	B	C	C	C
Safety promotion	B	B	C	C	C

The methodology for assessing the safety maturity will be the EASA RP4 EoSM methodology, tailored to the specifics of the NM in coordination with EASA.

3.1.2. Description of the measures that the Network Manager puts in place to achieve this target.

NM will use the latest standards and best practices developed by NM in cooperation with its stakeholders, like Standard of SMS Excellence, in the implementation of its own SMS, to achieve the highest possible maturity for each safety management objective. It will build on a balanced quick wins, costs, technologies and resources available.

NM will measure the effectiveness of its own SMS and improvement plans will be defined, where necessary, to catch-up with the expected output. It identifies actions where the measurement is showing a gap and addresses the EASA findings. It also designates champions from different divisions to promote the actions taken, if any. The iterative approach and cooperation with EASA in regard of the audits will allow a continuous improvement of areas needing catching up.

The NM organisation will bring synergies of the resources (both staff and technologies), as far as possible, that will support the SMS improvements.

In that regard, the specific measures are the activities, processes and best practices described in Annex A1.1.

These specific measures will be reviewed on a yearly basis and adaptation implemented if needed in accordance with the measurement of the effectiveness of NM SMS and EASA findings.

3.1.3. Description of the measures that the Network Manager puts in place to address ATFM over-deliveries.

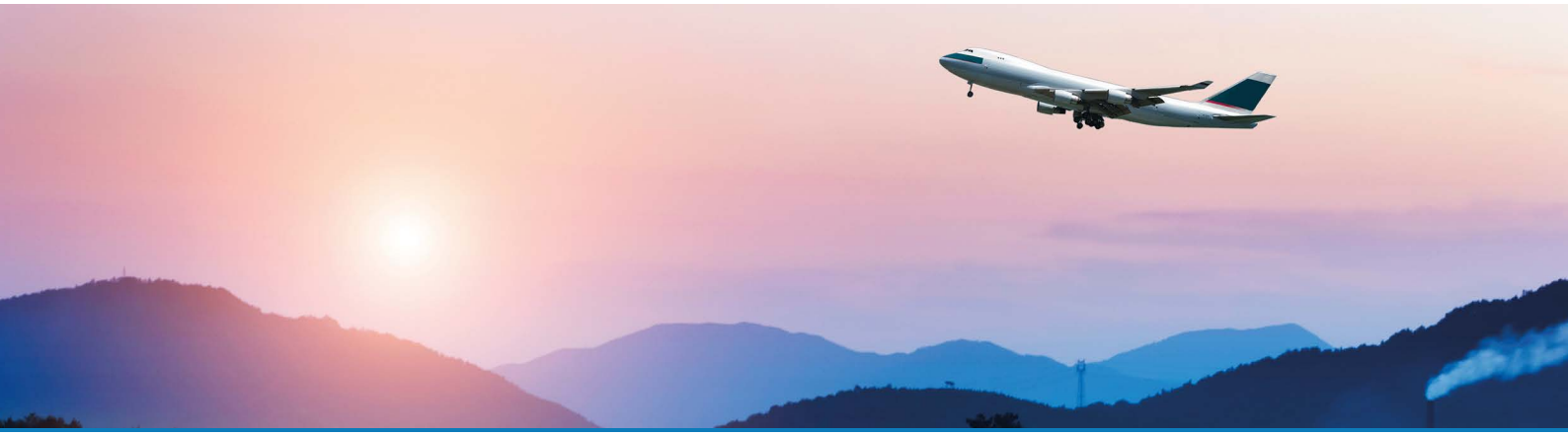
The measurement of the over-delivery (OVD) indicator is based on the number of entries in a period of time (one hour typically) in the traffic volume being regulated. It measures the proportion of slices where the number of actual entries is 10% above the regulated rate in the total number of slices in the ATFM regulations.

Towards the end of RP3, the NM conducted trials for the implementation of occupancy regulations. There will be additional trials, with an early indication that this type of regulation will be implemented at one point in RP4. Therefore, NM already defined and implemented indicators for occupancy regulation OVD states. There are two indicators that will be monitored: the OVD peak indicator and the OVD sustained indicator.

The main actions to address OVD are:

- dynamic investigation and analysis of over and under-deliveries (UND) made possible by Dynamo tool,
- actions reducting the gap between the planned and actual trajectory,
- better CDM processes for managing (cross-border) weather.

Annex A1.1 presents the detailed NM actions to address OVD.



3.2. Cost-efficiency performance of the Network Manager

3.2.1. Description of the measures that the Network Manager puts in place to improve its cost-efficiency.

The COVID-19 pandemic had a big impact on the aviation industry in 2020 and 2021, which continued in the rest of RP3. Due to the post-COVID geopolitical situation, it is expected that in RP4 the volatility will continue to be high and that it will be very complex to manage the network flows to align them with the evolving geopolitical landscape.

In addition, the disruption of the current IT Landscape by new technologies such as cloud computing, data services and GenAI will require significant resources during RP4. It will be imperative for organizations to strategically allocate resources, ensuring that they are invested in the most impactful areas. This may include upskilling the workforce, updating infrastructure, and adopting agile methodologies to stay relevant and innovative in a rapidly evolving digital landscape.

NM will continue to present a transparent work programme and budget to the operational stakeholders in the NMB. At this point in time, the integration of potential new work stemming from the SES2+ regulation has not been done. It will be done at the appropriate moment, following the adoption of the necessary regulatory material. It might result in an updated work programme and budget that will be presented to the NM governance for scrutiny and approval.

NM is constantly reviewing methods and organisation for delivering operations and services to meet the performance targets in a cost efficient manner. It is therefore regularly proposing to the governing bodies a number of business improvement initiatives to achieve that goal.

NM presented a detailed overview of efficiency gains in the NMB meetings in 2022 and 2023. These overviews focused on the achievements between 2019 and 2022. In this period, with budgets decreasing in real terms, NM's output increased with 30%. In summary:

- Cost-efficiency and productivity measures: The NM stopped or reduced a number of activities to create internal efficiencies, such as closing the Initial Flight Plan Processing at Bretigny, reducing recruitment and governance costs, consolidating data centres and data warehouse, and stopping the overlap between IT organizations.
- Increased delivery efficiency and better performance: The NM increased its delivery efficiency and better performance of several activities without additional staff or operational expenditure, such as preparing and delivering the iNM Programme, fulfilling all NM tasks and support to the execution of Network Functions, updating the Network Concept of Operations, implementing COVID-19 Support and proactive network operations planning, initiating new strategic programmes, deploying Operational Safety Management Tools and increasing data services. The implementation of the new iNM functionalities is aligned with the Network Concept of Operations roadmap.

NM presented the further efficiency gains of 2023 in NMB/39 This included the NM efficiencies and areas of higher productivity in 2023. Areas covered were Structural changes, Technology and IT, Operations, etc. It provided information related to cost containment, efficiencies and productivity. It also presented how the Network Manager focuses on the fundamental strategic priorities by presenting the activities that have been stopped or that the Network Manager selected not to perform.

- Structural improvements and efficiencies in 2023: NM achieved various structural improvements and efficiencies in 2023, such as centralising contract management, providing IT services for SDM, further integrating airports in the network, creating a CNS Programme Manager.

- Activities that NM stopped doing in 2023: NM prioritized fundamental strategic objectives and stopped doing some activities, such as operating and maintaining low-value corporate applications, providing Learning Zone for Organization Service, conducting systematic airport detailed capacity studies, and supporting EASA in the development of its first set of the conformity assessment detailed specifications.

- Increased efficiency and productivity in 2023: NM made significant efficiency and productivity improvements in 2023, such as reducing the production time of AI models, increasing stakeholder engagement and internal teamworking, delivering the first operational release of Location of an Aircraft in Distress Repository (LADR), developing new AI applications for CNS monitoring, and finalising the migration to a single CDR category.

- The main cost efficiencies already included in the budget for RP4 are:

    - The reduction of the cost of the service provision of EAD (2M per year)
    - The reduction of the cost of the hosting of the EAD system as a result of its integration in iNM (5.6M per year)
    - The reduction of the maintenance cost of the legacy Network Applications (-20M per year by 2029)
    - The Admin Reform (staff regulations) and the rejuvenation programme where retired staff is replaced with junior staff at entry grades reduces the evolution of the staff costs in the future
    - Enhanced contract management, demand management, governance for cloud services (FinOPS), enhanced Software Asset Management and the insourcing of a number of outsourced managed services will reduce contract expenditure on significant IT contracts by at least 2M per year.

In RP4, NM will keep presenting an annual efficiency programme.

In RP4, NM will also continue to implement a number of significant investment programmes. The table below provides an overview of the main CAPEX programmes already included in the budget for RP4:

	FY25	FY26	FY27	FY28	FY29
iNM and the Digital Platform	60.076.000	38.826.000	10.560.000	10.013.000	
INM : Digital Products	44.500.000	31.500.000	7.547.000	7.500.000	
INM: Programme Management	2.000.000	1.000.000			
Digital Platform	11.750.000	4.500.000	2.000.000	1.500.000	
DPLT Project for CNS	1.826.000	1.826.000	1.013.000	1.013.000	
CNS Tools, and (Real Time Monitoring)	2.724.000	2.524.000	1.724.000	1.624.000	1.624.000
Regional Monitoring Agency	209.000	209.000	209.000	209.000	209.000
Surveillance Avionics Monitoring Function	1.000.000	1.000.000	1.000.000	1.000.000	1.000.000
Surveillance Modernisation Support	15.000	15.000	15.000	15.000	15.000
CNS Programme Manager	1.500.000	1.300.000	500.000	400.000	400.000
Network Applications, Sustainment and Transformations	3.662.000	3.662.000	3.662.000	3.663.000	3.772.000
Network Applications	3.652.000	3.652.000	3.652.000	3.652.000	3.761.000
Operations Transformation	10.000	10.000	10.000	11.000	11.000
Grand Total	66.462.000	45.012.000	15.946.000	15.300.000	5.396.000

The main investment programmes are:

- The iNM, the investment programme to implement a forward looking modern system that will enable the development of future functionalities; these future functionalities also include the requirements stemming from the Commission Implementing Regulation (EU) 2021/116 (the CP1 Implementing Rule) aimed for deployment between 2025-2029, notably in what concerns AF5 and AF6. All the other CP1 requirements have been already implemented in the NM systems.

- The developments related to the implementation of the new ATM Master Plan are related to the iNM programme, the Digital Platform, Network Applications and Operations Transformation, as identified in the CAPEX table above. They are fully aligned with the content of the new ATM Master Plan. They are notably referring to the following Strategic Deployment Objectives:
    - SDO 2 - Optimising airport and TMA environmental footprint – 8 million EUROs
    - SDO 3 - Dynamic airspace configuration – 52 million EUROs
    - SDO 5 - Transition to Trajectory Based Operations – 42 million EUROs
- The further development and industrialisation of a range of CNS tools to implement Infrastructure Monitoring and (near) real time Infrastructure Monitoring, including tools to implement the tasks of the CNS Programme Manager in an efficient manner.

3.2.2. Investments for evolutive maintenance of the Network Applications and operations transformation. NM Cost Evolution.

NM Cost evolution in RP4 will be aligned with the strategic geopolitical context, cautious but forward looking to ensure the required scalability and support to traffic growth.

The NM cost base for RP4 consists of the NM activities covered by the Network Functions NFIR 2019/123 and resources for some additional activities resulting from the operational performance challenges identified in 2024.

The table below showing the summary cost including all NM budget segments is the currently proposed cost base for the activities covered by the NF-IR.

Type of Exp/ receipts	K€ 2025	K€ 2026	K€ 2027	K€ 2028	K€ 2029
Staff Remuneration	99.324	105.875	109.526	110.617	114.520
Contract Staff paid by operating	1.639	1.694	1.748	1.797	1.854
Art 41	139	98	99	76	0
ETS distribution	0	0	0	0	0
Staff related expenditure	1.955	1.934	1.894	1.889	1.894
External Effort	45.397	46.862	41.641	34.636	32.683
Operating	10.111	10.208	10.259	10.168	10.198
Depreciations Inv ABP Y0;Y+5	1.526	4.775	7.739	9.550	9.836
Cost of Capital Inv ABP Y0; Y+5	467	2.721	3.346	3.802	2.549
Depreciation Investments Y0	5.491	5.491	5.491	5.491	5.491
Depreciation Past Investments Prior Years	15.236	15.288	11.741	14.737	13.897
Cost of Capital Past Investments	6.113	4.644	7.038	2.920	2.222
Staff Receipts (Acc.Ins + Special Levy)	-1.615	-1.720	-1.783	-1.801	-1.869
Financial Receipts	-600	-600	-600	0	0
Existing agreements (before UPP)	-3.177	-3.279	-3.246	-3.207	-3.189
Tax Compensation & Ancillary Benefits	22.794	24.747	26.295	28.209	30.383
Sales of services UPP	-1.302	-1.119	-1.119	-1.119	-1.119
Sales of services UPP Indirect Costs	-391	-336	-336	-336	-336
Grand Total	**203.107**	**217.283**	**219.733**	**217.429**	**219.014**

The cost categories in the tables are:

Cost Category	Definition
Staff Remuneration	The remuneration of Agency Staff
Contract Staff paid by operating	The remuneration of staff sourced as Contract Staff rather than 'contractors'
Art. 41	The cost of the redundancy scheme following the Ops Room reorganisation a number of years ago.
ETS Distribution	The cost of the early retirement scheme a number of years ago.
Staff Related Expenditures	Expenditure for Training and Missions
External Effort	Expenditure for external effort on contracts
Other Operating	All other operating expenditure.
Depreciations Inv ABP Y0; Y+5	Depreciation for the investments in the future years
Cost of Capital Inv ABP Y0; Y+5	Cost of capital for the investments in the future years
Depreciation Investments Y0	Depreciation of investments in the current year
Depreciation Past Investments Prior Years	Depreciation of investments in the previous years
Cost of Capital Past Investments	Cost of capital for the investments in the previous years
Staff Receipts (Acc.Ins + Special Levy)	Receipts on staff remuneration. This the staff contribution to the accident insurance and a special levy.
Signed Agreements	Revenue from agreements.
Indirect Costs charged to other Pillars	Costs that are charged to other parts of the Agency (e.g. IT costs to CRCO).
Tax Compensation & Ancillary Benefits	Tax Compensation & Ancillary Benefits on pensions.
UPP Revenues	Revenue generated from User Pays Principle Contracts
UPP Indirect Costs	Revenue generated from User Pays Principle Contracts. Indirect costs charged to the users.

3.2.3. NM Cost Efficiency in RP4

Further to the measures described in 3.2.1 above, NM confirms its commitment to address further cost-efficiency measures in RP4. These measures will be integrated in the budget for the period 2025-2029 and will address effects resulting from:

- Further identification of synergies between various activities;
- Continuous improvement in project management;
- Consolidation and increased efficiency in projects implementation;
- Resources allocation and planning.

While it is not possible to precisely quantify them now, all these measures will be gradually taken into account in future NM budgets.

The tables below show the NM cost base in nominal and real terms (2022 = 100). The basis for the inflation is Belgium average inflation rates, actual Eurostat, forecast IMF.

	Actual	Actual	Actual	Actual	Actual	Planned	Planned	Planned	Planned	Planned	Planned
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Nominal	187.871	171.726	157.344	164.327	178.319	175.686	203.107	217.283	219.733	217.429	219.014
Real (2022 = 100)	214.708	195.475	173.550	164.327	174.310	165.731	187.855	197.252	195.738	189.806	187.398

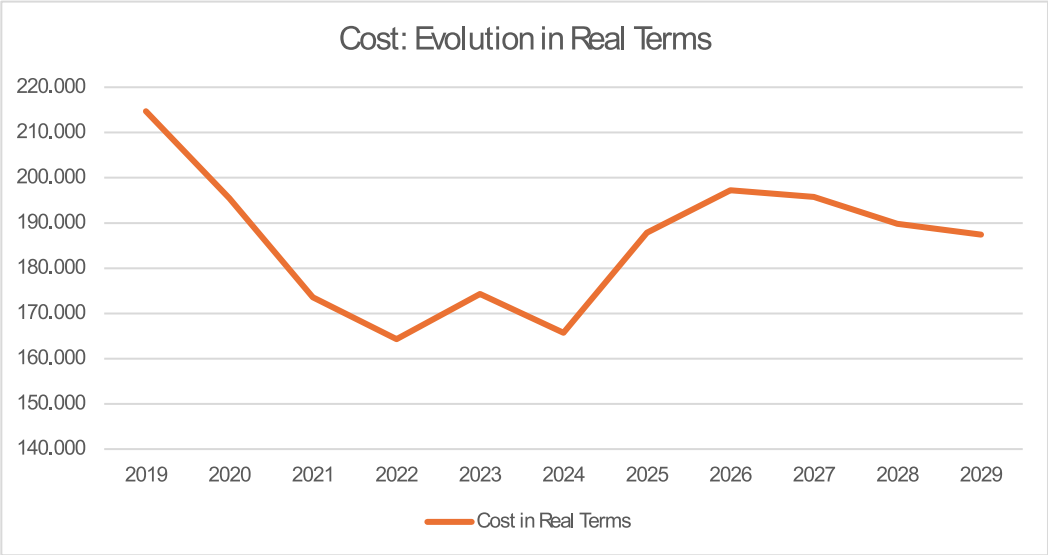


Fig. Evolution of the Cost in Real Terms

The evolution in real terms of the NM Cost per Service Unit (CSU) in the NM Area (the indicator for monitoring in the area of cost efficiency) is presented below. The data is based on Based on the May 2024 EUROCONTROL Forecast, with Actuals for 2023.

	Actual	Actual	Actual	Actual	Actual	Planned	Planned	Planned	Planned	Planned	Planned
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Service Units (Thousands)	171.965	72.848	92.730	149.549	170.284	180.202	186.109	191.587	196.728	202.205	206.711
Nominal Cost Per Service Unit	1,09	2,36	1,70	1,10	1,05	0,97	1,09	1,13	1,12	1,08	1,06
Real Cost Per Service Unit	1,25	2,68	1,87	1,10	1,02	0,92	1,01	1,03	0,99	0,94	0,91

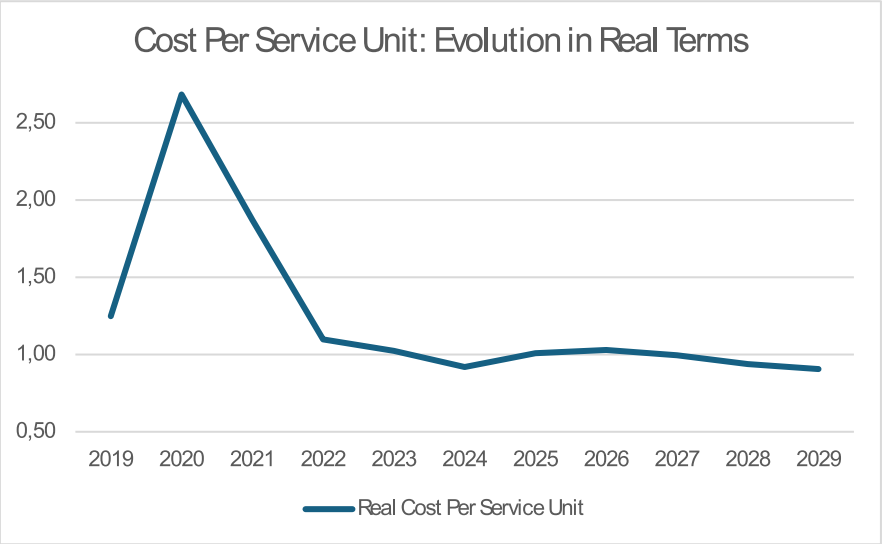


Fig. The Evolution of Cost Per Service Unit

The evolution in real terms in RP4 of the cost per service units shown below.

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Real Cost Per Service Unit	1,25	2,68	1,87	1,10	1,02	0,92	1,01	1,03	0,99	0,94	0,91
%-tage compared to 2022	114%	244%	170%	100%	93%	84%	92%	94%	91%	85%	83%

3.3. Performance targets and objectives specific to each network function

3.3.1. European Route Network Design (ERND) function

The targets and objectives for the environment area will be achieved through the implementation of the following initiatives:

- Development and implementation of the airspace changes included in the ERNIP Part 2 – ARN version 2024-2030 (including full FRA cross-border up to TMA and A-FUA evolutions, beyond the CP1 requirements)
- RAD impact assessment
- Increased cooperation with the Computer Flight Plan Service Providers (CFSPs) on the evolution of their own systems based on the guidelines material published by NM
- Implementation of the actions agreed as part of the NM Flight Efficiency strategic project
- Implementation of other initiatives, e.g. CCO/CDO and PBN.

More details are also available through the ERNIP Part 2 – ARN version 2024-2030, ERNIP Part 3 – ASM procedures and ERNIP Part 4 – RAD User Manual.

3.3.1.1. Performance targets for the environment key performance indicator

Performance IR 2019/317 defines in Annex I, Section 3, paragraph 3.1 as the environment KPI for NM the en route flight efficiency improvement generated by the European Route Network Design function related to the last filed flight plan trajectory, expressed as a percentage point of the year-on-year variation of the en route flight efficiency of the last filed flight plan trajectory. This KPI will be referenced in this document as KEP. It is also sometimes described as the average horizontal en route flight efficiency of the last filed flight plan trajectory.

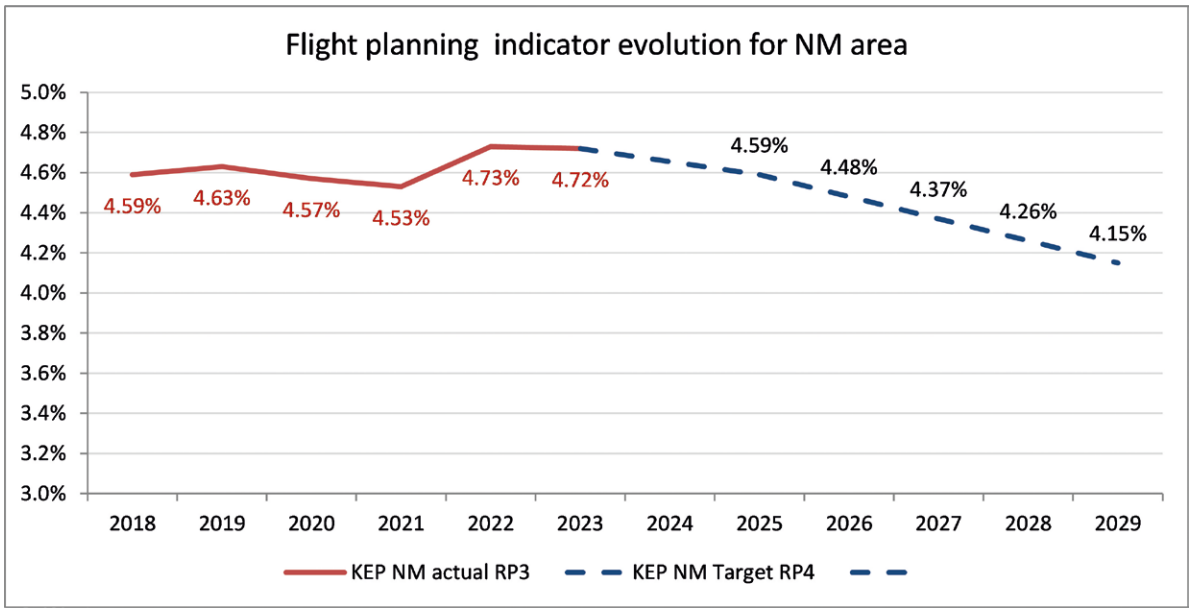
The evolution of KEP was impacted early on by the COVID-19 pandemic and from 2021 by the sanctions imposed on Belarus and the war in Ukraine. The KEP indicator was negatively impacted also by the other disruptions in the network. The crises in the Middle East, and south Mediterranean produced inefficiencies throughout RP3 and will continue to do so. The strikes' impact reached 2.7 million nautical miles during 2020-2023.

The KEP target setting took into account:

- the continued disruptions in the network
- it is uncertain when the war in Ukraine will end, and once than happens how long the recovery process is going to take; for these reasons the impact of the war in Ukraine is considered for the KEP target
- the limited margin for improvements in airspace design, especially in the scope of this indicator (i.e. en-route) – the RTE-DES indicator reached 1.79% in 2023
- the gap between KEP and SCR decreased to a record low of 0.19 pp in 2023 from 0.42pp in 2019, which means that opportunities for better routes narrowed accordingly
- the gap between KEP and KEA reduced by 0.24pp from 2019 to 2023
- the KEA target for RP4 is 2.66, therefore the reduction foreseen from KEA 2023 actual value is 0.33pp
- the ambition for KEP target is:
  - to get the same improvement from 2023 to end RP4 as the KEA (0.33pp);
  - on top of the above, further reduce the gap between KEP and KEA with 0.24pp, by improving on the RAD measures, on the flight planning expected from CFSPs and Aos (actions under the NM Flight Efficiency Initiative project) and on airspace changes
- therefore the RP4 target for KEP will be 4.72% - 0.33pp – 0.24pp = 4.15%
- *Note: due to the impact of the war in Ukraine, it is not possible to directly compare the KEP RP3 and RP4 targets.*

The annual values set for the KEP indicator for NM area are.

	2025	2026	2027	2028	2029
KEP NM area	4.59%	4.48%	4.37%	4.26%	4.15%



RTE-DES achieved its RP3 objective, and it is close to the lower limit of what is possible (ideal connectivity). NM will continue to monitor RTE-DES in RP4, so that the changes in the route structure are keeping the indicator at the low level achieved at the end of RP3.

NM will support the States to improve the KEA performance to achieve the EU-wide target for KEA indicator in line with the EU Decision (2,80% in 2025, 2,75% in 2026, 2,71% in 2027, 2,68% in 2028 and 2,66% in 2029). The measures indicated in the sections 2.2, 2.3 and 2.4 will support the ANSPs in achieving their local target and will contribute to the achievement of the Union-wide target for the environment.

The changes from the assumptions considered in the NPP will be reflected in NOP and ERNIP, which will describe the detailed plans and actions both at local (ANSP, FAB) and network level required to achieve the environment performance targets.

If the forecasted traffic increase is not followed by a similar capacity evolution, there is a high risk that the KEA and KEP would increase between 0.1-0.2 percentage points per year in an attempt by airspace users to find options across the network. This will also have a high detrimental effect on traffic volatility and predictability and, in turn, an even higher increase in ATFM delays.

NM will monitor the route extensions resulting from the CDM network procedures and Network Manager Operations Centre (NMOC) actions for en route ATFM delay savings recorded under 3.3.2 below, i.e. the RRPs initiated by NM and counted towards delay savings. Route extensions are measured as the differences between the distances of the actual trajectories after flights accepted rerouting proposals from NM and the distances of the last filed flight plan trajectories before accepting the rerouting proposals.

3.3.1.2. Description and explanation of the measures aimed at achieving the performance targets for the ERND function:

The NM contributes to the design of an efficient airspace structure, creates the conditions for a better utilisation of the airspace design by the operational stakeholders, including civil/military cooperation, and support the air operators and computerised flight plan service providers in the optimisation of their flight plans.

The KEP reduction between 2023 (4.72%) and 2029 target (4.15%) will be achieved through the implementation of the:

ENV(1). Airspace changes included in the ERNIP Part 2 – ARN version 2021-2030, including Free Route Airspace (FRA) – 0.05 pp of the KEP improvement for the entire RP4, i.e. 0.01 pp average reduction every year
ENV(2). NM Flight Efficiency strategic project – 0.10 pp of the KEP improvement for the entire RP4, i.e. 0.02 pp average reduction every year
ENV(3). ASM and Advanced FUA Network Strategic Programme and the RAD measures re-organisation and rationalisation – 0.42 pp of the KEP improvement for the entire RP4, i.e. 0.08-0.09 pp average reduction every year
ENV(4). Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide targets; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

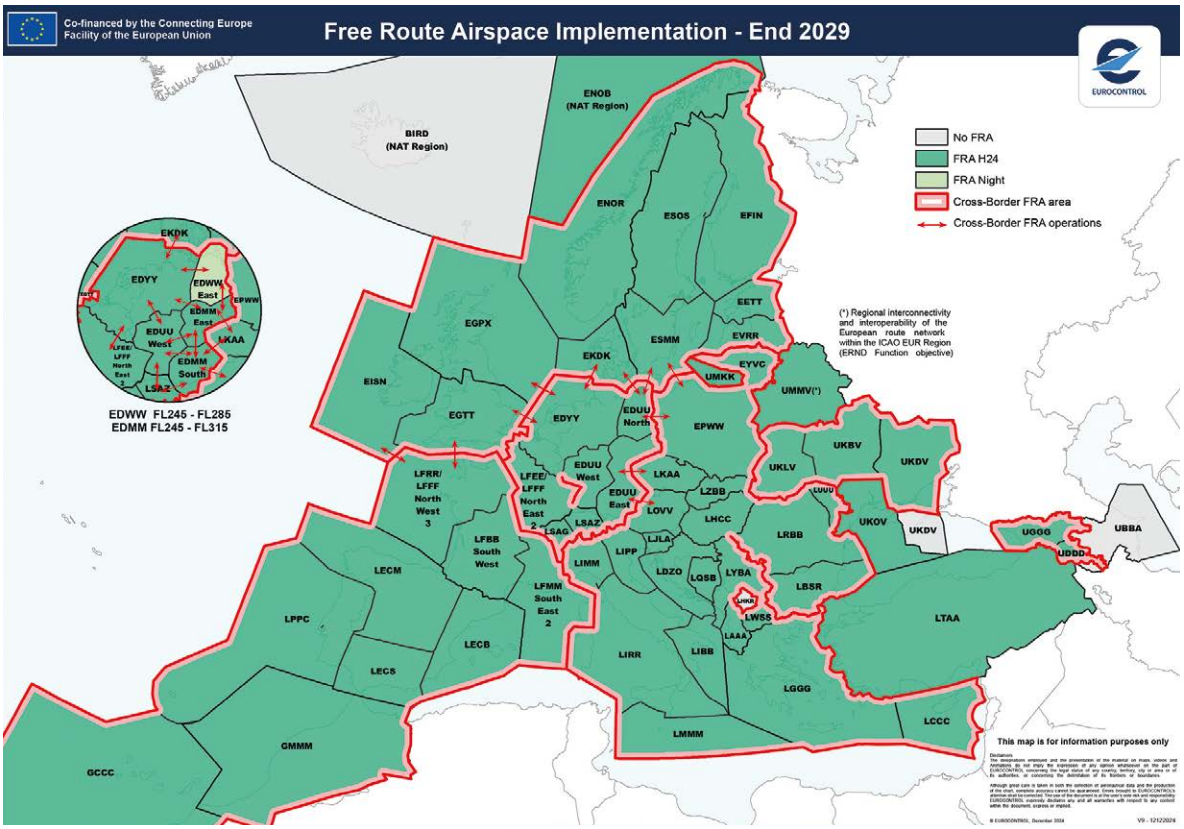
The implementation of the integrated Network Manager System (iNM) programme – ALL(1) will support the actions above. The implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

The impact of the crisis situations on the KEP evolution in RP4 will continue. NM will work with all the parties involved to minimise the impact of these situations, and other crises that could happen, to support a swift return to normal operations once the crisis is averted.

Measures related to the design of an efficient airspace structure;

NM will coordinate the airspace design in close cooperation with States and ANSPs to ensure that the European airspace can accommodate additional capacity needs over RP4. The actions in this area will fall within the ENV(1) and ENV(3) initiatives as explained above. Within ENV(1) the cross-border airspace design initiatives will provide direct flight efficiency benefits for the reduction of the route extension, notably full and harmonised implementation of Free Route Airspace (FRA).

The FRA implementation will continue in RP4 towards the cross-border FRA and FRA connectivity with TMAs. The map below shows the planned FRA implementation by the end of RP4.



Within ENV(3) NM will work to:

- reduce the impact of the **RAD restrictions** with the participation of all the interested parties,
- achieve further improvements in the ASM and Advanced FUA towards more dynamic ASM procedures, improve the availability and use of the Conditional Routes (CDR).

Annex A1.2 presents the detailed NM actions related to ENV(1) and ENV(3).

The NM will use the RTE-DES indicator to monitor the effectiveness of the airspace changes and SCR indicator for RAD/ASM/A-FUA improvements.

Measures related to a better airspace utilisation by the operational stakeholders and the optimisation of the flights

The KEP indicator based on the last filed flight plan captures, on top of the route and airspace design network, a series of inefficiencies stemming from ATC restrictions, military activity, awareness of the best plannable route, and route charges.
The airspace users (or computerised flight plan service providers on their behalf) are responsible for filing the flight plans with IFPS system and therefore the flight planning choices will have a direct impact on the RP4 results of KEP.

The main vehicle to enhance flight efficiency performance, supporting airspace users, mainly aircraft operators (AOs) and CFSPs during RP4 will be the strategic project **NM Flight Efficiency Implementation** – ENV(2). The main benefit stems from the provision of additional routing options and better airspace utilisation. It will support a more dynamic and flexible approach to flight planning to maximize the advantages of airspace design and airspace management solutions.

The Annex A1.2 lists the actions that NM actively supports and will continue to support the airspace users within the scope of the strategic NM Flight Efficiency Implementation project.

Excess Fuel Burn

NM developed the Excess Fuel Burn (XFB) metric in 2019 for the Network Fuel Inefficiency Study[9]. NM has reviewed the indicator in 2023 and decided to adapt it to ensure it maintains operational relevance. It will be an annual assessment of network flight fuel efficiency relative to the two most recent operational years.

The revised XFB also ensures that 100% of NM internal flights are included in the metric calculation, which avoids overstating the network inefficiency – it dampens potential high inefficiency of a partial population.

NM will monitor this updated XFB in RP4 to estimate the network fuel inefficiency and analyse the operational impact at flight / route / axis level. The FATHOM and CO2MPASS dashboards will help ANSPs investigate if they are contributing to route ineffiency. Airspace users can investigate their own flights with high excess fuel burn to see if operational improvements are possible.

Other flight efficiency initiatives

Flight efficiency actions at airports and within TMA will focus on improvements to TMA operations, notably Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO) and PBN deployment.

NM will monitor **vertical flights adherence** to the requested flight level (RFL) from the flight plan as part of the traffic predictability projects. The monitoring will point out inefficiencies in the planning or the actual vertical profile and allow NM and the air operators to optimise the en-route vertical profile.

The development works on the Landing and Take-Off Cycle Emissions Estimator (LTO EE) that are performed by NM's Airports, together with the Aviation Sustainability Unit, were concluded. The complete will become available at the start of RP4 and will provide ECAC-wide fuel burn and emissions data for aircraft operations on the ground and in the vicinity of airports in accordance with the ICAO LTO concept.

3.3.2. Air Traffic Flow Management (ATFM) function;

3.3.2.1. Performance targets for each relevant key performance indicator set out in point 4.1 in Section 3 of Annex I;

The Performance IR 2019/317 defines in Annex I (section 3 paragraph 4.1) NM's key performance indicators for the capacity area as the **percentage of en-route and airport ATFM delay savings** from the CDM network procedures and NMOC actions, over the initial total en-route and airport ATFM delay, respectively. The method through which the delay savings are measured is detailed below and has been independently audited and confirmed by NMB.

The main NM delay reduction actions, both direct and indirect are summarised below:

- The NOP network measures for the summer season that are taken at strategic level
- Capacity optimisation in the pre-tactical and a part of the tactical operations. It involves a CDM process with the FMPs to fine tune the available capacities according to the latest known demand. The outcome of the Capacity optimisation process is an improved sector configuration, fined-tuned measures (regulations) such as increased rates, shortened periods or even cancelled regulations.
- The demand optimisation by means of lateral or level-capping re-routing scenarios could bring significant delay savings.
- NMOC direct actions on individual flights, e.g. re-routing proposals for delay reductions (RRP) and slot optimisation.

[9] https://www.eurocontrol.int/publication/environmental-assessment-european-atm-network-fuel-inefficiency-study

NM delays savings KPIs are only calculated for RRPs and slot optimisation. These actions are focused on individual flight improvements. Details on the methodology of calculating the NM delay savings are in Annex A1.4. The other indirect delay savings will not change the current methodology of calculating the NM delay savings, as explained above, unless these measures will replace the actions (RRPs and slot optimisation) currently used to calculate the NM delay savings.

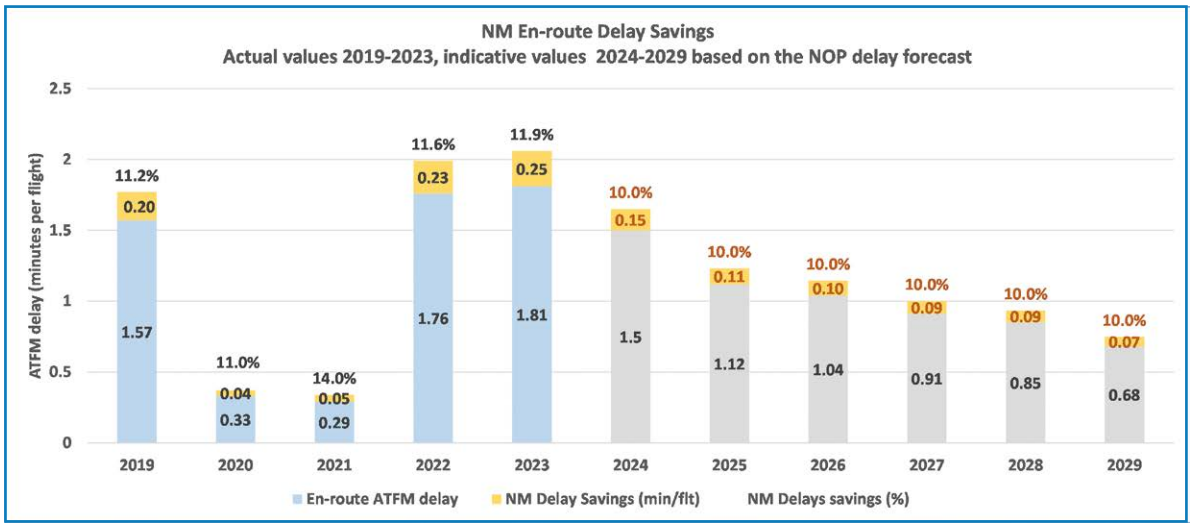
En-route delay savings

During RP3 the en-route delay savings were considered from direct actions in NMOC (i.e. force Calculated Time Over (CTO)/CTOT and override slot) and re-routings proposals (RRPs) followed by airlines. Considering only the actions above, NM met the 10% objective for every year of RP3, while the conditions varied widely, from the low traffic/low delays during the COVID-19 pandemic years of 2020 and 2021 to the high delay and volatility during the following years of recovery and the consequences of the war in Ukraine. These results confirmed the original 10% target for RP3.

Both the high and low delays situations pose their own challenges. The high delays situation requires a large amount of delay savings – actions are targeting the flights with big delay, which is what helps the airspace users the most. Low delays reduces the opportunity to do delay savings on individual flights with big delays, which requires to do more actions to save the same amount of delays. It is expected that, based on existing methods of measuring the delay reduction of NM actions (RRPs and slot optimisations) will add up to achieve the NM RP4 target of delivering additional operational benefits of 10% en-route delay savings. The percentage will be measured as the NM en-route delay savings over the total network en-route delay.

The annual values set for the NM en-route delay saving indicator are:

	2020	2021	2022	2023	2024
Percentage of NM en-route ATFM delay savings	10%	10%	10%	10%	10%



The additional benefits coming from the NPP cannot be achieved without the strong involvement and commitment of all operational actors through the NM CDM.

Airport delay savings

During RP3 the airport delay savings were considered from direct actions in NMOC (i.e. force CTO/CTOT and override slot). They will remain the main contributors to airport delay savings during RP4.

The annual values set for the NM airport delay saving indicator are:

	2020	2021	2022	2023	2024
Percentage of NM airport ATFM delay savings	5%	5%	5%	5%	5%

The airport ATFM delay savings are calculated only from the slot optimisation actions, as there are no RRPs possible for the aerodrome regulations. In addition, the nature of the ATFM regulations at airports (weather, structural capacity constraints) does not offer the same opportunities for pre-tactical and tactical interventions from NM like the en-route part. For these reasons there is a lower level for the airport delay savings.

3.3.2.2. Description and explanation of the measures aimed at achieving the performance targets for the ATFM function

The measures detailed in section 2.4 and below are required to meet the performance targets in the capacity performance area, not only for the NM but also for the network. The NOP will further describe the measures contributing towards achieving the Union-wide targets for capacity.

Main initiatives and actions for reducing the ATFM delay and contributing towards achieving the Union-wide targets for capacity

The main initiatives required to achieve the capacity performance targets and reduce ATFM delays, and contributing towards achieving the Union-wide targets for capacity, are the implementation of:

CAP(1) Summer operational priorities (first rotation, flight plan adherence, deliver agreed capacities and increased flexibility, realistic scheduling including turnaround times, adverse weather management) – 15% delay reduction every year compared to the final NOP forecast (this includes tactical NMOC delay savings)

CAP(2) New Network Operations Plan processes – 15% delay reduction every year compared to the initial NOP forecast prepared at the beginning of the NOP preparation cycle (this also includes the delay savings related to the Network Summer measures and the effects of the Network Strategic Projects included in the NOP)

CAP(3) Network Strategic projects (Cooperative Traffic Management (CTM), Flight Plan and Flight Data Evolution (FPFDE), Operational Excellence Programme (OEP), Airport and TMA Network Integration Network)

CAP(4) Stepped implementation of the various Concepts of Operations covering – Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATFCM Integration and FLOW; those concepts of operations form the foundation for the operational requirements of the iNM system; the iNM system is one of the major network enablers leading to the contributions for the achievement of the European-wide; the implementation of its new functionalities is aligned with the Network Concept of Operations roadmap.

These initiatives are detailed in Annex A1.3

NM will monitor during RP4 the indicators defined below. They represent the indicators for monitoring defined in paragraphs 4.2 (a) and (b) in Section 3 of Annex I of Performance IR 2019/317 as well as other indicators defined in Sections 1 and 2 of the same IR, enhanced and adapted to the needs of NM. The issues identified during monitoring that affect the performance of the network functions will be addressed with NM operational stakeholders. They may be escalated to the attention of the NM governing bodies in line with the NF IR 2019/123.

Throughput achieved and quality of service delivered (ATFM delay)

NM specifies a traffic throughput requirement for each ACC in the five-year NOP. ANSPs indicate their expected capacity over the same five-year period. NM then estimates if the capacity is sufficient or if further capacity enhancing measures are needed.

Likewise, NM establishes an 8-weeks daily traffic prediction for each ACC in the short-term rolling NOP – Rolling Seasonal Plan. ANSPs inform NM of their expected 24h sector count (for each day of the week) and NM assesses if the capacity proposal is sufficient. Otherwise, NM identifies local and/or network measures to counteract the expected shortfall.

As traffic levels recover and capacity bottlenecks reappear, there will be more ATFM regulations. The RP4 period will be heavily affected. NM believes it will be necessary to adapt the NOP – Rolling Seasonal Plan process to request specific ACCs to provide more capacity at short notice. ANSPs will need to react and NM needs to measure which ANSPs successfully add capacity.

To that end NM developed new metrics to understand better ANSP capacity delivery and their flexibility in adapting capacity to network requirements. As NM does not have full insight into ACC actual sector data, the metrics, are based on traffic throughput achieved and quality of service delivered (ATFM delay) and cover different lead time periods.

The new indicators are:

- **G-THR:** Percentage of days (over a short-term monitoring period) where actual daily ACC traffic > expected daily ACC traffic (established using Guideline Forecast Traffic method.)
- **R-THR:** Percentage of days (over a short-term monitoring period) where actual daily ACC traffic > expected daily ACC traffic (established using Rolling NOP 8w prediction)
- **F-DEL:** Percentage of days (over a short-term monitoring period) where actual daily ACC ATFM delay > expected daily ACC ATFM delay (established using Guideline Forecast Delay method)
- **T-DEL:** Percentage of days (over a short-term monitoring period) where actual daily ACC ATFM delay > expected daily ACC ATFM delay (established using Guideline Target Delay method.)

The performance assessment comes from comparing throughput and QoS achieved, e.g. high G-THR (%) and low F-DEL (%) for an ACC would indicate good performance relative to the previous year's NOP expectations.

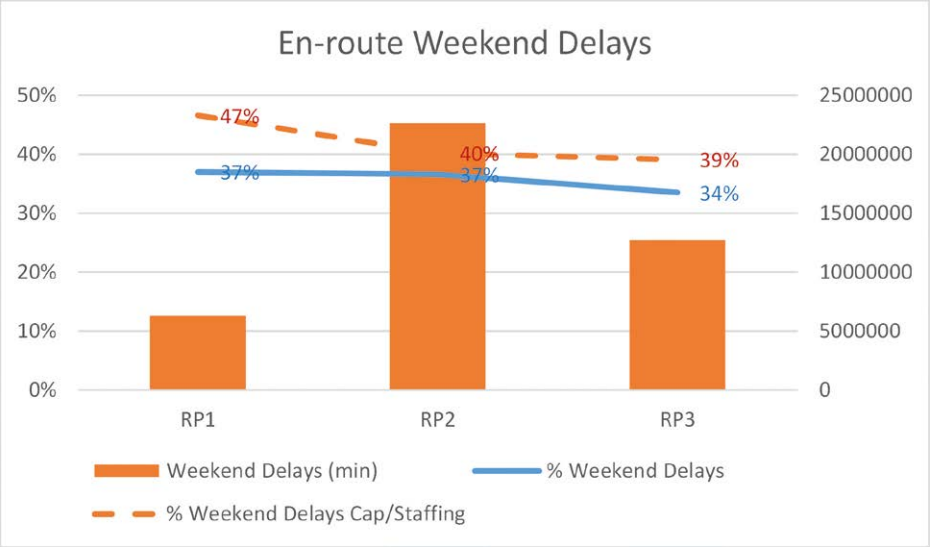
Minimising flights with big ATFM delays

NM will continue to monitor the flights with big delays (above 30 minutes) and the NMOC actions that successfully brought such flights below the 30 minutes threshold. Other initiatives related to delay reductions, like the first-rotation will continue to reduce the number and proportion of flights with big delays.

ATFM Weekend delays

A number of factors, notably how many ATC strikes takes place during the weekend, influences the proportion of weekend delays in total en-route delays. This is why in RP3 NM monitored, and will continue in RP4, both the overall proportion of weekend delays and the proportion of weekend delays caused by the ATC capacity and staffing reasons.

During RP3 (until and including 2023), the proportion of en route ATFM delay related to ATC capacity and staffing on the weekend delays was 39%, marginally better than in RP2. The 2023 proportion of 36% was the best in all refrence periods. There is however still room for improvement, as the proportion of weekend delays remains high.



The NM will continue to work with the ACCs concerned and local FMPs to match the airspace and sector configuration with the traffic demand and complexity. As part of the priority initiative for delivering agreed capacities & increased flexibility, NM and ANSPs will work on balancing the traffic and en-route capacity during weekends.

First Rotation delays reduction and Reactionary delays

During RP3, NM included the network on-time performance in its performance framework. It is reflected in two of the four priorities deployed during the summer seasons of 2023 and 2024: prioritise first rotation and realistic scheduling and turnaround times.

NM will continue to prioritise in RP4 the network on-time performance, including the first rotation. NM will continue the approach to have a better understanding of ground risks impacting on-time performance and will continue to work closely (pre-) tactically via the airport function with more “at risk” airports. NM will support airport integration processes to improve network time predictability.

NM will use the MIRROR tool to optimise the first rotation and help mitigate ATFM regulation-induced reactionary delays. AI-based predictive delay module in MIRROR support NM in identifying and mitigating potential ATFM regulation-induced diversions due to airport curfews, which often implies assisting a flight several rotations before the aircraft will operate the last flight of the day.

The NOP planning function will include the identification of required improvement measures at airport and network level to support the achievement of on-time operations at airports. It will evolve towards the integration of airport and network operations, addressing the links AOP-NOP and the connectivity between airport and NM operations centres.

Managing weather

With the post-pandemic traffic recovery, the en-route weather delays climb fast to the high levels seen in 2018 and 2019. In 2023 the network experienced the highest weather delays, both in absolute number (more than 5 million minutes) and as the proportion of weather in total en-route delays. Larger areas are impacted by bad weather generating a very high amount of weather delay, often combined with a structural lack of capacity in some areas.

Adverse weather conditions affect negatively the network, causing network volatility and instability, extra workload for air traffic controllers due to tactical deviations from the flight plans as well as flight cancelations, some of them related to night curfew limitations in some airports.

NM worked closely with stakeholders making use of the Cross-Border Weather Procedure (XBW procedure) to help plan and coordinate mitigation actions, improve network planning in support of network delay reduction and fuel-burn reduction. The XBW procedure was supported by integrating into NMOC experts from meteorological organisations from the network, coordinated by the European MET Services (through EUMETNET).

As there are limitations in what the XBW procedure can achieve, a different approach, the en-route Sever Weather Partnership (ESWEP), will be incrementally implemented starting with a proof of concept in summer 2024.The implementation of an accurate network forecast in NMOC will be key to the new approach.

Over-deliveries

The indicator and changes in the OVD indicator are explained in details in the section 3.1.3. The reduction of the duration when a traffic volume is over-delivered and its magnitude has a direct effect on capacity, as repeated occurrences of OVD will end up in providing a buffer to “accommodate” them without having a safety impact on the provision of air traffic service. Therefore the measures foreseen in section 3.1.3 will also address the capacity aspects, by reducing or eliminating the need for capacity buffers.

The analysis of OVD is intimately related to the analysis of network predictability and volatility. High volatility will often end up in over-delivery in one traffic volume (due to un-anticipated traffic) and under-delivery in another (expected traffic not showing up).

NM provides tools to analyse and investigate the over-deliveries and under-deliveries in connection with the network predictability and volatility. It will work with the ANSPs, Aos and CFPSP to implement measures derived from the analysis to lower the over-deliveries occurrences and their impact.

3.3.2.3. Other capacity initiatives.

NM implemented the airport function within the NMOC as a permanent feature, which provided tactical support at airports having capacity issues, optimise the first rotation and help mitigate ATFM regulation-induced reactionary delays. This will continue in RP4.

The implementation of the RECAT-EU optimised wake minima, as well as of approach spacing tool (based on time or distance), also integrating reduced runway occupancy separation, will continue to provide capacity at busy airports in the network.

3.3.3. Coordination of scarce resources functions:

3.3.3.1. Coordination of radio frequencies function:

Description of the support to network capacity;

The Radio Frequency Function (RFF) contributes to network capacity by ensuring the availability of aeronautical radio frequencies for the provision of Air Traffic Services. Interference free radio frequencies are required by communication, surveillance and navigation systems in order to deliver the ATM capacity planned by airspace design. The RFF contributes also to safety by supporting the mitigation of the impact of radio interferences.

Description of specific objectives.

The NM performance indicators for the RFF functions in RP4 are:

- Number of Radio Interferences; this indicator measures the number of reported radio frequency interferences that have not been resolved six months after the first report.
- Number of Unsatisfied Requests; this indicator reports the number of unsatisfied radio frequency requests at a specific moment in time.
- Average Time to Satisfy a Request; this indicator reports the average time required to satisfy a frequency request at a specific moment in time (plus the minimum and maximum time required).

The NM objectives for RP4 are:

- to prevent the increase of the number of Unsatisfied Requests;
- to prevent the increase time to satisfy frequency requests; this KPI is calculated for congested areas only.

3.3.3.2. Coordination of radar transponder codes function:

Description of the support to network safety;

The **Transponder Code Function (TCF)** contributes to improving safety by seeking to eliminate Secondary Surveillance Radar (SSR) transponder code conflicts and consequently reducing flight correlation errors while ensuring unique aircraft identification. At the same time TCF aims to reduce the overall number of code changes and as such contribute to the reduction of controllers' and pilot's workload related to these tasks.

One of the main enablers for TCF is the Centralised Code Assignment and Management System (CCAMS), a pan-European solution to overcome the current and future shortages of the SSR codes used by Air Traffic Control for radar services. CCAMS provides a unique SSR code to each flight operating in the countries using the service. By mid- 2024, twenty one States implemented CCAMS namely: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, Ireland, Israel, Lithuania, Moldova, Montenegro, Poland, Portugal, Norway, Romania, Serbia, Sweden, Ukraine and the United Kingdom.

The TCF performance indicators and the associated objectives have been developed and agreed in cooperation with the NM operational stakeholders.

Description of specific objectives.

TCF safety related performance indicators

The performance indicators addressing the safety of SSR transponder codes usage are related to systemic errors, and are to be interpreted in close conjunction with the process of SSR transponder code allocation to States. The two performance indicators that will be monitored in this context are:

- The number of reported code conflicts generated by the SSR transponder code allocations to States;
- The number of reported unplanned shortfalls (e.g. Code shortages) generated by the SSR transponder code allocations to States.

The NM objective is to ensure that for RP4 the code allocation to States does not induce any negative effects for operations:

- to eliminate code conflicts generated by SSR transponder codes allocations to States;
- to eliminate unplanned shortfalls (e.g. code shortages) generated by SSR transponder codes allocations to States.

In 2023, there were no code conflicts generated by SSR transponder codes allocations to States and no cases of codes shortages were detected by the monitoring tools.

NM is responsible for the operation of CCAMS and the correct assignment of SSR transponder codes on behalf of CCAMS users. CCAMS is required to assign codes in accordance to the SSR transponder codes allocated for its use by States, and reflected in the Code Allocation List (CAL). Any deviation has the potential to generate a code conflict in one of the CCAMS States, or in a third party's area of responsibility.

The NM objective for RP4 is to ensure that CCAMS does not assign any wrong SSR transponder code for CCAMS managed flights.

TCF efficiency related indicators

The efficiency of SSR transponder code allocations to States is reflected in the number of code changes. The NM aims at reducing constantly the daily number of required code changes by optimising the code allocations. The same objective is supported by deployment of technology in support of code management (e.g. Mode S, CCAMS, etc.).

3.3.4. Military Dimension of the Plan

Military authorities are an important CDM partner of NM influencing all performance areas due to their different role and type of operation. Effective CDM processes have allowed airspace design projects to take due account of military airspace needs, facilitated the introduction of better and targeted conditional routes and enabled more efficient utilisation of military use airspace and the ATM route network. They are all facilitated by the implementation of the Advanced Flexible Use of Airspace strategic project.

The development of enhanced airspace managements in RP4, notably the further integration between ASM and ATFM, is addressed in section 2.4.1.

Availability and use of the Conditional Routes

NM will work to improve the civil/military CDM processes in areas where military mission effectiveness is constrained or availability and effective usage of the CDR network is unnecessarily restricted.

NM will monitor the RAI and RAU indicators throughout RP4. The indicators are defined in details in the ASM Handbook Section 7.

Booking procedures

NM will support its military stakeholders in improving the effectiveness of booking procedures for FUA, as per paragraph 4.2 I in Section 3 of Annex I of Performance IR 2019/317, as this can benefit the capacity available in the network.

4. IMPLEMENTATION OF THE NETWORK PERFORMANCE PLAN

4.1. Monitoring of and reporting on the implementation of the Network Performance Plan;

The Commission is in accordance with Article 37 of the Performance IR 2019/317 responsible for the monitoring of the performance of the network functions and have in this regard to assess whether the performance targets contained in the Network Performance Plan are met. In this task the Commission will be assisted by the PRB in accordance with Article 3(k) of the same Regulation. The NM will facilitate this monitoring.

NM will regularly be invited to participate in the PRB meetings to provide the latest status with the achievement of the Network Performance Plan, the latest performance evolutions in the network and the identification of other possible actions, in cooperation with the PRB and the European Commission, to address network performance evolutions. In addition, the participation of the PRB as an observer in NDOP/NDTECH/NMB will be considered.

In addition to the above:

- NM will report annually the results of the monitoring of the KPIs and related targets to the EC and NM governing bodies, usually as part of the NM Annual Report. In addition, NM will report its performance and the results of KPIs monitoring to each NMB meeting. This report will simultaneously be submitted to the PRB.
- Monitoring will be ensured by using several dashboards that allow the daily, weekly, monthly, seasonally and annually monitoring of several NPP indicators. This will allow a more flexible monitoring of those indicators.

The effectiveness of safety management of NM is measured by conducting the relevant survey assessing the implementation of the different SMS management objectives. The Safety Improvement Sub Group will facilitate the ongoing maintenance and deliverables from the NM 'Top 5' safety risks initiative. The NM SMS is continuously monitored as indicated in the NM SMS Manual.

The Cost efficiency indicator will be monitored annually.

4.2. Measures to address the situation where targets are not reached during the reference period;

In case the performance targets contained in the Network Performance Plan are not met or risk not being met, the Commission shall request the Network Manager to define appropriate measures in order to rectify the situation and achieve those targets.

Such corrective actions will address the divergences from NPP and associated KPIs and its implementation will be monitored by the NMB and its subcommittees.

The Cost efficiency indicator will be presented to NMB together with the status of the actions to manage NM costs.

The monitoring of Scarce Resources indicators will be presented to the subcommittees of the NMB as per the related CDM processes. Any significant issues will be presented to NMB. The Crisis management updates will be presented annually to the NMB. The NM will ensure that reports to the NMB simultaneously will be made available to the PRB.

Overall, NM will implement and apply these mechanisms specified for remedial actions in the article 10 of NF IR 2019/123, including the register of the operational actions and remedial measures that operational stakeholders have not implemented.

4.3. Coordination with the national supervisory authorities.

As per Article 10.2 of the NF IR 2019/123, NM will inform Member States and the national supervisory authorities responsible for the oversight of the operational stakeholder concerned by the remedial measures, about the content of the measures and about any aspect related to changes in operational performance. NM will continue to coordinate with NSA in the framework of the post ops performance adjustment process. This coordination will include the changes to the process, escalation and reporting on the adjustment process.

Appendix I. List of NM performance indicators for RP4

The list is in line with Performance IR 2019/317, Annex I, Section 3

NM key performance indicators				Target
SAF	KPI	EoSM	The level of the effectiveness of safety management of the Network Manager	Improving its own SMS to reach at least Level C in the safety management objectives 'safety culture','safety assurance', and 'safety promotion' and at least Level D in the safety management objectives 'safety risk management' and 'safety policy and objectives'
ENV	KPI	KEP	En route flight efficiency improvement generated by the European Route Network Design function related to the last filed flight plan trajectory, expressed as a percentage point of the year-on-year variation of the en route flight efficiency of the last filed flight plan trajectory	Achieve 4.15% for NM area for KEP indicator by 2029
CAP	KPI	ENR-DS	The percentage of en route ATFM delay savings	Deliver additional operational benefits in terms of en-route delay savings of 10% of total en-route delay
	KPI	APT-DS	The percentage of arrival ATFM delay savings	Deliver additional operational benefits in terms of en-route delay savings of 5% of total airport delay

NM indicators for monitoring		
PI	OVD	The ATFM over-deliveries above the capacity limits of a sector declared by the air navigation service provider where ATFM regulations are imposed.
PI	VFE	En route vertical flight efficiency indicator, i.e. flights adherence to the requested flight level (RFL) from the flight plan
PI	XFB	Excess Fuel Burn
PI	TQS	Throughput achieved and quality of service delivered
PI	DLA	ATFM Delay (en-route ATFM delay is an EU-wide KPIs)
PI	B-DLA	The annual percentage of IFR flights with ATFM delay above 30 minutes
PI	W-DLA	The average, over a calendar year, of en route ATFM weekend delay expressed in minutes of delay per flight
PI	F-ROT	The annual percentage of all first rotation delay for a pre-selection of area control centers and airports with the most significant potential delay reduction as identified annually by the Network Manager
PI	DUC	The unit cost for the execution of the tasks of the Network Manager

Appendix II. List of additional NM performance indicators for RP4

NM has defined a number of additional performance indicators (API) to monitor, analyse and take corrective actions in regard of the NM and network performance. It will also support effective management and oversight from NM governing bodies in regard of monitoring performance.

NM indicators for flight efficiency and capacity			
	API	RTE-DES	The route extension due to airspace design indicator
	API	SCR	The route extension of the shortest constraint route
	API	VOL	Volatility indicator (general, time and airspace volatility for traffic volume count)
	API	CDM-DPI	A-CDM coverage of departure time information as % of network departures
NM indicators for the scarce resources functions			
	API	RFF-RFI	Number of reported radio frequency interferences that have not been resolved six months after the first report
	API	RFF-UFR	Number of unsatisfied radio frequency requests at a specific moment in time
	API	RFF-AFR	Average time required to satisfy a frequency request at a specific moment in time (plus the minimum and maximum time required)
	API	TCF-CCS	The number of reported code conflicts generated by the SSR transponder code allocations to States
	API	TCF-CS	The number of reported unplanned shortfalls (e.g. code shortages) generated by the SSR transponder code allocations to States
	API	TCF-CCH	The efficiency of SSR transponder code allocations to States reflected in the number of code changes
	API	TCF-WTC	Number of wrong SSR transponder code for CCAMS managed flights

Annex 1. The NM's main initiatives and related actions undertaken to achieve the targets and objectives in RP4.

This Annex will detail the lines of actions pertaining to those initiatives with an indication of the:

- **Performance area covered,**
- **The KPIs, including the Union-wide KPIs, as well as the Nm PIs that are being addressed,**
- **How it is contributing to the achievement of the target.**

The following initiatives are mapped against enhancements for the Environment key performance area (KPA):

- Development and implementation of the airspace changes included in the ERNIP Part 2 – ARN version 2021-2030 (including FRA and FUA evolutions)
- Implementation of the Free Route Airspace Network Strategic programme
- Implementation of the ASM and Advanced FUA Network Strategic Programme
- Implementation of the NM Flight Efficiency strategic project
- RAD measures re-organisation and rationalisation
- Increased cooperation with the Computer Flight Plan Service Providers (CFSPs) on the evolution of their own systems based on the guidelines material published by NM
- Implementation of the Airport and TMA Network Integration Network Strategic Programme
- Implementation of other initiatives, e.g. CCO/CDO and PBN
- All those initiatives are described in detail in the sections 2.2, 2.3, 2.4 and in the sections below. More details are also available through the ERNIP Part 2 – ARN version 2021-2030, ERNIP Part 3 – ASM procedures and ERNIP Part 4 – RAD User Manual
- iNM implementation.

The following initiatives are mapped against enhancements for the Capacity KPA:

- Implementation of the Cooperative Traffic Management Network Strategic Programme
- Implementation of the FF-ICE Initial Trajectory Information Sharing Network Strategic Programme, 4D business trajectory management
- Implementation of the Airport and TMA Network Integration Network Strategic Programme
- Implementation of new Network Operations Plan processes, including the weekly European Network Operations Plan – Rolling Seasonal Plan providing the outlook for the next 8 weeks
- Network ATFM measures to maximise utilisation of available capacity and monitor the capacity vs quality of service delivered
- Re-enforcement of ATFM strategic, pre-tactical and tactical planning processes made possible by the iNM digital system architecture and shared aviation network information
- Network CDM process to optimise ATFM regulations from a network perspective
- Advanced ASM/ATFCM integrated management
- Network CDM processes for weather through the en-route Sever Weather Partnership
- Re-enforcement of post operational analysis processes and feed-back loop into the planning processes
- iNM implementation.

A1.1 Measures aimed at achieving the safety performance targets and address over-deliveries;

NM will use the latest standards and best practices developed by NM in cooperation with its stake-holders, like Standard of SMS Excellence, in the implementation of its own SMS, to achieve the highest possible maturity for each safety management objective.

The specific measures will comprise inter-alia the following activities, processes, and best practices:

- **For Safety promotion Management Objective:**
  Internal safety training adapted to the safety responsibility of the individual,
  Feed-back is used to improve training and
  SKYbrary (www.skybrary.aero) platform will be used actively for the safety promotion to cover all aspects of operational safety as well as safety management.

- **For Safety policy and objectives Management Objective**
  Enhanced and periodic process for safety policy review.
  Integration with the Eurocontrol Agency Safety Culture policy and rules of application (RoA45).
  Establishment of the just culture committee .
  Internal Safety Reviews will ensure the adequate accountability with assurance that safety improvements actions across the NM are prioritized and coordinated effectively.

- **For Safety Assurance Management Objective**
  Establishment of an integrated safety performance monitoring and measurement through safety dashboards.
  Safety reporting, investigation separated from operations and integrated with the performance monitoring.
  Adoption of modern tools such as eTOKAI (Tool Kit for ATM Occurrence Investigation) to store data and exchange it with EASA and feed Business intelligence tools and dashboards.
  Safety surveys and audits (internal and external) will be used in the continual improvement of the SMS.

- **For Safety Culture Management Objective**
  Safety Culture transformational journey will start with a reorganisation of NM Directorate. NM will adopt an intelligent and effective organisational safety culture programme based on Asset Based Community Development (ABCD) framework - ABCD is an approach to community development that focuses on revealing assets, including people, places, artefacts, means of communication and exchange, etc. While the classical safety culture approach focuses primarily on needs, the ABCD approach focuses primarily on assets. Combining the two presents an opportunity to understand and improve how we think about work and how we do work.

- **For Safety Risk Management Objective**
  NM will build on its existing risk register and will establish an Integrated Risk Management approach by
  - combining reactive, pro-active and where possible predictive measures
  - align safety risks with other risks from business, quality and (cyber) security measures
  - have a regular risk review process at the senior management level to address the risks and their respective mitigations.

NM actions to address over-deliveries

Action	KPA	KPI/PI[10]	Timeline	Description
Support ANSPs to investigate and analyse OVD. The Dynamo tool will support the ANSPs in the investigation and analysis of the OVD and under-deliveries (UND),	SAF CAP	OVD	O/G	Support directly OVD or as part of the larger look at the predictability and volatility of the traffic evolution for regulated traffic volumes. Support the identification of the TVs with high volatility and the analysis of the causes of volatility, OVD and UND, as well as the time predictability leading to OVD Dynamic analysis of the OVD, showing the development of an OVD, how and when the different contributing factors kicked in. It was further supported by an analysis of the most frequent airspace un-anticipated traffic[11], and its "twin" the airspace avoiding traffic[12], which are a major contributor to the OVD and UND respectively
Flight Plan Predictability strategic project actions related to the YoYo profile detection and sharp-turn angle tools in the NM system.	SAF CAP ENV	OVD KEP	O/G	It will provide protection from un-anticipated traffic that could not follow those YoYo profiles and sharp-turns, ending up in different airspace than planned
Improve the level of adherence to requested flight level (part of CTM strategic project)	SAF CAP	OVD	O/G	Vertical un-anticipated traffic is the main contributor to the ENR regulations
Removal of un-necessary RADs	SAF CAP ENV	OVD KEP SCR	O/G	It is reducing the gap between the planned and actual trajectory/ flight level flown.

[10] The full list of indicators can be found under Appendix I and II
[11] Airspace un-anticipated traffic are the flights not planned (as per last flight plan) but actually entered the regulated traffic volume
[12] Airspace avoiding traffic are the flights that are planned to enter the regulated traffic volume (as per last flight plan) but never actually entered it

Better CDM processes for managing (cross-border) weather	SAF CAP	OVD DLA	O/G	Lowering volatility and as such having less un-anticipated traffic. Provide more time between the regulation activation and regulation start (and as such avoid the OVD in the time interval immediately after the regulation starts, especially when the regulated rate is below the nominal capacity)

A1.2 Measures aimed at achieving the performance targets for the ERND function the design of an efficient airspace structure.

These includes the:

- measures related to the design of an efficient airspace structure,
- measures related to a better airspace utilisation by the operational stakeholders,
- measures related the optimisation of the flights.

The high-level description of the main initiatives is in section 3.3.1

Action	KPA	KPI/PI	Timeline	Description
ENV(1): Development and implementation of the airspace changes included in the ERNIP Part 2 – ARN version 2021-2030	ENV	KEP RTE-DES	As per ERNIP database	
Implementation of the Free Route Airspace Network Strategic programme	ENV	KEP RTE-DES	As per ERNIP database	
TMA optimisation based on PBN Implementation	ENV	CCO CDO	PBN transition plans.	connection with FRA enhanced arrival procedures CDO/CCO deployment
ENV(2): NM Flight Efficiency Implementation project			O/G See also FE implementation Project management plan (FE-PMP)	

Expanded, enhanced and harmonised utilisation of existing NM tools. This includes the group rerouting tool (GRRT), NMP Flight related functionality.	ENV	KEP	on-going	The GRRT driven opportunity tool proposes better routes
Cooperation with the Computer Flight Plan Service Providers (CFSPs) on the evolution of their own systems based on the guidelines material published by NM;	ENV	KEP	on-going	Most efficient flight plans to include mandatory functionalities related to Free Route Airspace, Flexible Use of Airspace, dynamic RAD, utilization of the file plans options provided by the NM systems
Improvement of flight planning practices and addressing limitations in flight planning systems, including manually tailored and coordinated rerouting proposals which provides better routes; this is addressing more than 160 AOs	ENV	KEP	on-going	Shorter routes
Strategic and continuous improvement of the airline operators' route catalogue (allow all AOs and CFSPs to compare their flight plans with the best filed flight plan accepted by IFPS and to detect new implemented routes)	ENV	KEP	on-going	Improve the SCR and reduce the gap btw SCR and D–S - better defined RADs impact less flights and facilitates the flight planning for the flights impacted
Traffic flow rules limiting preferred flight planning options; NM proposes RAD simplification actions in cooperation with relevant stakeholders, based on the inputs from the identified flight planning opportunities and information received from the airspace users but also through continuous RAD impact analysis. This will be a priority area in RP4.	ENV	KEP SCR VFE	on-going	See RAD actions

Identifying and removing Yo-Yo and sharp-turn-angle flight plans	SAF ENV CAP	KEP OVD	on-going	For flight efficiency the main impact is avoiding extra fuel burn (due to low flight levels or extra distance). But it has wider benefits in terms of predictability, over-deliveries and un-realistic trajectories
better utilisation of CDRs and airspace openings	ENV	KEP	on-going	Make the best use of the improvements in ASM under ENV(3)
ENV(3): ASM A-FUA				
more dynamic and flexible ASM/ATFCM/ATS processes towards the full application dynamic airspace configuration	ENV CAP	KEP SCR DLA	O/G	Better accommodate civil and military demand, with more airspaces and route available longer
the rolling AUP/UUP	ENV CAP	KEP SCR DLA	O/G	airspace availability shared in real time, direct and shorter routeings can be used efficiently in case of airspace release
real-time ASM data exchanges,	ENV CAP	KEP SCR DLA	O/G	As above
ASM performance reporting to facilitate efficient and harmonised FUA coordination between all ATM actors (local / regional),		KEP SCR	O/G	Better use of the available airspace
ENV(3): improve the availability and use of the Conditional Routes (CDR)				
Make use of the finalised transition to single CDR in most of ECAC, as part of the continuous network improvement process (covered by ERNIP part 2)	ENV	KEP SCR	O/G	All CDRs being cat 1 simplify the awareness of their activation
direct flight efficiency benefits via automated notification of opportunities for airspace users (AUP/UUP).	ENV	KEP SCR	O/G	The availability of routes is known and can be acted upon at the earliest opportunity

real-time ASM data exchanges,	ENV	KEP SCR	O/G	As above
improve the civil/military CDM processes in areas where military mission effectiveness is constrained or availability and effective usage of the CDR network is unnecessarily restricted.	ENV	KEP SCR	O/G	More routes are available for civilian use
ENV(3): Reduce the impact of the RAD restrictions				
improve the use of the RAD Application and simplify the RAD grammar (improved grammar rules allowing coherent, harmonised and unique expression of the traffic flow rules and flight planning facilitation options);	ENV	KEP SCR VFE	O/G	Better RAD definition with less FE impact
NM support to all National RAD Coordinators to reduce their workload and ensure required level of support.	ENV	KEP SCR VFE	O/G	Better RAD definition with less FE impact
trials to dynamically reduce restrictions for flight planning to ensure more direct and sustainable flights (dynamic RAD) showed that the process is feasible in the pre-tactical phase. Further evaluation in RP4 is required to assess its applicability on the day of operations.	ENV	KEP SCR VFE		Ensures that restrictions are activated only when needed, therefore impacting less flights with the same effectiveness
FRA implementations also led to further RAD simplification in the FRA areas where ATS route network was withdrawn.	ENV	KEP SCR VFE	ENRIP database	Less restrictions, less impact
renewed focus in RP4 on the impact and usefulness of restrictions, which will inform the decision of their rationalization; new tools will need to be developed to enable this activity	ENV	KEP SCR VFE	O/G	By removing restrictions that may no longer be needed but still negatively impact flight efficiency.

A1.3 Measures aimed at achieving the performance targets for the ATFM and contributing towards achieving the Union-wide targets for capacity

The high-level description of the main initiatives is in section 3.3.2.

Action	KPA	KPI/PI	Timeline	Description
CAP(1): Summer operational priorities				
first rotation	CAP	DLA ENR-DS APT-DS F-ROT	O/G	Airport functions working with airport "at risk" Airport integration processes to improve network time predictability MIRROR tool to optimise the first rotation and help mitigate ATFM regulation-induced reactionary delays
flight plan adherence	CAP ENV SAF	DLA VFE OVD	O/G	Improving predictability and reducing over-deliveries and as such reducing capacity buffers.
deliver agreed capacities and increased flexibility	CAP	DLA TQS F-ROT	O/G	The combination of the new more flexible planning approach reacting to changes in traffic throughput while maintaining the quality of service. To be supported by the new "throughput achieved and quality of service delivered" indicators.
realistic scheduling including turnaround times	CAP	DLA F-ROT	O/G	Support enhanced scheduling for the airlines, to ensure the feasibility of the schedules and to avoid structural demand volatility Support for better on time execution of the airline schedules

adverse weather management	SAF CAP	DLA ENR-DS APT-DS OVD	O/G	From Cross-Border Weather Procedure to en-route Severe Weather Partnership.
CAP(2): New Network Operations Plan processes				
NOP - Rolling Seasonal Plan	CAP	ALL	Weekly	planning of the next eight weeks and managing the execution and implementation of the 5-years NOP
Network measures	CAP	DLA	As per NOP and Rolling Seasonal NOP	address major capacity bottlenecks, with the aim to stabilise the network and to allow advanced planning in neighbouring ACCs
Transition Plan for Major Projects	CAP	DLA	Yearly	to ensure smooth and coordinated transitions of the implementation of major airspace reorganisations or migration to new/upgraded ATM (which may lead to temporary capacity reductions)
delay reattribution process between States or a proposed network delay budget	CAP	DLA	O/G	To encourage more network centric measures by ensuring that the extra delays generated by the on-loaded ACCs will be dealt with through the CDM process for ATFM delay attribution, part of post-ops performance adjustment process
Re-enforcement of post operational analysis processes and feed-back loop into the planning processes	CAP ENV	ALL	O/G	Identification of areas lacking performance that will allow the development of effective network measures
CAP(3): Network Strategic projects				
Cooperative Traffic Management Network Strategic Programme	CAP	ALL	O/G	collaborative processes involving all operational actors supported by continuous information sharing, in both the planning and execution phases of ATM

Implementation of the FF-ICE Initial Trajectory Information Sharing Network Strategic Programme, 4D business trajectory management	CAP	ALL	FPFDE NFPM Implementation Guidelines	future FF-ICE flight plans
Operational Excellence Programme OEP	CAP	ALL	harmonised implementation plans for integration into NOP	implement best-in-class operational and technical evolutions to deliver harmonised common operational capabilities among all operational stakeholders
Re-enforcement of ATFM strategic, pre-tactical and tactical planning processes made possible by the iNM digital system architecture and shared aviation network information	CAP	ALL	In line with iNM PMP	
Network CDM process to optimise ATFM regulations from a network perspective	CAP	DLA	O/G	e.g. Keystone regulations
Advanced ASM/ATFCM integrated management	CAP	DLA DS	ASM/ATFCM Concept of Operations - Roadmap for implementation	Full collaboration between the different ATM actors during all operational phases supported by real-time ASM data exchanges enabled by iNM implementation. To include also Dynamic RAD procedures, harmonization of the buffer times for Military Areas bookings, procedures for the planning of large-scale military activities
CAP(3): Airport and TMA– Network Integration				
implementation of A-CDM, Advanced Tower	CAP	DLA APT-DS	As per A-CDM and AAT implementation status dashboard	Improve predictability through exchanging relevant accurate and timely information, especially on aircraft turn-round and pre-departure processes
Regional airports integration into the Network	CAP		ECRA programme deployment	Through European Connected Regional Airport

AOP/NOP integration	CAP	ALL	As per NOP	To include enhanced exchange of information between airport and NMOC
DCB function at airports	CAP	ALL		balancing arrival, turn-around and departures
Application of arrival target times	CAP	APT-DS		extended On-Time Performance

A1.4 The methodologies of calculating the NM KPIs

Safety KPI

The methodology for assessing the safety maturity will be based on the revised CANSO Standard of Excellence (SoE) from February 2023, tailored to the specifics of the NM in coordination with EASA.

Environment KPI

The methodology to calculate the KEP indicator is described on the SES Performance portal at https://ansperformance.eu/methodology/horizontal-flight-efficiency-pi/

Capacity KPIs

The en-route and airport delay savings are calculated for RRPs and slot optimisation actions as follows:

Rerouting Proposals (RRPs)

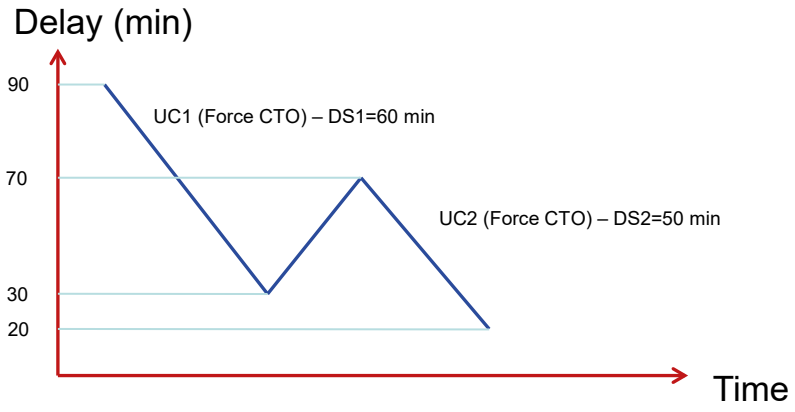
NM sends RRPs to reduce ATFM delay or route length, and sometimes for flight time reduction. An RRP is considered for delay savings if it proposes a delay reduction. Where the "proposed delay reduction" equals the "effective delay reduction", it is considered as an accepted RRP. The corresponding delay reduction is counted as reduction achieved by NM. RRPs for route length reduction or flight time reduction are excluded from the scope.

NM applies additional validation criteria on the RRPs:

- there is a response to the RRP from the airline in terms of a FPL or CHG message;
- only the last RRP is used when there are multiple RRPs for the same flight;
- the flight plan remains outside the TV for which the RRP was sent (for the last filed FPL);
- only RRPs that are sent 3 hours or less in advance of the EOBT.

Slot list optimisation

There are three specific NM actions that improve the (calculated/approved take off time) CTOT of a flight: Force CTOT, Force SLOT, and Override Slot. For each of these manual flight actions, except when a flight is no longer regulated after the action (no new CTOT), only the delay savings that are reflected in the final delay are counted. For multiple NM actions on the same flight, the sum of delay savings of that flight will not be greater that the difference between the maximum initial delay and the actual ATFM delay of the flight. In the example below the delay saving considered is only 70 minutes.



Indirect capacity benefits

The indirect capacity benefits are calculated on the basis of the Network Operations Plan delay simulations and forecast.

A1.5 The relationship between NSP strategic objectives and the NPP key performance indicators

The NSP operational drivers and the strategic objectives have a direct and/or indirect impact on the key performance areas of the performance scheme.

The table below gives an overview of the relationship between SOs and the key performance indicators (KPIs) and indicators for monitoring (PI) of the performance of the Network Manager and of the network functions (reference to EU-wide indicators is also made when relevant). The NPP section reference column shows which NM actions contribute added value to the performance improvement of various NSP strategic objectives and key performance areas and indicators.

	NSP Strategic Objective	KPI and indicators for monitoring (PI) of the performance of the Network Manager and of the network functions	NPP section reference
SO 1	Manage network performance through 'Network-minded' decision making	Monitoring of all KPIs and subsequent performance analysis and corrective actions NM actions on network optimisation and harmonisation	Chapters 3 and 4 Chapter 2
SO2	Digitalise aviation through the deployment and integration of interoperable and secure information management systems	Network Functions related indicators for monitoring NM actions in the area of interoperability and technical area coordination	3.3 2.7
SO 3	Sustainable and 59inalizin Network design	All environment KPI (KEP, KEA) and indicators for monitoring Conditional Route (CDR) planning and usage, but also other indicators as DES,SCR	2.2, 3.3.1, 4.1

SO 4	Sustainable and 60inalizin Network operations	Improve predictability and reduce volatility: en-route capacity indicators for monitoring and flight efficiency indicators, both KPI (KEP,KEA) and PI (SCR). PI Over-deliveries reduction (OVD)	2.3, 2.4,2.5,2.6, 3.3 3.1.3
SO 5	Provide on-time operations for and at airport platforms with the support of the Network Manager	Better predictability for departing aircraft will have a positive influence on all capacity indicators. Better flight plan / airport slot consistency will make better use of the available airport capacity.	2.1,2.5,3.3.2
SO 6	Ensure network resilience, safety and security, and reinforce crisis management	EoSM KPI, reduction of over-deliveries, as well as the top 5 safety priorities in the network Support to ANSP for achieving their safety KPIs and PIMs	3.3.3
SO 7	Optimise and Digitalise (as appropriate) ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services	All Radio Frequency Function (RFF) and Transponder Code Function (TCF) functions indicators	2.7,3.1
SO 8	Develop the network people and improve its flexibility through excellence	Improve capacity and reduce delay	3.3.2
SO 9	Towards net zero emissions aviation	All Flight Efficiency indicators and related NM actions	2.2, 2.3, 2.4, 3.3.1
SO 10	Support European aviation on global markets	Improved integration will increase predictability for traffic coming from outside NM and as such release additional capacity.	3.3.2

Annex 2. NM's measures in support of the activities of Member States, functional airspace blocks, air navigation service providers and civil and military airspace users

A2.1 Network and regional operational concepts

The High-Level Network Concept of Operation (CONOPS) 2029[13] [4] operationalises the NSP and offers more details in terms of operational and technological developments based on the NSP.

The main RP4 directions of change in the High-Level Network Concept of Operation (CONOPS) 2029 are:

- **Optimised network design and utilisation** - combined operation of Flexible Airspace Management and Free Route Airspace, towards full Pan-European cross-border FRA implementation and FRA extension until TMA boundaries; the Dynamic Airspace Configurations (DAC) will be used to accommodate civil and military demand.
- **Optimum Capacity and Flight Efficiency Planning** - airspace optimisation by the consolidation and reconfiguration of current sector configurations, dynamically allocated to support the expected traffic flows and ensure connectivity with TMAs; Demand Capacity Balancing (DCB) process to support capacity; gradually implementation of the integrated network and ATC planning; iNM implementation will enable the provision of common network situation.
- **Trajectory and Cooperative Traffic Management** - network management through flow centric operations; measures towards 4D business trajectory management: implementation of FF-ICE/R1 services, trajectory management will move towards a centralised coordination and FF-ICE/R2 coordination capabilities; full integration of OAT flight planning function and further steps towards mission trajectory management.
- **Airport and TMA - Network Integration** - AOP/NOP integration; enhanced exchange of information between NM and airports operation centres; extension of A-CDM and Adv Tower implementation, toward the integration of small and regional airports via advanced data exchanged; arrival and departure management.
- **Network components/systems and CNS infrastructure evolutions** - digital transformation of the network, including the iNM implementation; pan-European deployment together with the operational stakeholders; EAD-CACD integration; monitoring the performance of the ATM infrastructure with a high network impact; evolution of CNS infrastructure towards a performance-based service-oriented approach.

More detailed directions are provided in the various domain Concepts of Operations covering: Integrated Data Layer (iDL), Network 4D Trajectory, ASM/ATM Integration and FLOW. Those concepts of operations have been developed through the Network CDM Process and approved by the Network Management Board. They represent the main source of user requirements for iNM.

The implementation of the new iNM functionalities is aligned with the Network Concept of Operations roadmap.

[13] Approved by NMB/34 on 5 July 2022; this is an updated version of the document titled "High Level Network Operational Framework 2029", which was approved by the NMB/27 on 2 April 2020

A2.2 Development and harmonisation of airspace projects

NM will support the development and implementation of the following actions in RP4, considering a network-minded approach to airspace availability and utilisation to meet the required operational performance targets:

- Seamless airspace structures, which will be required to enable progress with the overall operational performance and with addressing both civil and military airspace users' requirements.
- towards full pan-European **cross-border FRA implementation**, extended to cover the FRA extension until TMA boundaries, beyond CP1 requirements.
- The **TMA operations** supported by the application of Performance Based Navigation (PBN), enhanced arrival procedures based on GBAS and continuous climb and descent operations (CCO/CDO). Ultimately, they will have the capability to dynamically extend the scope of terminal airspace, which is further optimised by the application of advanced CCO/CDO and synchronisation of arrival/departure flows.
- sustainable flight operations focusing on improving fuel burn to address emissions (CO_2) and contribute to the de-carbonisation of air travel; new NM tools like CO_2MPASS to monitor fuel burn at network and local level, find areas of improvement and take/support improvement actions on the un-environmental flight operations. NM will work with operational partners to improve the network's influence on fuel burn.

A2.3 Reducing inefficient use of route network and available airspace

During RP4 the NM will focus on these actions to reduce the gap between the flight plan and what the route network can offer as well as the impact of RAD restrictions, as follows:

- The refreshed **strategic project NM Flight Efficiency Implementation** will contribute to improvement of overall performance through better utilisation of the network capabilities (see section 3.3.1.2 for more details).
- NM will continue to work with the **Computer Flight Plan Service Providers** (CFSP) and the Aircraft Operators to ensure that that mandatory functionalities related to Free Route Airspace, Flexible Use of Airspace, dynamic RAD, utilization of the options provided by the NM systems become available as standard functionalities as they form part of the package of European airspace structures and utilization rules.
- The NM Guidance Material for the Computer Flight Plan Service Providers [5] will support further improvements of the flight planning systems.
- The group re-routing tool (GRRT, NMP Flight) is being continuously improved and will continue to provide better opportunity not only for refiling shorter and more efficient routes but also to allow airlines to identify possible inefficiencies in their flight planning system.
- NM will work with the interested parties to simplify and reduce the RAD restrictions, which requires sustained effort by all stakeholders involved in RP4.
- NM will fully support the ANSPs in the deployment of **cross-border FRA** and FRA extension until TMA boundaries and in further optimising the actual flights to meet the average horizontal en route flight efficiency of the actual trajectory (KEA) indicator.

A2.4 Enhanced ASM and ATFCM processes

The following paragraphs describe the NM added value in the areas of airspace management and air traffic flow and capacity management, as well as their integration. The operational procedures related to those evolutions as well as the required NM system support are planned for gradual implementation over RP4. They are aligned with the requirements of the Common Project 1 (CP1) IR 2021/116[14] and their full implementation is expected to contribute to the achievement of the Union-wide targets. Nevertheless, implementation by the operational stakeholders of their related actions remains key and this will be monitored through the Network Operations Plan and the European Route Network Improvement Plan that will also contain, whenever necessary, remedial local and network measures.

Airspace Management (ASM) and Air Traffic Flow and Capacity Management (ATFCM) are integral parts of ATM and should work in close cooperation to achieve a more efficient utilisation of the available airspace and capacity.

One of the key improvements will derive from the progressive integration of ASM/ATFCM/ATC operations, evolving in the management of dynamic airspace configurations (i.e. ATC sector configuration, dynamic utilisation of restrictions and areas flexibility in geographical location, modularity and temporary usage of the areas by civil and military airspace users), fully integrated in a dynamic demand capacity balance process, able to dynamically accommodate civil and military airspace users' requirements according to predefined priorities. The emphasis on the network approach will facilitate the exploitation of any ATM capacity, with minimum penalisation to the airspace users.

The **ASM/ATFCM Concept of Operations** provides a high-level description of the current and future processes and views of systems evolution to support advanced ASM/ATFCM integrated management during RP4.

ASM/ATFCM integration will be driven by the following principles:

- Full collaboration between the different ATM actors during all operational phases for the benefit of all users.
- (on time, reliable, up to date) information sharing will promote the exploitation of available capacity and will allow an efficient use of the airspace.
- Flexibility and clear priorities in the decision making will guarantee a resilient response to any event at local or Network level.
- Automation and digitalization will support CDM processes and information sharing at all phases.
- Support the management of crisis events.

The main vehicle for the implementation by NM of the advanced ASM/ATFCM integrated processes will be iNM system. The progressive implementation in RP4 is described in the ASM/ATFCM integration roadmap and the iNM roadmap. The implementation of the new iNM functionalities is aligned with the Network Concept of Operations roadmap.

[14] COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan

Airspace Management (ASM) and Advanced FUA evolution aims to improve existing ASM/ATFCM processes by putting more emphasis on the better utilisation of existing ASM processes, enhancing performance-driven ASM/ATFCM processes.

Further Advanced FUA implementation will address:

- the rolling AUP/UUP (airspace availability shared in real time, direct and shorter routeings can be used efficiently in case of airspace release),
- more dynamic and flexible ASM/ATFCM/ATS processes towards the full application dynamic airspace configuration (accommodate civil and military demand, including the management of dynamic ATC and cross-border sectorisation, dynamic mobile areas and TMA structures),
- real-time ASM data exchanges,
- enhanced network impact assessment,
- ASM performance reporting to facilitate efficient and harmonised FUA coordination between all ATM actors (local / regional),
- integration of new generation fighters to deliver the flight efficiency benefits to airspace users.

NM will develop/update procedures, as part of the ASM Handbook, to identify the ASM scenarios associated to existing ATFCM re-routing scenarios, with the goal of having a more efficient utilisation of ATFCM scenarios.

NM will work with the military stakeholders to improve the availability and use of the Conditional Routes (CDR)

- Make use of the finalised transition to single CDR in most of ECAC, as part of the continuous network improvement process (covered by ERNIP part 2)
- direct flight efficiency benefits via automated notification of opportunities for airspace users (AUP/UUP)
- improve the civil/military CDM processes in areas where military mission effectiveness is constrained or availability and effective usage of the CDR network is unnecessarily restricted.

The ASM efficiency indicator were reviewed to consider the impact of the FRA implementation capturing better the airspace users' usage of all opportunities made available following the release of the reserved/segregated airspaces, as per paragraph 4.2 (f) and (g) in Section 3 of Annex I of Performance IR 2019/317. NM will continue to monitor the ASM indicators - rate of planning (RAI) and rate of usage (RAU) of conditional routes (CDR).

The implementation of the ASM and Advanced FUA will contribute, together with RAD improvements and other similar initiatives, to the reduction of the gap between the horizontal flight efficiency indicators related to the shortest constraint route and the airspace design, with the objective of improving KEP with 0.05pp over RP4 (see 3.3.1.2 for more details).

Development of Air Traffic Flow and Capacity Management (ATFCM) processes

This section summarises the main components of the ATFCM processes and their expected evolutions during RP4. The RP4 evolution is strongly related to the concepts and principles described in section 2.1.

NM will continue to deploy during RP4 ATFCM processes to improve performance across the whole pan-European network:

- ATFCM processes will evolve to support the management of complete *traffic flow* in the *network context* and in a *collaborative manner*. The section 2.1 above elaborates the changes NM initiated for the evolution of the ATFCM processes and systems aimed at addressing the interdependencies between different major projects that will deliver the performance improvements expected in RP4.
- The full *implementation of iNM* will enable the provision of common network situation awareness and enhanced demand and capacity balancing tools.
- Full *support to its stakeholders*, FABs, ANSPs, AOs, Airports and CFSPs, to achieve and improve their capacity performance, taking into account the network impact and bringing more agility in adapting the required capacity to the demand and in making a better use of the available capacity.

A detailed description of the steps to be implemented over RP4 is included in the High Level Network Concept of Operation (CONOPS) 2029 and in the FLOW CONOPS approved by the NMB in April 2024. They are aligned with the requirements of the Common Project 1 (CP1) IR 2021/116 and their full implementation is expected to contribute to the achievement of the Union-wide targets.

Nevertheless, implementation by the operational stakeholders of their related actions remains key and this will be monitored through the Network Operations Plan and the European Route Network Improvement Plan that will also contain, whenever necessary, remedial local and network measures. See section 2.5 for more actions on the capacity planning actions.

In addition and support to the network measures, NM will focus together with the operational stakeholders on several priority initiatives, to support smooth operations, avoid bottlenecks and volatility, and improve the predictability in the network. During 2023 and 2024 they were:

- prioritise first rotation,
- disciplined flight plan execution,
- delivering agreed capacities & increased flexibility,
- realistic schedules including turnaround times.

They will be under constant review in RP4 and updated as necessary.

NM will support the **Airport and TMA integration** in the network through:

- *Airport-CDM implementation*, which facilitates the integration of major airports into the network and delivers more accurate departure time information (DPI) – by 2023, 33 airports achieved full implementation covering 38% of departures.
- *Advanced ATC Tower implementation,* which is a cost-effective means of enabling smaller airports to become connected to the network – by 2023, 30 airports covering 10% of departures in the NM area.
- The connection of the regional airports through the deployment of the *European Connected Regional Airport* (ECRA) project. Phase 1 integrated or finalising the path of integration of nineteen airports (e.g. the Greek islands airports). The follow-up phase is expecting to connect as many as 100 locations at low cost.
- The *Airport Function*, will be a permanent NMOC service. It provides continuous services to capacity-challenged regional and hub airports, supporting resolution of demand-capacity balancing issues and facilitating operational exchange between an airport operations centre (APOC) and NMOC. The Airport Function closely monitors night curfews (closures or night quotas) and endeavours to avoid the need for diversions wherever possible.
- Full integration between the Airport Operations Plan (AOP) and NOP.

Further initiatives provide for:

- network-orientated traffic re-routing measures,
- specific sector opening schemes and rostering,
- CDM Process for management of en-route weather,
- harmonization of FUA application and enhanced FUA procedures,
- network CDM process to optimise ATFM regulations,
- network delay optimisation through keystone ATFM regulations,
- addressing structural airspace bottlenecks,
- ANSPs to work with social partners to avoid strikes or to provide improved notification to airlines and NM.

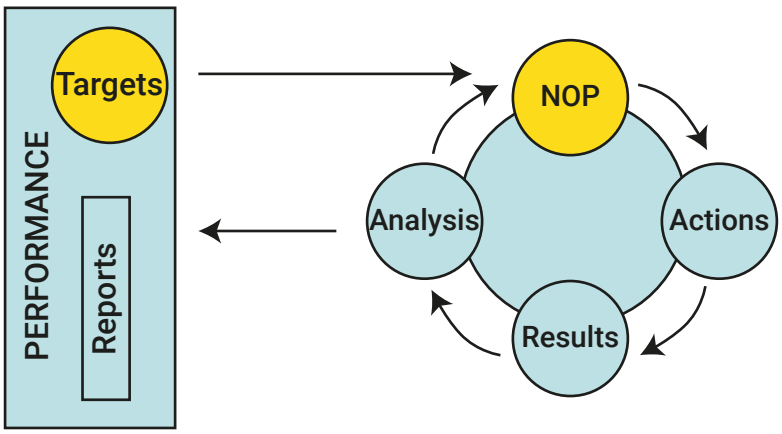
NM will continue to develop the **network tools to support stakeholders** in reducing delay and improve capacity while considering the network effect.

A2.5 Harmonised capacity planning and measurement of operational performance

NM consolidates and coordinates the activities of the network to continuously improve network performance. NM's planning, operations and continuous monitoring activities are closely interconnected to ensure that network performance is achieved.

The development of the NOP, together with the implementation of cooperative decision making processes and improved information management will ensure better use of the capacity available on the network and improved management of both planned and unplanned events and constraints. The preparation of the NOP is done in the framework of the Cooperative Decision Making (CDM) Processes of the Network Manager, as endorsed by the Network Management Board following the positive opinion of the Single Sky Committee.

Network operations are driven by enhanced stakeholders' participation in a rolling cooperative process with several layers over time. This is achieved by continuously sharing the demand (incorporating the latest flight intentions) and the available capacity, defining measures in the NOP, considering NOP as a target by all actors taking into account operational updates, evaluating operations against performance targets and updating the plan.



Overall network performance will be closely monitored and managed, including monitoring of the performance targets for the main actors in aviation. This enables Member States and Operational Stakeholders to enhance their local performance from a network perspective. All partners operate with a high level of transparency, through intensive information sharing via SWIM, allowing dynamic management of available resources responding to the airspace/airport user needs.

The capacity planning process will be reinforced as follows:

- The **Network Operations Plan (NOP)** identifies actions and activities at local and European network level needed to improve capacity; measures addressing the causes of constraints are proposed as the basis of an action plan at ANSP, FAB and network level, aimed at delivering the required performance.

- NM will define the capacity requirements to satisfy demand across the network based on the traffic forecast and the local and network performance targets, in close cooperation with the ANSPs and airspace users. In addition, the NOPs will contain an impact assessment once the local en-route ATFM delay targets have been approved by the European Commission as part of the local Performance Plans. The impact assessment will reflect how those local targets impact on the achievement of the Union-wide targets.

- The **NOP - Rolling Seasonal Plan**, which started during the COVID-19 crisis, will be a permanent feature of the ATFCM planning process, focusing on the planning of the next eight weeks and in managing the execution and implementation of the 5-years NOP.

- While the implementation of major airspace reorganisations or migration to new/upgraded ATM systems will provide benefits for ATFCM, it may lead to temporary capacity reductions; to ensure smooth and coordinated transitions, NM will develop a **Transition Plan for Major Projects** in Europe every year, to limit to the maximum the network impact of such transitions.

- The **network measures** will address major capacity bottlenecks, with the aim to stabilise the network and to allow advanced planning in neighbouring ACCs. It will consider the network impact, including capacity and environmental impact, and ensuring the right balance between the different stakeholders.

- The measures will be adapted to the expected demand as necessary. A **delay reattribution process** between States or using a proposed **network delay budget** will apply, by which the extra delays generated by the on-loaded ACCs will be dealt with through the CDM process for ATFM delay attribution, part of post-ops performance adjustment process. The impact on the route extension and on vertical flight efficiency will be also monitored.

The time horizon and frequency of the updates will be regularly reviewed during RP4.

In addition to NOP, the European Route Network Improvement Plan ensures full coherency of the airspace structure at the interface areas, covering many of the States that have an interface with those in the scope of NPP.

The measurement of operational performance, both at network and local level, provides a harmonised view using consistent and validated data and tools. NM updated the reporting of consistent and validated data through interactive reporting tools - NM interactive reporting facility, ATFCM Statistics, ATFM compliance data.

New tools are available, including FATHOM, CO_2MPASS, and FLAIR. They will enable the analysis of environment performance through fuel burn indicators (excess fuel burn, fuel burn through each phase of flight and each ACC or TMA), that can transform data into climate-friendly fuel efficiency measures. This will support NM stakeholders in identifying areas of improvement and analysing the root causes of the inefficiency.

Past performance results provide an input to the capacity planning process for the next cycle. The commitments made in the NOP are measured during the operations to identify gaps, both pro-actively (e.g. traffic risk analysis) and reactively (e.g. sector planned vs sectors actually delivered). This will provide a solid foundation for measuring the harmonised operational performance against targets and objectives both at the network level (NPP) and local level (National or FAB performance plans).

NM will introduce new capacity monitoring metrics for RP4 period. The SES performance scheme already includes an en-route capacity metric that captures the imbalance between traffic and en-route capacity, i.e. ATFM delay. The approach does not immediately address which operational factors are influencing ATFM delay. It is often unclear whether ATFM delay is a result of too much traffic, not enough capacity, or a mix.

The ability to absorb the changes and imbalances in traffic, while maintaining the quality of service (QoS as ATFM delay level), is dependent on the magnitude of change and the flexibility of the ANSP to provide extra capacity during the period of excess traffic demand. Moreover, even when the traffic rests within the expected range, reduced capacity (e.g. due to staffing, events) can influence the QoS.

NM developed metrics to understand better ANSP capacity delivery and their flexibility in adapting capacity to network requirements. The lessons learned from this exercise could form the basis for a more formal capacity monitoring approach beyond RP4. More info on the metrics in section 3.3.2.2.

The weekly Enlarged NDOP Coordination Cell is set up as a weekly executive meeting to provide NDOP members with an update of the performance of the network for the previous week, analyse and assess the updated traffic demand and the measures included in the weekly Seasonal Rolling NOP as well as any recurring issues with the performance and the implementation of the capacity mitigation measures.

The Enlarged NDOP Coordination Cell will share possible remedial measures following network performance assessment and discuss their implementation with the NDOP members.

The meeting is chaired by Director NM, is supported by executive staff in NM and is run with the involvement of the members of NDOP.

A2.6 Technical area coordination and interoperability

During RP3, several developments in the technical area significantly improved the coordination and the interaction between NM, ANSPs and other stakeholders.

The European aviation network is facing challenging operational issues. Getting on board all parts of the aviation value chain, and meeting the challenges together, is the way forward to prove that the European aviation is resilient and agile.

Within the framework of the Network Directors of Operations (NDOP) / Network Directors of Technology (NDTECH), NM significantly contributes to the single aviation value chain. The close collaboration with the SESAR3 Joint Undertaking, the SESAR Deployment Manager, EASA achieved a more integrated lifecycle approach, ensuring the involvement of all relevant stakeholder through consistent decision-making.

The full implementation of the CNS Programme Manager concept will support the integration of the CNS infrastructure planning, rationalisation and monitoring into a single value chain approach.

NM updated the NM Interoperability Strategy and the Transition to SWIM Policy, and merged them into the "**NM B2B Strategy**". It will consult on the NM B2B Strategy, together with the **NM B2B Concept of Operations**, aiming for approval in 2024 in time for RP4. The NM B2B Strategy will enable the implementation of the relevant strategic objectives of the NSP, in particular SO1 - Manage network performance through 'Network-minded' decision-making and SO2 - Digitalise aviation through the deployment and integration of interoperable and secure information management systems.

The NM B2B Strategy aims at the adoption of *open data in ATM*, enabling true information sharing and supporting the creation of an ATM digital collaborative environment with NM stakeholders, leading to a more performant ATM system, developing aviation connectivity within and beyond Europe. It will reinforce the interaction between NM and ATC systems to further improve the trajectory management, ATFCM processes, and the sharing of more consistent planning information with all involved actors.

Other developments will have an effect on RP4. They cover the following main areas:

- AOP/NOP integration
- Further integration of airports in the network (A-CDM, AdvTower evolutions)
- A-FUA Process Improvements
- Predictability evolutions (sector intruders and yo-yo flights)
- iNM implementation
- Flight Efficiency tools enhancements (GRRT, NMP Flight)
- Implementation of CASA occupancies ATFM regulations
- Cooperative Traffic Management/ATFM improvements for more dynamic operations
- Temporary sector delegations between neighbouring ACC/UAC
- Stepped implementation of FF-ICE Release 1
- OAT flight plan

The implementation of the iNM digital system ATM architecture will support the interoperability between all aviation stakeholders.

NM working together with ANSPs, SJU, European Organisation for Civil Aviation Equipment (EUROCAE) and EASA, will identify the network ATM infrastructure requirements needed to achieve the performance targets.

As required by the Article 7.3.(g) of NFIR 2019/123, NM will monitor and report on the performance of the infrastructure relevant for the execution of the network functions: ground and space-based navigation system in support of the implementation and operation of navigation applications, surveillance interrogators and avionics, datalink communications, airborne collision avoidance systems, airborne altimetry.

A2.7 Support to Network Safety and the implementation, monitoring and improvement of local safety performance

NM supports ANSPs and other NM stakeholders to manage existing hazards and anticipate new safety threats, in order to keep the network safe. It aims to arrive at a common approach to tackling new safety risks based on identified hotspots and trends in the network.

The actions and objectives identified in the NPP are in line with NSP strategic objective 6.

Network Operational Safety Risks

During RP2 NM established and reviewed the Top 5 Operational safety risks. The activity of identification of operational safety hazards at network level in cooperation with operational stakeholders and of assessment of the associated network safety risk will continue during RP4 in line with NF IR 2019/123 requirements 7.2.(e).

The latest large scale exercise using safety data sample was undertaken with ANSPs in 2020 to re-prioritise the operational network risks. Based on the conclusions of the incident data analysis, the prioritisation was:

- the top 5 safety priorities: Controller blind spot, Restricted airspace infringement, Controlled airspace infringement, Controller detection of potential runway conflict, Flight without transponder or with dysfunctional one and,
- to monitor the risk associated with: Altitude deviation, On-the-job-training, High controller workload, Synchronisation of successive arriving to land and of arriving to land and departing aircraft, VFR/IFR incidents in TMA/CTR airspace, Non-commercial flights in TMA/CTR airspace, Inadequate ATC teamwork; Pilot/driver induced incorrect entry onto the runway protected area; Incorrect presence of non-commercial flight aircraft on the runway protected area; Incorrect presence of vehicles on the runway protected area; Incorrect presence on the runway protected area that could have been prevented by stop bars.

The results are being reported to EASA.

The Operational Studies are/will be developed/updated for identified top risks, which will enable the sharing of lessons learned from incidents and the facilitation of best practices implementation.

Improving Safety Management

NM will support the ANSP in improving their safety management and meeting their target for the effectiveness of the safety management KPI.

The NM activities in support of the above include:

- Ensuring the availability of complementary Safety Tools to allow the implementation of an integrated safety management system:
  - Automatic Safety Monitoring Tool (ASMT) to ensure improvements to safety performance monitoring, also in support of the relevant local safety indicator (Annex I, Section 2 para 1.2.(e) of Performance IR 2019/317).
  - Toolkit for ATM Occurrence Investigation (TOKAI) provides dedicated software for each step of the investigation process.

- Developing and implementing ANSP safety culture measurement and improvement.

- Maintenance and development of the **SKYbrary** Toolkits - various toolkits consisting of learning notes, video tutorials etc covering safety improvement initiatives such as level bust, runway incursion, air ground communications, airspace infringements, human performance and unstablised approaches.

- NM, working together with partners across the aviation and legal/judicial industries, intends to develop, facilitate and implement a **Just Culture** environment to support improved incident reporting and data sharing in ATM. The work is centred around three activity strands:
  - Implementation of a Model Just Culture Policy in 95% of ANSPs by 2029.
  - Delivery of Just Culture Prosecution Expert Courses (2 per year).
  - Delivery of Regional Just Culture Roadshows/workshops (1-3 per year) for ANSPs/FABs.

The NM will also continue to work with its partners from beyond the NM area to extend the Standard of Safety Management System (SMS) Excellence.

Safety Occurrences Reporting and Monitoring

NM supported during RP2 and RP3 the reporting, investigation and risk assessment of the safety occurrences, including runway incursions and separation minima infringement, notably in support of the KPI Severity Classification: Application of the Risk Analysis Tool (RAT) Methodology. This enabled the definition of new safety indicators for monitoring at both EU wide and local level for the rate of runway incursions and separation minima infringement.

NM will support the monitoring of these new indicators during RP4:

- Ensure the continued development of TOKAI and Risk Analysis Tool (RAT) to answer the users' requirements and prioritisation (as expressed by the Change Control Board);
- Supporting the deployment and usage of TOKAI and RAT in the ANSPs;
- Harmonised and consistent exposure data is used for the monitoring of the safety performance indicators.

The measures are further detailed in the NOP - Safety Requirements and Support to Network Safety sections.

Glossary

AAS	Airspace Architecture Study
ACC	Area Control Centre
ACI	Airports Council International
A-CDM	Airport Collaborative Decision Making
A-FUA	Advance Flexible Use of Airspace
ANSP	Air Navigation Service Provider
AOP	Airport Operations Plan
ARN	ATS Route Network
ASM	Airspace Management
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFM	Air Traffic Flow Management
ATFCM	Air Traffic Flow and Capacity Management
ATM	Air Traffic Management
AUP/UUP	Airspace Use Plan/ Updated (Airspace) Use Plan
B2B	Business-to-Business
CACD	Central Airspace and Capacity Database
CAM	Cost Allocation Methodology
CANSO	Civil Air Navigation Services Organisation
CASA	Computer-Assisted Slot Allocation
CCAMS	Centralised Code Assignment and Management System
CCO	Continuous Climb Operations
CDM	Cooperative Decision Making
CDO	Continuous Descent Operations
CDR	Conditional Route
CFSP	Computerised Flight plan Service Provider
CNS	Communication, Navigation & Surveillance
CONOPS	Operational Concept of Operations

CTM	Cooperative Traffic Management
CTO	Calculated Time Over
CTOT	Calculated Take-Off Time
CTR	Control Zone
DCB	Demand Capacity Balancing
DPI	Departure Planning Information
EAD	European AIS Database
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
EOBT	Estimated Off-Block Time
EoSM	Effectiveness of Safety Management
ERA	European Regional Airlines Organisation
ERND	European Route Network Design
ERNIP	European Route Network Improvement Plan
ETFMS	Enhanced Technical Flow Management Service
EUROCAE	European Organisation for Civil Aviation Equipment
EUROCONTROL	European Organisation for the Safety of Air Navigation
EU	European Union
FAB	Functional Airspace Blocks
FE	Flight Efficiency
FF-ICE	Flight and Flow Information for a Collaborative Environment
FMP	Flow Management Position
FRA	Free-Route Airspace
FUA	Flexible Use of Airspace
FUTARS	Future System Architecture Study
GRRT	Group Rerouting Tool
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFPS	Integrated Initial Flight Plan Processing System
iNM	integrated Network Manager system

KEA	The average horizontal en route flight efficiency of the actual trajectory
KEP	The average horizontal en route flight efficiency of the last filed flight plan trajectory
KPI	Key Performance Indicator
NDOP	Network Directors of Operations
NDTECH	Network Directors of Technology
NM	Network Manager
NMB	Network Management Board
NMOC	Network Manager Operations Centre
NMP	Network Manager Portal
NOP	Network Operations Plan
NPP	Network Performance Plan
NSA	National Supervisory Authorities
NSP	Network Strategy Plan
OAT	Operational Air Traffic
OVD	Over-deliveries
PBN	Performance Based Navigation
PIM	Performance Indicator for Monitoring
RAD	Route Availability Document
RAI	Rate of Aircraft Interested in CDR or Reserved/ Restricted Airspace
RAT	Risk Analysis Tool
RAU	Rate of Actual Use of CDR or Reserved/ Restricted Airspace
RECAT-EU	European separation standard for aircraft wake turbulence
RFF	Radio Frequency Function
RP2	Reference Period 2 (2015-2019)
RP3	Reference Period 3 (2020-2024)
RRP	Re-Route Proposal
RSA	Restricted Airspace
RTE-DES	Route Extension Due to Airspace Design
SCC	NM Summer Coordination Cell
SCR	Shortest Constraint Route

SDIP	SESAR Deployment & Infrastructure Partnership
SES	Single European Sky
SESAR	Single European Sky ATM Research
SJU	SESAR Joint Undertaking
SMS	Safety Management System
SSR	Secondary Surveillance Radar
STAM	Short-Term ATFCM Measures
SWIM	System-Wide Information Management
TCF	Transponder Code Function
TMA	Terminal Control Area
TOKAI	Toolkit for ATM Occurrence Investigation

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